DECISION-MAKING ON LNG TERMINAL SITING: THE NETHERLANDS

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PREFACE

This paper is a set of *background notes* on decision-making for the siting of a Liquefied Natural Gas (LNG) terminal in the Netherlands, prepared for the IIASA risk research project on liquefied energy gases (1980-1982).

The paper provides a detailed account of the major aspects of the decision process on LNG in the Netherlands, but it is in no way to be considered as a finished research report. It was prepared as an internal working document to facilitate discussion within the IIASA research team, and has provided the basis for the analysis of the Dutch LNG decision process as featured in the final IIASA research report on "Risk Analysis and Decision Processes: The Siting of LEG Facilities in Four Countries" (IIASA 1982 and a forthcoming publication of Springer Verlag).

The author wishes to acknowledge the many individuals and organizations who have contributed to the collection and analysis of empirical data concerning the Dutch LNG decision process. In this respect, the author expresses his sincere thanks to colleagues at IIASA and the many individuals in the Netherlands, without whom the detailed account of the complex decision processes concerned would not have been possible. Appendix A lists the major organizations and individuals which have been consulted during this research. Parts of this paper have been completed while the author was at the Department of Social and Economic Studies, Imperial College of Science and Technology (University of London).

Finally, it is stressed again, that this paper is to be considered as a ***preliminary*** working document only, which was prepared while research was still in progress. Results of further analysis and conclusions as to the Dutch case study on LNG siting, are reported in the final IIASA study on decision processes and LEG siting (IIASA 1982).

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DECISION-MAKING ON LNG TERMINAL SITING: THE NETHERLANDS

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SECTION I: DECISION CASE STUDY

CHAPTER 1: INTRODUCTION AND NATIONAL CONTEXT

1.1. INTRODUCTION

From the mid-1970s onwards, the Dutch semi-state company NV Nederlandse Gasunie has shown serious interest in importing large quantities of Liquefied Natural Gas (LNG) via its own terminal, to be built and sited in the Netherlands. The activities of the Gasunie concerning LNG--which is the sole company responsible for the supply of national gas in the Netherlands and which was acting within the context of Dutch governmental policy of importing natural gas gradually set into motion developments at national and local governmental level, leading towards decisions on the importation of LNG into the Netherlands and the siting of an LNG terminal. The decision process finally led to the approval, in late 1978, of a Dutch LNG terminal by the Dutch Cabinet. This background paper attempts to analyze and evaluate the major developments in the Netherlands concerning the decision-making process as regards the approval and siting of this LNG terminal. This working paper* forms the basis for one of four country-specific case studies, which were carried out by the International Institute for Applied Systems Analysis (IIASA), in Laxenburg, Austria, on liquefied energy gases facility siting and related decision-making. The final IIASA report analyzes comparative issues, whilst this

*The IIASA research is supported by the Bundesministerium für Forschung und Technologie, F.R.G., contract no. 321/7591/RGB 8001. The final IIASA report is referred to as IIASA (1982) and is entitled "Risk Analysis and Decision Processes: The Siting of LEG Facilities in Four Countries," a forthcoming publication from Springer Verlag.

paper is strictly limited to a descriptive analysis and evaluation of major aspects of the decision-making on LNG siting as it took place in the Netherlands.

Section I sets out the major events of the decision process in the Netherlands and introduces the major parties involved in the political process--mainly between 1975 and 1978--leading up to the decision by the Dutch Cabinet to locate an LNG terminal at a site at Eemshaven, in the northwestern province of Groningen. This section sets the context for the analysis of the decision process as attempted in subsequent sections of the case study.

Section II discusses the major dimensions which seem to have been at the center of the LNG decision problem in the Netherlands: energy policy, economics, safety, socio-economics and environmental impact. For each of the major parties it is assessed how and to what extent these dimensions were evaluated and which role they seem to have played in the particular policy perspectives of each of the parties involved (Chapter 4).

Section III analyzes the decision structure which was at the basis of the policy-making process in the Netherlands and the hierarchy of decision-makers. In this section the decision powers of the different parties are assessed within the decision process--in particular in relation to what have been the major decision points in the event on LNG in the Netherlands. An attempt is made to describe the complex interaction between the multitude of interested parties, and ultimately to assess the "field of forces" which seems to have been instrumental in pushing the final outcome of the decision on LNG in the Netherlands in a particular direction.

The emphasis of this paper has been placed upon providing a systematic review of the major features of the decision process on LNG siting in the Netherlands. The largely descriptive approach, drawing heavily on published documents in *Dutch*, was partly adopted to facilitate involvement of other members of the IIASA risk research project team and to enable discussion on the basis of empirical data, rather than analysis (which would otherwise have been restricted to Dutch speaking researchers).

The nature of this paper--as a background document for discussion and subsequent analysis--has also meant that well developed conclusions as to the determinants of the Dutch LNG decision process, are not explicitly formulated in the context of this internal document. For similar reasons, since various parts of this paper were prepared at different stages of the research, frequently for the purpose of specific research discussion meetings at IIASA, some degree of repetition in the descriptive elements of the paper has been inevitable. For a considered analysis of the major factors governing the Dutch LNG decision process, including the role of risk and safety issues, the reader is referred to the Dutch case study report, prepared for the main IIASA study on the project (IIASA 1982).

1.2. NATIONAL CONTEXT

The discussion and analysis is strictly limited to the specific decision-making on LNG siting as it took place in the Netherlands, and therefore largely reflects particular national characteristics. It must be seen as a study of *Dutch* national decision-making, and many of its conclusions are limited in this respect.

Dutch national decision-making is relatively centralized, with the national government coordinating major decisions, within national policies for regional development, energy planning, land use, etc. Specific siting *approval* for industrial development is, however, usually a matter of local authorities--thereby making many planning decisions of importance, including the LNG facilities here discussed, a combination of local *and* national decision structures.

The Dutch decision-making on LNG reflects this "dual" structure of local and national authorities. Furthermore, and perhaps more significantly, the multi-disciplinary nature of the LNG siting decision (involving land use planning, energy policy, socio-economic factors, health and safety, etc.) and the inter-departmental decision-structures as a result, give rise to a complex set of "interested parties" and decision-making events and procedures. In this context, the study of LNG siting may be typical of governmental decision-making on large-scale technological projects with a multi-disciplinary character. In terms of both support mechanisms and implications. In the case of LNG, the aspect of risk and safety, furthermore, deserves special attention. The analysis will give special emphasis to the health and safety dimension--which has been an important element of the IIASA comparative research carried out on liquefied energy gases facility siting.

At the level of the national government the character of the LNG decision problem is reflected in the large number of governmental departments and advisory bodies which were involved. As policy issues have become more complex governmental decision-making at the national level in the Netherlands has seen an increasing emphasis upon so-called "inter-departmental coordination."

In many areas where responsibility of different governmental departments intersect, interdepartmental coordinating committees have been set up, with the aim of agreeing upon a common line among top civil servants from different ministries in order to prepare governmental (and more often than not, *Cabinet)* policies. In the case of LNG decision-making, departmental policy coordination took place mainly within ICONA, the interdepartmental committee for North Sea affairs, under the responsibility of the Minister for Transport and Public Works.

At the local as well as national level, public involvement in decision-making in the Netherlands takes place via elected councils of representatives, common to modern parliamentary democracy. Within this context Dutch political tradition has emphasized the importance of *pluralism* in government and society, and this is reflected in the large number of

political parties in the Netherlands. A related phenomena is the relative weakness of extra-parliamentary public interest groups, although the last decade or so has signaled changes in this respect. The Dutch tradition of pluralism also forms the context for the fact that a large number of different interested parties were consulted or involved themselves in the debate in the course of the decision-making process on LNG siting. The nature and length of this report reflects this point.

As far as the Dutch decision-making on the siting of a LNG terminal is concerned, the process started in the early seventies, in the context of overall energy and gas supply policies. Towards the end of the decision process, in 1977 and 1978, however, the decision-making on LNG siting increasingly centered around a LNG terminal site specifically to handle LNG which was contracted from Algeria, and due to arrive in the Netherlands in 1983/1984. Although initial expectations of the imported LNG were higher, the actual quantity of Algerian LNG contracted for in 1977 totaled $4 \times 10^9 m^3$ LNG/year. Final discussions in the Netherlands concerned a LNG terminal which could eventually handle quantities of 10-15 x $10^9 m^3$ LNG per year.

Although this case study on LNG siting decision-making does not analyze any events which took place after the national governmental decision in October 1978 for the siting of a LNG terminal (at Eemshaven), it is noted that by 1982 (as this report is being completed) the Algerian LNG contract has been called off by the Algerian supplier; and as a result of lack of alternative LNG suppliers, further planning and construction activities in the Netherlands for a LNG terminal has been stalled.

CHAPTER 2:
LNG DECISION-PROCESS

2.1. INTRODUCTION

In this chapter it is attempted to present some contextual factors to the Dutch LNG decision process and to consider the decision structures that were used in the process in the Netherlands. It introduces the various procedures for LNG decision-making and the major parties involved. This section also presents the major events in the decision-making process as it took place in the Netherlands. It furthermore attempts to identify those developments which were of major importance in governing the *structure* and *outcome* of the decision problem and process, which are therefore of greatest relevance for the decision analysis. By way of introduction, Table 2.1 summarizes the major interested parties involved in the Dutch LNG decision making process.

2.2. CONTEXT

Like in other LNG siting decisions, this case study on LNG in the Netherlands is concerned with two interrelated questions:

(a) whether to site an LNG facility in the country, and

(b) where to site such a facility (if the answer to the first question is "yes").

Table 2.1. Key Parties Concerned in Decision Process.

APPLICANT/DEVELOPER	
NV NEDERLANDSE GASUNIE	"Gasunie": The sole national gas company set up in 1963 for the management, sale, and distribution of natural gas fields in the Netherlands. The national government holds fifty percent of the shares in Gasunie, participates in its governing body, and must approve or veto many of its proposed activities
NATIONAL GOVERNMENT	
CABINET	The Netherland's national executive body comprised of 16 Ministers, responsible for making national policies and decisions (all but two head government departments).
ICONA	The Interministerial Coordination Committee on North Sea Affairs (Interdepartmentale Coordinatie Commissie voor Noordzeeaangelegenheden: A policy advisory group to the Cabinet consisting of (civil servants) representatives from all but two of the sixteen ministers that comprise the Dutch cabinet.
LOCAL AUTHORITIES	
GRONINGEN LOCAL AUTHORITIES	Include the a) governors and council of the Province of Groningen, b) the city council of the town of Uithuizermeeden, and c) the Delfzijl harbour authority*
CITY OF ROTTERDAM	The local authority with primary responsibility for planning permission and building permits in Rotterdam; represented by the major and aldermen; responsible for harbour activities via the Rotterdam Harbour Authority
RIJNMOND PUBLIC AUTHORITY	A collective of 16 municipalities in the Rotterdam area, including the City of Rotterdam, that performs certain legislative roles regarding activities such as environmental planning, housing policy, transportation, health and safety, and pollution management
PROVINCE OF ZUID-HOLLAND	The province in southern Netherlands that encompasses the Rotterdam area and has legislative responsibility for certain pollution, planning, and housing regulations in this region
OTHER INTERESTED PARTIES	
Dutch Shipowners Association	
Electricity Corporation of Groningen and Drenthe Provinces	
Provincial Chamber of Commerce in Groningen	
Public interest and environmental groups in Rotterdam and Eemshaven areas	
Trade Union organizations in Groningen	

*All three local authorities are considered as one in this report, the Groningent Local Authorities, since they held nearly the same point of view concerning the LNG siting issue and co-ordinated their policy actions throughout the decision process.

This implies that the decision-making process on LNG siting cannot be looked at in isolation and decision structures and procedures for broader policy aspects will have to be taken into account, including LNG importation and energy policies. In order to provide a historical perspective it will also be necessary to assess to what extent products of prior economic, social and political circumstances and dynamics.

An important contextual aspect of the Dutch LNG decision-making process is provided by Dutch "energy policy" which was first formulated as such in a governmental policy paper on energy in 1974 (Tweede Kamer 1974). Dutch energy policy emphasized, among other things, the need for importation of foreign sources of natural gas, in order to conserve Dutch national gas fields and the need for establishing strategic natural gas reserves in the Netherlands. These policies provided the mandate for major decisions by the partly state-owned gas company NV Nederlandse Gasunie (hereafter referred to as Gasunie), as for the government itself, in connection with LNG. In particular in the early stages of the decision-making process on LNG, the gas industry (Gasunie) and the national government (being responsible for Dutch gas supplies) played an important, if not dominant role.

Gasunie requested a first official view from the Cabinet in 1975, concerning the possibilities for Dutch LNG terminals, thereby intensifying government interest and involvement in the question of LNG imports and reception and storage facilities.

This formal request is a major decision point in the Dutch LNG decision-making process, which was preceded by developments relating to LNG some years earlier, involving activities of the Gasunie, potential LNG suppliers and the Dutch government. Gasunie's involvement with LNG had started in 1972 when first discussions were held with Rotterdam harbor authorities, concerning the siting of a LNG *peak shaving plant* at Maasvlakte, in the greater Rotterdam area. This development led to direct involvement of the national government: amongst other activities the Ministry for Social Affairs (Ministerie van Sociale Zaken) (with responsibility for occupational hazards, etc.) requested a committee (Commissie Buschmann) to evaluate the safety aspects of a LNG peak shaving plant at Maasvlakte. Following early discussions by Gasunie with the Algerian company, Sonatrach, for the importation of LNG, and Gasunie's stated interest in a LNG terminal, next to its Maasvlakte peak shaving plant, governmental concern in LNG intensified. The Buschmann committee's brief was later extended to include the safety aspects of a *LNG terminal*, and partly as a result of these developments, TNO (the Dutch organization for applied scientific research) was asked (in March 1974) to carry out a study on the safety aspects of LNG importation, and other groups were initiated by the Dutch government to research the nautical feasibility and safety aspects of various potential Dutch LNG sites.

Gasunie's request of 1975 concerning LNG importation, together with governmental involvement in various aspects of LNG (especially safety), were linked in government circles to existing interests (of industry and the Ministry for Transport and Public Works (Ministerie van Verkeer en Waterstaat) in an artificial island in the North Sea off the Dutch coast. As a result the so-called STUNET "steering group for the study of North Sea

islands and terminals" was set up. Its first major task: to study and to advise the Cabinet on the desirability and modalities of a Dutch LNG terminal to be located off-shore on an artificial island in the North Sea, whereby a comparison between land-based and offshore LNG sites was also made. STUNET set up a working group specifically to look into a LNG terminal; the working group in turn set up five sub-groups to investigate different aspects. The sub-group on environment and safety incorporated the on-going activities of the Buschmann Committee (see above).

STUNET's report was completed in 1977 and concluded that importation of LNG should be welcomed as a part of securing Dutch gas supplies. As far as a LNG terminal was concerned, a site at the Maasvlakte or offshore should be considered, (LNG terminal in de Noordzee, STUNET, 1977, p.0-1/7). After initial consideration (involving especially nautical and safety aspects), other LNG sites were rejected at this point. The STUNET report was submitted to a governmental advisory committee called ICONA (for Interdepartmental Coordinating-Committee for North Sea Affairs) which was established by the government in 1977 to coordinate among the different ministries, the decision-making process (including policy advice and implementation) on affairs concerning the North Sea, which included LNG siting. Renewed discussions on LNG imports between Gasunie and the Algerian LNG supplier Sonatrach were by then well underway. ICONA was given the task of studying the various issues involved in the upcoming decisions on LNG. This illustrates that there was no single established governmental organization in the Netherlands for dealing with the question of siting a terminal, involving not only regional and industrial planning, but also health and safety, economics, energy policy, and international affairs at a national level. It is of interest to note that despite the main context provided by Dutch *energy policy*, ICONA, continued the national governmental coordination, under responsibility of the Ministry of Transport and Public works and not the Ministry for Economic Affairs (Ministerie van Economische Zaken), which had responsibility for Energy policy. Within ICONA all relevant national ministers were represented and it continued to be the main interdepartmental forum dealing with the siting of a LNG terminal.

ICONA's first policy report (ICONA 1977) had to be completed within several months, since it was to be the basis of the Cabinet's assessment of the need for LNG importation and a Dutch LNG terminal. The major constraining factor in this context was the signing by Gasunie, in June 1977, of a contract with the Algerian company Sonatrach for the importation of LNG (4,000 million m^3 a year over a period of twenty years--1985-2005). This contract required the official approval of the Ministry of Economic Affairs, by 31st October 1977. The Cabinet was hereby called into "active involvement" in the LNG decision-making process; it had become clear by that time, that a great number of ministerial departments would collectively be responsible for basic decisions and policies concerning LNG importation and storage in the Netherlands, whereby the formal responsibilities of *local authorities* for *approving* a LNG site was not affected.

When the Ministry for Economic Affairs subsequently approved the LNG contract (20th October 1977) a main part of the context for the further decision process on LNG siting was set: a side letter attached to the contract specified that by the 31st October, 1978, Gasunie was obliged

to inform Sonatrach of the location of the LNG importation site (if this proved impossible, the contract would have become void). The LNG siting debate was hereby officially opened and the machinery for national and local government decision-making procedures was set into motion--against the background of a constraining time factor.

ICONA continued its "advisory role" as an interdepartmental coordinating body and more parties were included in the decision process (such as the Council for Land Use Planning, RRO). As the LNG siting process had by then moved into a phase of actual assessment of LNG sites for LNG various ministerial departments set out to achieve increased involvement for their respective ministerial responsibilities. As a result the interdepartmental Committee for Environmental Hygiene (ICMH) with the Health and Environmental Protection Ministry (Ministerie van Volksgezondheid en Milieuhygiene) as the coordinating department, and the State Land Use Planning Committee (RPC) under the Ministry for Housing and Physical Planning (Ministerie van Volkshuisvesting en Ruimtelijke Ordening) were also actively involved in the decision procedure. Local authorities were officially involved at this point and were asked for their views, in the context of their respective responsibilities in connection with environmental and planning legislation.

Except for nuclear facilities, no formal laws and regulations existed in the Netherlands to deal with complex policy decisions such as the siting of a LNG terminal--involving questions of economics, environment, regional planning, public safety, shipping, etc.--at both regional and national level. A special decision procedure was drafted by the central government in late 1977, taking into account existing powers and responsibilities of state and local authorities in connection with planning and environmental legislations.

Figure 2.1 depicts schematically the formal role played by the respective state provincial and municipal authorities with reference to existing Dutch legislation applicable to the LNG siting decision (The Rijnmond Authority is a local body in the Province of Zuid-Holland, performing certain legislative roles for a conglomerate of municipalities around--and including--Rotterdam). Laws concerning the following aspects are included: air pollution (Wet inzake de Luchtverontreiniguing), "Nuisance" (Hinderwet), land use planning (Wet op de Ruimtelijke Ordening), land use (gronduitgifte), construction permission (bouwvergunning), and investment (Wet Selective Investeringsregeling--SIR).

In the case of LNG, however, decision procedures designed by the state government especially for the LNG siting decision, required the local authorities to make "in principle" decisions on the approval of each of the sites considered (in their respective areas of responsibility) at a relatively early stage of the process. The positions hereby taken by the local authorities and notified to the national government would then be indicative for subsequent formal legislative procedures within the context of the above mentioned laws and regulations. The national government thus acquired "in advance" decisions on LNG siting approval by the various local authorities ("pre-selected" by the national government), which could subsequently be incorporated in the national government's decision on LNG siting. (The eventual formal planning and approval procedures—

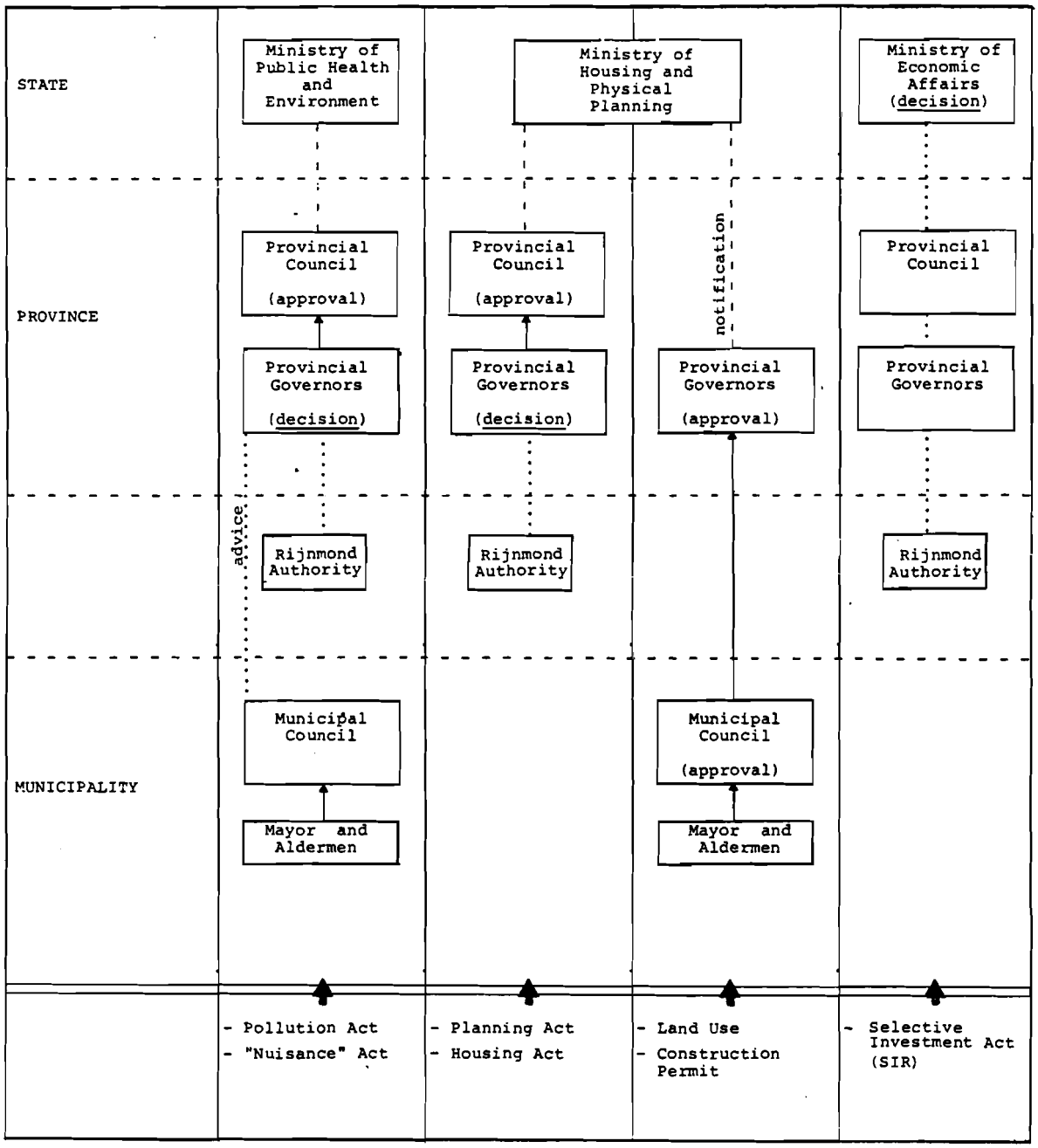


Figure 2.1. LNG Decision Procedures: The Netherlands Legislation and State/Local Authorities Responsibilities

for construction permission--at the local authority level was still to be followed at a later stage.)

The LNG decision process also included public hearings and information meetings organized at the municipal and provincial level to enable the general public to air its views. These views were then to be incorporated in the positions taken by the respective local authority, which subsequently was to notify the central government (by a specific date) officially of the "in principle" approval or disapproval of potential LNG developments in its area.

Final decisions on LNG siting were thus taken by the Cabinet (prepared by the national government ministeries) on the basis of three major inputs:

(1) decisions from local authorities on future approval/disapproval of LNG sites,

(2) advice from ICONA and other national advisory bodies,

(3) advice from Gasunie and other interested parties.

Local authorities were given complete authority as to which procedures to use in order to reach their policy positions--enabling them to decide which dimensions to include, to seek external advice and to have (risk) analyses performed.

ICONA was also given a broad mandate; its terms of reference, however, and the selection of "relevant" dimensions to be included in their advice was decided upon by the different ministerial departments, which were represented in the advisory committee. In late 1977 the government outlined a timetable for LNG decision procedures leading to a final siting decision by 31st October 1978--the final date by which the Dutch had to commit themselves to a LNG terminal site and to notify the Algerians, in order to validate the import contract for LNG.

2.3. LNG DECISION EVENTS

Major events in this decision procedure as originally laid down by the national government are summarized in Table 2.2. It is of interest here to mention that at the time the national government drafted the timetable for the decision procedures, it was generally accepted that only one group of local authorities would be involved: Rotterdam, Rijnmond Public Authority, and the Province of Zuid-Holland. It was not until February 1978 that an alternative area for the LNG terminal was (re)introduced (Eemshaven in the Province of Groningen).

The actual decision events on LNG took place broadly along the lines planned by the national government. The major exception was the (re)introduction of the Eemshaven area as a viable alternative for a LNG site. This took place early in 1978 following discussions between the Harbour of Delfzijl (formally responsible for Eemshaven activities) and Gasunie, at the request of the latter. As a result, new actors and issues were introduced in the discussion on LNG and, in the decision-making process.

Table 2.2. Governmental Decision Procedure for LNG Siting 1977/1978* (dates in brackets indicate actual events)

8.12.77 - 23.12.77	Cabinet approves decision schedule prepared by State Planning Committee (RPC)
3.12.77 - 15.01.78	Official notification to local authorities Zuid-Holland that their views will be required and preliminary Cabinet position concerning LNG, expected by 1 April 1978.
12.77 - 01.03.78	Preparation of advice by ICONA, ICMH (Interdepartmental advisory committee for environmental hygiene) and RPC.
1.03.78 - 01.04.78	Preliminary Cabinet position; request for local authorities' response. Publication of Cabinet preliminary position (13 March 1978) Possible discussion on internal aspects.
01.04.78 - 01.07.78	Preparation of views at local authority level positions of local authorities decided upon (June) notification of local authorities' views to the Cabinet.
01.07.78 - 31.10.78	Possible negotiations between state and local government Discussion and subsequent decision in Cabinet (council of ministers)(25 August 1978) Involvement Parliament (15 September 1978) Response to Algeria (31 October 1978)

*based on official document from the RPC drafted in December, 1977.

Source: Biljage 2, ICONA advice, 21 February 1978, ***Nader advies van de ICONA inzake de aanvoer van vloeibaar aardgas in Nederland.*** "Inventarisatie besluitvormingsprocedure LNG-terminal."

Considering, in some more detail, the decision process on LNG as it took place in late 1977 and 1978, two major decision levels can be identified:

1. National Government: decision events involving the Cabinet, ministries and parliament;

2. Local Government: decision events involving local authorities:
   (a) Zuid-Holland (Maasvlakte site)
   (b) Groningen (Eemshaven site)

Figures 2.2, 2.3, and 2.4 depict the major events concerning the LNG siting decision at the various levels identified above. To a large extent the events shown in Figures 2.3 and 2.4 served as input to the decision events of the national government as illustrated in Figure 2.2.

A full set of events provides a complex picture of the different interested parties and their formal actions in decision-making. However, analytical insight into the decision process can only be acquired when major and minor decision events can be distinguished. Major decision events may be defined as those events that relate to the most important and influential interested parties in the decision processes (which include both the major parties' own actions and activities of others which seem to have had an important effect on their subsequent actions).

The major parties involved in the Dutch LNG decision process are the Cabinet, National Ministries, ICONA, the local authorities at the two regions, and Gasunie, since discussions among these parties were predominantly responsible for deciding on the *structure* of the decision process (defining the problem, setting the context, and determining the boundary conditions, etc.). Of the above, the first four (those within the national and local government) had furthermore the formal responsibility for (preparing and determining) the *decision outcome* of the process.

Based on such a distinction of major interested parties, an aggregated picture of the major events in the development of the decision process can thus be constructed on the basis of the events illustrated in Figure 2.5. Pre-supposing furthermore a sequential nature of the decision process an initial list of key events in the LNG decision process can be put forward:

1. Gasunie requests governmental view on LNG imports (1975).
2. Government/Cabinet requests official committee (STUNET) to study LNG terminal problem (1975); Ministry of Social Affairs initiates risk analyses (performed by TNO).
3. STUNET submits LNG terminal study to ICONA (partly based on TNO risk analysis); ICONA advises Cabinet on policies (1977, March and October).

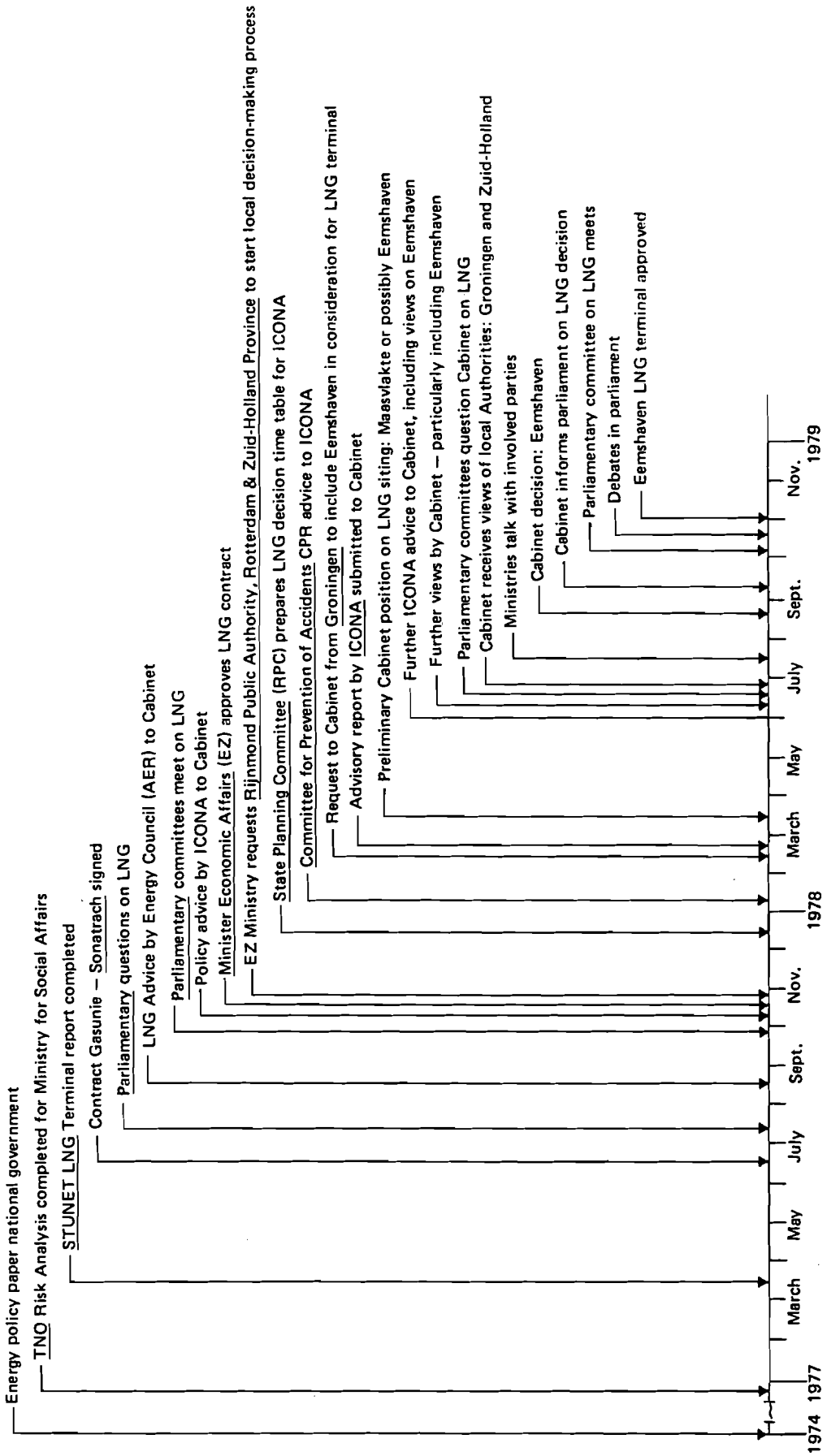


Figure 2.2. Decision Events LNG 1977-78: National Government and Cabinet

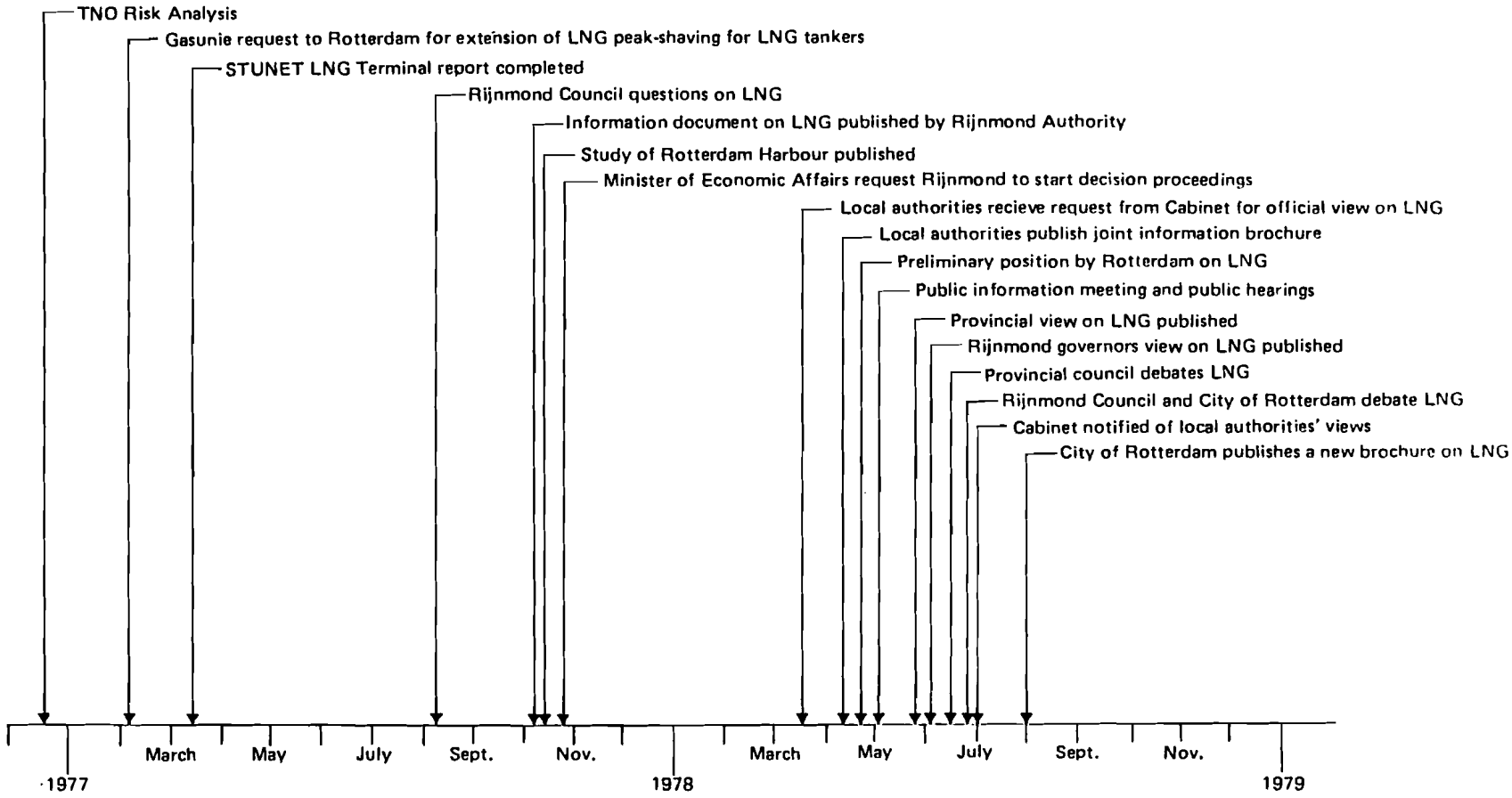


Figure 2.3. Decision Events LNG 1977-78: Local Authorities/Maasvlakte.

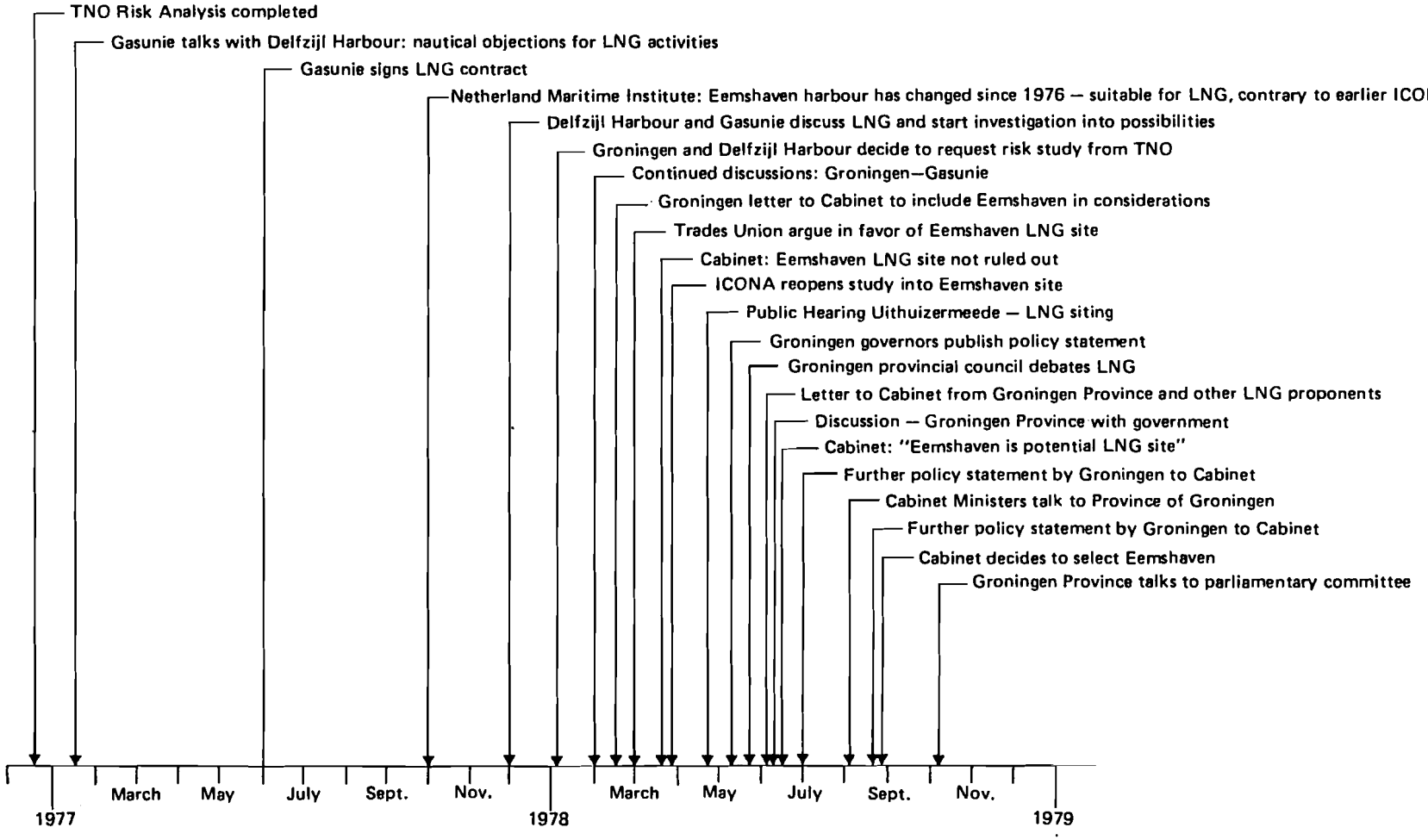


Figure 2.4. Decision Events LNG 1977-78: Local Authorities/Eemshaven.

4. Gasunie signs contract with Sonatrach for LNG imports (1977 June)
5. Ministry for Economic Affairs approves Algerian LNG contract (1977 October).
6. National government decides upon decision procedures (1977 December).
7. Gasunie opens discussions with Delfzijl Harbour about Eemshaven LNG terminal (1977 December) which ultimately results in consideration by the government of Eemshaven as viable alternative to a LNG site at Maasvlakte.
8. ICONA submits further advice to the Cabinet, together with advice of RPC and ICMH (1977 October, 1978 February).
9. Cabinet preliminary policy view: Maasvlakte sites possible; Eemshaven site not ruled out (1978 March).
10. Local authorities of the provinces of Zuid-Holland and Groningen debate LNG siting and inform the Cabinet of their positions (1978 March-June).
11. ICONA advises Cabinet about Eemshaven LNG terminal compared to Maasvlakte (1978 June).
12. Government decides on LNG terminal site: Eemshaven (1978 August).
13. Parliamentary debate: approval of government decision (1978 October).

It is possible to distinguish between activities of *governmental bodies* such as Cabinet/Ministries (□) and official advisory committees STUNET and ICONA (◇) on the one hand, and *activities of others* as an *input to governmental* decisions/actions such as those of Gasunie (○) and local authorities (△). Using these denotations the twelve decision points may be pictured as in Figure 2.5. Such a division of parties and events is of limited use since the decision-making process involved a complex series of *interactive* activities by different parties. It is therefore more useful--for the sake of analysis--to identify the importance of events in a different way. Below are summarized what can be identified as the six *major* decision points which have distinctly influenced the event structure of the decision process (major interested parties italicized).

(a) 1975 — The Dutch gas company NV Nederlandse *Gasunie* shows interest in importing LNG into the Netherlands and requests a governmental view on the possibilities for a Dutch LNG terminal (either on Dutch soil or off-shore);

(b) 1975 — National *government* starts assessing possibilities and need for LNG importation and terminal--via *STUNET* and later ICONA, advisory committee;

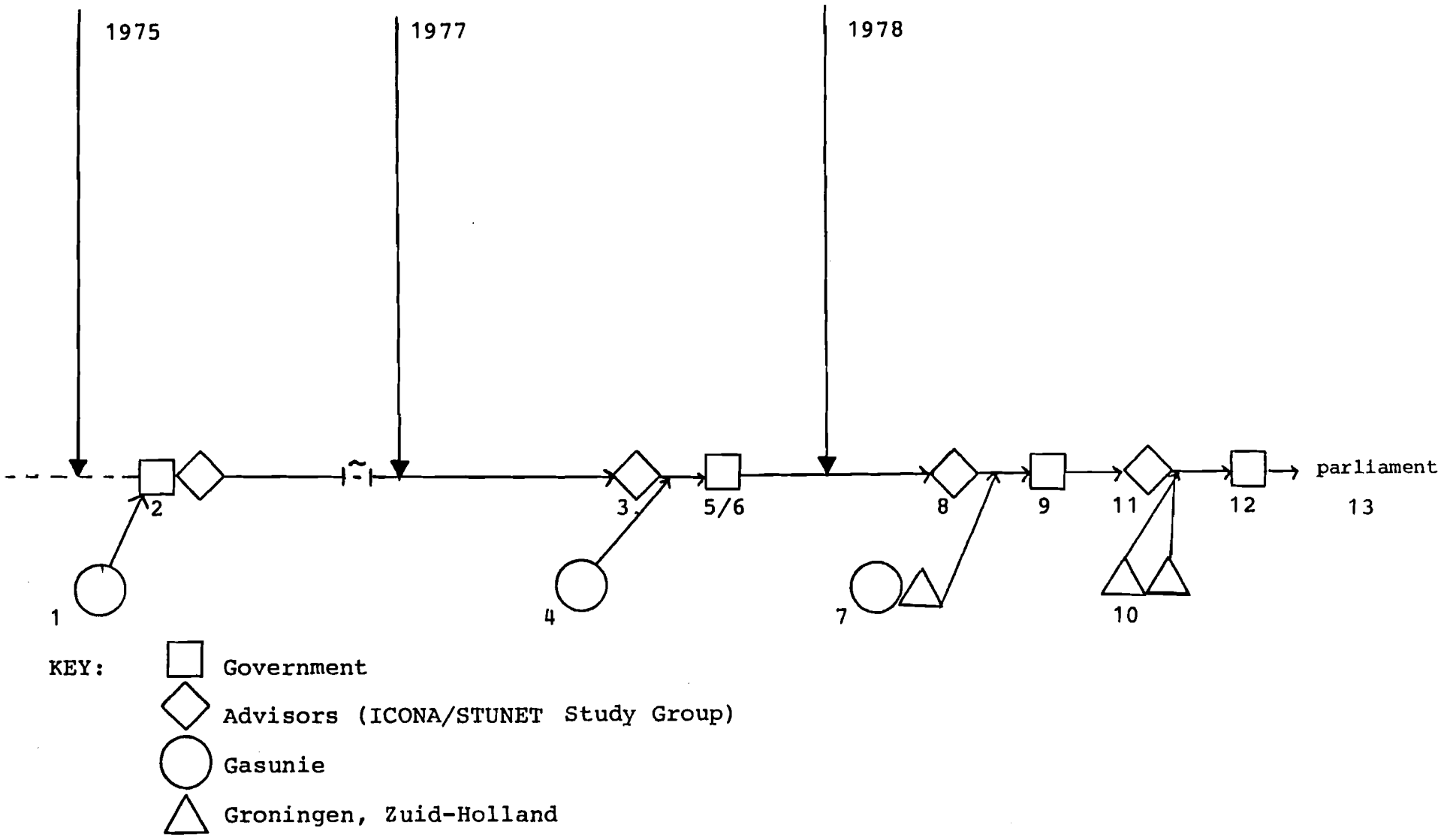


Figure 2.5. Governmental Parties, Gasunie, and Local Authorities: Event Diagram.

(c) June 1977 — NV Nederlandse *Gasunie* signs contract for the importation of LNG (from Algeria) into the Netherlands, which among other things specifies that LNG site should be named by October 1978;

(d) October 1977 — *Ministry of Economic Affairs* approves LNG import contract and government starts procedures for decision-making on LNG terminal siting, involving advisory bodies and *local authorities;*

(e) December 1977 — NV Nederlandse *Gasunie* and *Delfzijl Harbour Authorities* discuss LNG, which results in Eemshaven site being taken into consideration (by the government) for LNG terminal as alternative to (previously considered) Maasvlakte sites.

(f) August 1978 — Cabinet decides in favor of Eemshaven LNG site.

These major decision points represent in some ways the events in the process where an important shift in the nature of the decision problem takes place, causing, for example, new actors to be introduced, new decision structures to be set up or new alternatives for sites to be considered. It is thus possible to distinguish between "normal" events in the decision process and "special" events. The "special" events identified above are represented as vertical lines in Figure 2.6, which highlights some features of the decision process on LNG.

The diagrammatic representation forces the policy analyst to raise essential questions concerning the vertical and horizontal lines of the decision event structure. The vertical lines highlight shifts in the normal decision structure and the important question thus becomes to ask why these shifts occur? Which interested party(ies) initiated the shift and why? Why did the shift take place when it did? What is the "dynamic" behind it? Important questions should also be raised as regards the implications of these shifts in the decision event structure, which may provide essential inputs to the analysis of decision events later in the process. As regards the horizontal lines of the diagram, analysis should similarly look into questions of why? and how? and to ask which parties governed this part of the decision process. Before the decision process is analyzed in this way, the major dimensions of the LNG decision case study are assessed, as well as the major interested parties. In Chapter 4, the different position on the major policy dimensions by the major interested parties are analyzed.

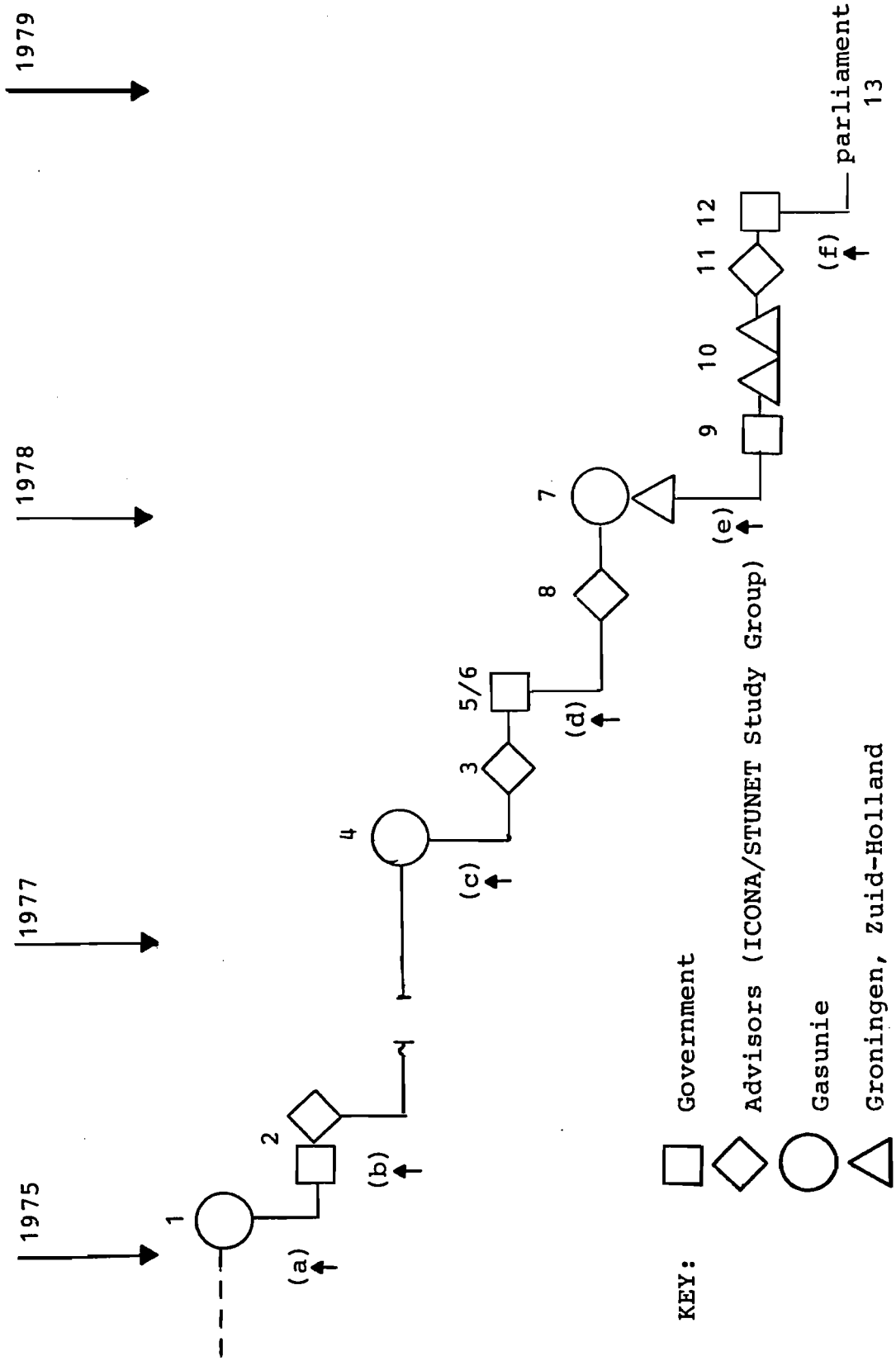


Figure 2.6. Governmental Parties, Gasunie and Local Authorities: Event Diagram--Crucial Events

SECTION II:
ANALYSIS OF DECISION PROBLEM

CHAPTER 3:
DIMENSIONS OF THE LNG DECISION PROBLEM

3.1. INTRODUCTION

The decision problem of LNG importation and terminal siting is a complex issue with many different facets. Although by no means commonly shared by all the interested parties, a number of major dimensions to the LNG decision-making process in the Netherlands, may be identified. The five major dimensions which are considered in this analysis are the following:

(1) energy policy/energy supply
(2) economics/cost
(3) socio-economic/industrial and regional policy
(4) health and safety/risk
(5) environmental impact

In addition to the above dimensions a fair number of other issues and concerns have featured in the debate on LNG in the Netherlands. These concerns (such as public participation) will be assessed in other parts of this study. In the section below the above set of key dimensions will be introduced in the specific context of the decision-making process as it occurred in the Netherlands.

3.2. ENERGY POLICY/ENERGY SUPPLY DIMENSION

The aspect of energy policy and the need for the importation of LNG into the Netherlands played an important role in the decision-making process. Energy supply in the Netherlands is heavily oriented towards natural gas and oil. The increased use of natural gas in the Netherlands was pushed heavily by successive governments in the 1960s, following the discovery and the exploitation of major natural gas fields in the northern part of the Netherlands. Whilst in 1963 the proportion of natural gas in the total Dutch use of energy was a mere 2%, this share had increased to 46% in 1972. By 1975 the natural gas share had risen to 57%, with an important 37% share still taken by oil.

The Netherlands currently produces about 100 x $10^9 m^3$ of natural gas per year (Schwarz 1980), of which approximately half is exported. Major export contracts were signed with a number of European countries in the late sixties," (based on the assumption that nuclear energy would soon take over a major role in the supply of energy and the market price of natural gas would fall substantially as a result.)

On a more specific level, the issue of energy supply involved a discussion on the ways Dutch demand for natural gas could or should be met by foreign suppliers. The major question here concerned firstly whether natural gas should be supplied in the form of LNG (thereby requiring LNG tankers, terminals, storage facilities, etc.), or as gas, via pipeline. In the Dutch LNG case this debate was further enriched by the longstanding arrangements between the Netherlands and Italy for the supply (until 1994) via pipeline of Dutch natural gas to Italy (6 x $10^9 m^3$/year). Issues debated in this context included the possibility of exchanging contracts, whereby foreign suppliers (e.g., Algeria) would transport natural gas to Italy (at the expense of the Dutch) thereby enabling the Dutch to keep their domestic natural gas supplies in the country. Such questions of international (re-) arrangements concerning natural gas trade flows, also introduced into the Dutch LNG debate, issues of international dependence upon foreign energy supplies.

The Netherlands is a net exporter of natural gas and is expected to remain in this position. Probable natural gas field reserves are currently estimated at about 2,000 x $10^9 m^3$, whilst yearly natural gas consumption is estimated to remain 40-45 x $10^9 m^3$ (Rijnmond LNG 1978a, 2e Kamer 1980). In 1974, the government published the first policy paper on energy, which forms the background to the energy policy dimensions in the LNG debate in the Netherlands. In its policy paper the government formulated the following aims (Schwarz 1980):

- savings on the whole range of energy consumption,
- less dependency from other countries,
- a strategic natural gas reserve,
- substitution of oil by other energy sources.

Within this context a natural gas policy has emerged in the Netherlands, which included restrictive management and saving of Dutch natural gas supplies, a more selective export policy and (most important in the context of the LNG debate) importation of supplementary quantities of natural gas into the Netherlands. The contracts at stake for the importation of LNG in the Netherlands, thus stem from the interest of saving Dutch supplies of natural gas. The Dutch government intends to maintain a relatively high share of natural gas in the energy use mix (35-40%), mainly because of the existence of an extremely good infrastructure for the use of gas and the advantages of natural gas from an environmental point of view. Because of its strategic importance, the government has pursued a policy of conserving its national gas field whenever possible. The security of gas supplies in the Netherlands against the background of Dutch official energy policy was perhaps the major dimension setting the context of the debate on LNG for the various interested parties.

3.3. ECONOMICS/COST DIMENSION

Another aspect relevant to the decision on the importation of LNG and the siting selection is economics. As regards to the need for importation of LNG, the economic advantages of LNG compared to natural gas imports (via pipeline) are to be considered. At a broader level, the economic importance to e attached to the supply of natural gas from foreign sources has entered the decision-making process in the Netherlands.

concerning the siting of a LNG terminal in the Netherlands, the economics of planning and construction of the terminal was of relevance. As regards comparison between alternative LNG sites, the following aspects are included in the cost dimension: transport, distance distribution to major users, terminal infrastructure, maintenance, harbor modification, safety measures, etc. Another factor of economics of relevance to the decision-making process in the Netherlands concerned the possibility of a Dutch LNG terminal being used as a supply base for natural gas by other, neighboring, countries. At various stages of the decision process the possibility of re-exportation of foreign natural gas via a Dutch LNG terminal was brought up.

The time of completion of a LNG terminal and possible delays in the completion of the LNG project may also be included in the economics dimension.

3.4. SOCIO-ECONOMICS/INDUSTRIAL AND REGIONAL POLICY DIMENSIONS

The socio-economic dimension includes the impact on individuals living near a proposed facility site (exclusive of health and safety), increased industrial activity with its employment effects, and other labor impacts.

A major issue (primarily at the local level) concerns the employment generating effect of large scale LNG activities and the extent to which LNG operations can be expected to stimulate further economic activity in the Netherlands.

Possible positive employment effects may refer to those industrial sectors involved in building, supplying and maintaining the LNG terminal. The benefits a terminal for LNG may bring for general harbor activity and infrastructure is also of relevance here.

Indirect socio-economic effects may result from follow-on industrial activities which could be stimulated by or based upon LNG projects, such as cryogenics industries. From the point of view of industrial policy, positive effects of a LNG project stimulus for the development of new skills and know-how involved in LNG and related technologies in the Netherlands.

Siting of a major LNG project can be used as a tool for industrial policy. Personnel which is attracted to build, maintain or operate a LNG terminal may affect the economic activity and the social institutions in the area, and thus becomes factor relevant to industrial policy.

Regional policy issues concern first of all the important effects for regional development, which are attributed to the siting of a LNG terminal. These effects also largely refer to employment and related industrial activities. Discussion on this point in relation to the Dutch country planning and regional development policies, which specifically favor plans towards a more equitable spatial distribution of land-use, social and economic activity and employment. One of the areas which had previously been singled out by dutch regional development policy is the northeastern part of the Netherlands (e.g., Groningen). It is important to note that the Dutch government had started active planning towards industrial activities in the Eemshaven area of Groningen in 1974. Such regional development schemes of the government and existing and planned concentrations of population, industry, employment (etc.) are thus of relevance with respect to the Dutch LNG policy debate.

3.5. HEALTH AND SAFETY/RISK DIMENSION

The safety dimension was an important aspect in the Dutch LNG debate. The discussion focused on the probabilities and the consequences of accidents with the LNG vessel on its way, in or near the terminal. The safety discussions included the risk to individuals, both those working at the LNG terminal as well as those living within a certain range from the site or shipping route.

Some of the discussion considered the ways risk could or should be measured; whether it should be assessed as being "probability x consequence," or that other "measurement" of risk should be used. In this context considerable discussion concerned with the importance that should be attached to the *perceived* risks by the (local) population, resulting from LNG activities.

Discussions on safety also included the scope or need for risk-reducing measures and the need for specific standards and conditions, in order to minimize the probabilities and/or consequences involved.

Most of the discussion around risk and safety of LNG in the Netherlands took place against the background of two major risk assessment studies, which were performed in the Netherlands by TNO (1976), the Dutch organization for applied scientific research (on behalf of the Ministry of Social Affairs). In addition, some smaller studies were performed, focusing on the nautical aspects of LNG transport and importation.

3.6. ENVIRONMENTAL IMPACT DIMENSION

Environmental issues in the Dutch LNG debate include the effects upon the environment of (1) transportation of LNG by tanker to the terminal, and (2) the effects stemming from the location and operation of a LNG terminal. As regards to the first aspect, the need for changes to (natural) waterways and technical-nautical requirements entered the discussion. As to the effects of the terminal, various kinds of environment pollution, thermal effects, noise, etc., were included in the various debates. Additionally, the ways LNG activities may affect the use of land (especially around the terminal) e.g., for recreation or housing development, must also be considered as part of the discussion on the environment impact of LNG. Environmental impacts of LNG activities may include such factors as chemical changes in the water, disturbance of sea life and the sea bed.

Two Dutch laws are of particular relevance in the discussion on environmental impact: "Wet inzake de luchtverontreiniging" concerning air pollution and "Hinderwet," (literally "Nuisance Act"). Both stipulate approval for developments from local authorities at the provincial level. (In the case of LNG the national government, however, requested *in principle* decisions from local authorities on approval, *before* official request for planning permission had been made.)

3.7. OTHER DIMENSIONS

The dimension of acceptance of a LNG project is another aspect and it includes the role devoted to the views of local residents, environmental groups, local authorities and various other concerned parties. The degree of participation by the public and specific interest groups as regards LNG decisions is of importance here. Acceptance of LNG plans relates directly to the impact within the socio-economic, environmental, economic, health, and safety dimensions. In the case of LNG in the Netherlands, acceptance by local authorities played a particular important role in the overall decision-making process; the national government required formal approval by local authorities (in the relevant areas) before a final decision was made.

From a broader perspective, public involvement and acceptance of a LNG terminal was a definite feature of the LNG debate in the Netherlands—directly related to the issue of "perceived" risk of the operations. National government concern about the acceptance of its plans at various levels, was reflected in the large number of advisory bodies and consultative agencies which were included in the decision-making process. At the provincial and municipal levels, authorities apparently faced similar issues concerning acceptability of their decisions and recommendations concerning the LNG siting question. These and other additional aspects of the LNG decision problems are analyzed in the context of the decision process rather than with respect to each party separately.

CHAPTER 4:
PARTY PERSPECTIVES

4.1. INTRODUCTION

This section will set out to analyze the views of the major parties involved in the decision-making process on LNG in the Netherlands. The three main areas of actors involvement in the LNG decision process are (1) national government and parliament, (2) local authorities, (3) Gasunie, and (4) other parties.

On the part of the government, both interdepartmental committees involved in LNG, STUNET-LNG Working Group and ICONA, have played a dominant role, especially in the initial period of decision-making. Different ministerial departments were represented in STUNET and ICONA and their advice paved the way for the Cabinet's involvement in the decision on LNG. At the level of local authorities bodies of two regional areas came into play (a) for the Maasvlakte sites respectively the City of Rotterdam, Public Authority Rijnmond and the Province of Zuid-Holland, and (b) for the Eemshaven site, the Harbor of Delfzijl and the Province of Groningen. In view of their close collaboration and co-ordination of views, the analysis below treats the relevant Groningen local authorities basically as a single party.

In this section the respective views on the various dimensions of the LNG decision problems are described and analyzed. The policy positions of the following parties are assessed in detail:

1. STUNET LNG Working Group and ICONA
2a. City of Rotterdam
2b. Rijnmond Public Authority
2c. Province of Zuid-Holland
3. Groningen Local Authorities
4. Gasunie
5. Other parties such as the public, environmental organizations, trade unions, and other interested groups.
6. Cabinet/National government

This section will set the context for the analysis of the political process leading to decisions on LNG and highlight in particular the way in which different interested parties had different perspectives and policy views on the various aspects of the LNG problem.

The analysis of the policy views of the different parties is largely based upon published material, complemented by information from interviews with involved interested parties. (Appendix A lists the major organizations and individuals which have been consulted in the course of this research.)

4.2. STUNET AND ICONA

4.2.1. Background and Responsibilities

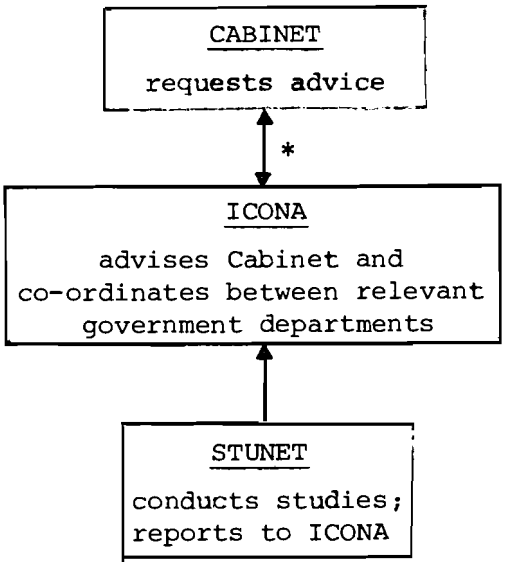
The STUNET as a technical study group and ICONA advisory committee were set up by the national government to advise the Dutch Cabinet on issues concerning the North Sea (ICONA) and (industrial) off-shore activities (STUNET).

STUNET (the North Sea Island and Terminal Steering Committee) was first set up in 1975, by the Dutch Minister for Transport and Public Works. STUNET was commissioned by the government to carry out studies concerning the desirability of an artificial industrial island in the North Sea and possible LNG terminal. The government initiative came in response to industrial interest* (in such an artificial island) and to a request of the NV Netherlandse Gasunie as regards LNG importation (STUNET 1979, p.1). Gasunie had requested a formal government position on among other things, the possibilities for a LNG terminal in the North Sea and the government in response decided that an independent (interdependent) inquiry was necessary (ICONA 1978c, p. 10).

The formal connection between Gasunie and the State government normally involves the Energy Department of the Ministry of Economic Affairs. The setting up of the special STUNET committee, however, was co-ordinated by the Ministry for Transport and Public Works, because of its overall responsibility on North Sea matters.

*In particular, the so-called NSIG-North Sea Island Group should be mentioned here.

STUNET was to submit its report to ICONA, the Interministerial Coordination Committee on North Sea Affairs. The formal relationship between the Cabinet, ICONA, and STUNET is illustrated in Figure 4.1.



*Formally, ICONA reports to MICONA (the Ministerial Inter-departmental Coordinating Committee for North Sea Affairs), a ministerial sub-committee of the Cabinet (Council of Ministers).

Figure 4.1: Governmental advisory structure.
(based on STUNET 1979, p.2)

4.2.2. Advisory Report and Committee Membership

One of STUNET's first tasks was to look into the desirability and possibilities of a LNG terminal either in the North Sea or on-shore. A STUNET Working Group "LNG Terminal" was set up to carry out the study. This particular study received high priority in the light of the "urgency of the selection of a location for a LNG terminal" (STUNET 1979, p.1.). At the time this related to negotiations between the Dutch and the Belgians about a Dutch LNG terminal importing LNG destined for Belgium (ICONA 1978c, p.12); the negotiations between Gasunie and the Algerian LNG supplier Sonatrach probably was another major factor.

The report by the STUNET "LNG Terminal" Working Group was completed in March 1977 and submitted to ICONA, which was to use its information for its policy advice to the Cabinet on LNG. This was particularly significant in relation to the awaited approval by the Minister for Economic Affairs of the Gasunie-Sonatrach LNG importation contract, which had been signed June 30, 1977.

The analysis below of STUNET's position vis-a-vis the LNG decision problem in the Netherlands is based on the March 1977 study and appendices (STUNET 1977a,b) by the "LNG Terminal" Working Group of STUNET. In relation to further analysis of governmental views as regards LNG, it is important to note that the LNG Terminal Working Group was chaired by the deputy head of the energy department of the Ministry for Economic Affairs; the Working Group furthermore included representatives of the following State Ministries: Transport and Public Works, Social Affairs, Health and Environmental Protection. Further members included representatives NV Nederlandse Gasunie (observer-status) (STUNET 1977a, p.I-3/4).* The close connection between ICONA and STUNET was emphasized by the fact that five members of ICONA, including its Chairman, were also members of STUNET. When ICONA was being installed, STUNET was officially explained as being the "executive committee" of ICONA (1978, p.42). ICONA members included representatives of all but two of the sixteen ministers of the national government departments which make up the Cabinet (ICONA 1977a, p.35).

ICONA submitted its first policy advice to the Cabinet in October 1977 (ICONA 1977), based on the STUNET LNG Terminal report, which had incorporated a risk analysis study, performed by TNO (the organization for applied scientific research). A second and third advisory report by ICONA was completed in February (ICONA 1978a) and June 1978 (1978b) respectively and incorporated advice from other state bodies such as CPR (Committee for the Prevention of Disasters by Dangerous Substances), ICMH (Interdepartmental Committee for Environmental Hygiene), RPC (State Land Use Planning Committee) and TNO. The various inputs to ICONA are depicted in Figure 4.2.

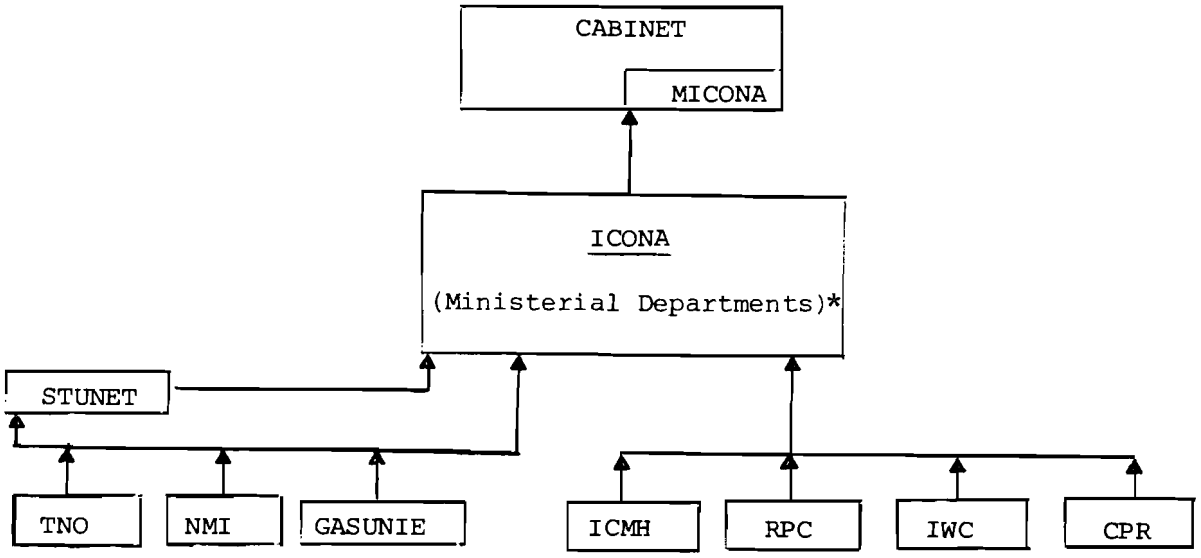
4.2.3. Problem Definition

The STUNET LNG report and the three ICONA policy advisory reports progressively addressed the major issues involved in the LNG decision problem in the Netherlands. The task definition of STUNET and of ICONA in particular, was very broad. Since their work was to be the basis for the Cabinet's position on issues relating to a LNG terminal, the advisory committees were requested to look into all relevant factors, whenever possible. The analyses of ICONA and STUNET were concerned with two interrelated questions:

1. Should LNG be imported into the Netherlands?
2. Where should LNG terminals be located?

In particular when ICONA involved itself in exploring the second question, it became apparent that it could, in effect, be split up into the following sub-questions:

*Sub-groups of the STUNET LNG Terminal Working Group included also representatives of other ministerial departments (Internal Affairs, Defense, Foreign Affairs, Finance), and observers from other organizations including TNO.



*Representatives for the following ministerial responsibilities were members of ICONA: General Affairs (Cabinet Office), Home Affairs, Justice, Education and Science, Science Policy, Finance, Defense, Housing and Physical Planning, Transport and Public Works, Economic Affairs, Agriculture and Fisheries, Social Affairs, Cultural Affairs, Recreation, Social Work, and Health and Environmental Protection.

Figure 4.2.

(2a) LNG terminal outside the Netherlands?
(2b) LNG terminal land-based or on an (artificial) island?
(2c) Exact location of the LNG terminal?

STUNET and ICONA were concerned with the following dimensions of the LNG decision problem, as the further analysis will highlight:

(a) energy policy/energy supply
(b) economics/cost
(c) health and safety/risk
(d) socio-economic/industrial and regional policies
(e) environmental impact

In the following main sections the conclusions of STUNET and the policy views of ICONA are assessed, based on the published reports by these two (advisory) committees.

4.2.4. STUNET Dimensional Views

4.2.4.1. Energy Policy

STUNET concluded that the importation of LNG should be considered positively; it based its conclusion primarily on a quantitative cost benefit analysis carried out by the Economics Working Group of STUNET. (LNG Terminal in de Noordzee, Chapter 2 and Appendix XI).*

According to the analysis, the benefits exceeded the costs--based on the quantifiable factors. Additional non-quantified factors, such as strategic considerations with respect to energy policy (e.g. diversification) and economic factors in the Dutch LNG project. The only major factor which was *not* in favor of the LNG project, according to STUNET's analysis was safety. STUNET's favorable view towards a LNG project was firmly rooted in the context of securing Dutch energy sources, within the framework of the stated Dutch energy policy. The cost benefit analysis involved comparison between two scenarios: (1) importation of LNG; and (2) no importation of LNG, whereby the equivalent energy supply would be obtained from other sources such as oil. The analysis focused almost entirely on the importation of *liquefied* natural gas; the option of importing natural gas via pipeline, was rejected at a very early stage, on the grounds that gas demand in West Europe was high, "nearby" suppliers were limited and a pipeline would not be viable (on practical, technical and economic grounds) for remote suppliers of natural gas (STUNET main report, p.0-1).

4.2.4.2. Economics/Cost

The cost-dimension was considered extensively by STUNET, focusing on two aspects:

(i) cost comparison between oil and LNG,

(ii) cost comparison between land-based and off-shore LNG terminals.

As to the way these cost comparisons were carried out as regards to the first point, reference can be made to the cost-benefit analysis reported above. As to the second aspect, the cost comparison between an artificial island and a land-based terminal for LNG, cost considerations clearly favored a land-based terminal. The calculations for a land-based terminal were based on a site in the Maasvlakte area. Other possible sites, such as Eemshaven, were ruled out, largely on nautical grounds based largely on research by the Netherlands Maritime Institute, NMI.

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*The following factors were included in the qualitative cost benefit analysis:

COST:	Gas import, transport by sea, terminal, inland distribution, environmental charges, further transport costs.
BENEFITS:	Industrial benefits, lower cost (compared to oil) of importation and storage of fuel, benefits of re-exportation.

4.2.4.3. Health and Safety

The safety aspect was certainly considered by STUNET, although a definite *conclusion* on the aspects of health and safety was not put forward. The risk of LNG was "comparable to other industrial risk," it was concluded by STUNET. STUNET emphasized the possibilities of risk reducing measures, limiting either the probability or the consequences of a possible accident. Based on the TNO risk analysis STUNET concluded that safety was the sole dimension of the LNG decision problem, which would favor an off-shore site for the terminal location. This conclusion, however, bears on the decisions whether it is considered a prime concern to *minimize* the *effect of a potential LNG accident*. Considering, however, the "weighed effect" or risk involved, defined by "probability x consequence," no significant difference between the safety of an off-shore or land-based terminal was concluded (in terms of possible deaths in case of a major hazard--namely 0.14 deaths/year at Maasvlakte and 0.12 deaths/year for an island terminal. Nautical risk and safety consideration formed the basis of STUNET's rejection of all but one land-based site--Maasvlakte. In this respect STUNET mentioned the scope for risk-reducing measures (STUNET 19771, p.0-7). The STUNET working group concluded that it was unable to give unequivocal (eenduidig) advice as regards the safety aspect of LNG, also because no generally accepted criteria exist for large-scale effects (such as those involved in LNG).

4.2.4.4. Environmental Impact

The STUNET analysis concluded that the negative environmental effects of a LNG project would be limited, and at all times within "acceptable" limits. What those limits were, was not elaborated on. Some aspects of the potential environmental impact had favored a sea-terminal, whilst others favored a land-based location. No overall conclusion in favor of one option or the other could be drawn, according to STUNET. As regards to comparison with oil, LNG was considered as being environmentally less damaging.

4.2.4.5. Socio-Economics

The positive and negative socio-economic effects of a LNG project were only briefly evaluated by STUNET. The only reference in this context, concerns an item in the cost-benefit analysis regarding industrial employment and generated industrial activities. No quantification of this aspect is made by STUNET. Nor is it related to the policy conclusions STUNET puts forward, which can be interpreted as keeping the socio-economic policy dimension virtually out of the analysis.

4.2.4.6. STUNET Perspective

The STUNET views on the main four dimensions considered can be summarized as follows (also see Table 4.1):

> The main *decisive* factors for STUNET, in relation to its endorsement of further consideration of a LNG terminal, seem to have been energy policy and economics. Concerning the recommendation that the importation of LNG should be considered positively by the Cabinet, a major factor was the perceived lack of

prospects in respect of the option of importing natural gas by pipeline. STUNET views on this point simply stated that European demand for natural gas was high, and consequently imports of gas from nearby suppliers would be limited. Importation of natural gas over large distances would thus require *LNG* transport, for economic and practical reasons, STUNET asserted (1977a, p. 0-1). Once LNG was judged by STUNET as the only practical way of importing natural gas,, the favorable position of STUNET vis-a-vis importation of LNG was easily argued, within the framework of the stated Dutch policy on energy (emphasizing diversification of sources and favoring gas). *Energy policy* thus became the *dominant dimension* in relation to the first policy question, on the desirability of LNG importation. Supported by the imperative of this favorable position concerning LNG, the *economics* dimension then became the major factor in determining the outcome of STUNET's discussion of options concerning the second policy choice, on off-shore versus land-based LNG sites. STUNET concluded that cost considerations would favor a land-based site, whilst all other dimensions would also favor a land-based site, with the exception of the safety dimension. Of the other land-based sites, all but Maasvlakte were turned down on ground of nautical and safety grounds (STUNET 1977a, p.0-5). The health and safety dimension nor the environmental dimension seem to have played a *decisive* role in STUNET's technical analysis. STUNET itself acknowledged that these two single factors would not be a sufficient selection criteria. The importance of safety was acknowledged, but STUNET apparently considered itself unable to make unequivocal recommendations with respect to the safety aspect of LNG, for which no agreed criteria were available (STUNET 1977a, p.0-7). It is important to note here that STUNET had made use of the risk analysis for LNG which had been carried out by TNO, and had been included as an appendix to STUNET's report.

The first two dimensions, energy policy and economic factors, can be said to have been the primary dimensions on which STUNET had based its main conclusion, concerning the importation of LNG and the location of the terminal. As Table 4.2 illustrates STUNET was in favor of LNG importation and in favor of a land-based terminal.*

*This statement does ***not*** imply that STUNET did not give considerable ***attention*** to the aspects of safety, but rather relates to the ***implications*** of the safety studies, in terms of the final conclusions and advice of STUNET, as reported to ICONA.

Table 4.1.

ENERGY POLICY:	LNG importation favored gas import via pipeline unrealistic for large distance.
ECONOMICS/COSTS:	Natural gas favored over oil; land-based LNG terminal less expensive.
HEALTH/SAFETY:	No definite conclusion sea terminal "not significantly" safer (in terms of consequences) no basis for concern/risk-reduction possible.
ENVIRONMENT:	Limited effect; no basis for deciding on location of terminal site gas compares favorably to oil

Table 4.2.

Policy Question / **Dimensions**	**LNG Import?**	**Land-Based Terminal?**
1. energy policy	+	+/-
2. economics/cost	+	+
3. health and safety	+	-/+
4. environmental impact	+	-/+
Outcome	yes	yes*

KEY:
- \+ favorable
- \- unfavorable
- +/- not decisive - marginally favorable
- -/+ not decisive - marginally unfavorable
- * except when ***safety concern*** of large-scale effect of accident is dominant dimension.

4.2.5. ICONA

In this section the policy views of ICONA are assessed with reference to the major policy dimensions and policy questions which were taken into consideration by this governmental advisory group. In view of the importance ICONA has played in the decision-making process in the Netherlands, its views are analyzed in somewhat more detail than most of the other interested parties. The analysis is based on ICONA's three policy reports to the Cabinet, submitted between October 1977 and June 1978 (ICONA 1977, 1978a,b; ICONA 1977 is also referred to as Tweede Kamer 1977, no. 3). The later focused in particular on the comparison of Maasvlakte sites with the proposed site at Eemshaven, which by 1978 were the only two contenders left.

4.2.5.1. Energy Policy

In ICONA's first policy advice (1977) the advisory committee whole heartedly supported the desirability of LNG importation, from the perspective of securing Dutch energy supply. The justification of this position (as referred to by ICONA) was found in the stated Dutch governmental policy on Energy (Tweede Kamer 1974), which included diversification of energy supply, strategic reserves of Dutch natural gas, environmental benefits of gas compared to oil, active import policies for natural gas, etc. (Tweede Kamer 1977, no. 3, and ICONA 1978a, p.2-1). the case *against* the "economic and practical" viability of importing natural *gas via pipeline* from distant suppliers (those outside north-west Europe) was largely in line with the assessments made by STUNET (Tweede Kamer 1977, no. 3, p.3). In ICONA's own words, "the desirability of *importing LNG* must (thus) be considered against the general desirability of *importing natural gas*," (my emphasis) (ICONA 1978a, p.2-1). Exchange of agreements involving foreign suppliers of natural gas and importers of Dutch natural gas was discussed as a possibility by ICONA, but was considered to be of little real value ("weinig realistisch") (ICONA 1978a, p.2-7). Having considered the various options for Dutch energy policy vis-a-vis natural gas, ICONA strongly favored the importation of LNG into the Netherlands (generally supporting the policies put forward by the Gasunie and the Ministry for Economic Affairs in this context --EZ 1977). Consideration was given to the possibility of acquiring foreign LNG through a terminal outside the Netherlands--possibly in (bordering) Belgium or the Federal Republic of Germany (FRG), which were both considering such a terminal. ICONA considered this option "undesirable" because of strategic factors (e.g., security, dependency of supply) in relation to energy policy (ICONA 1978a, p.3-8).

As regards the location of a Dutch LNG terminal, from the viewpoint of Dutch energy policy, ICONA concluded that natural gas imports (and LNG for that matter) should be made available to Dutch domestic users at the lowest possible economic cost. ICONA thus shifted the question of the location of the LNG terminal (partly) into the realm of the economics dimension (see Section 4.2.5.2.). From the perspective of energy policy, ICONA was concerned with the "time dimension" of the problem: considering the date by which a Dutch LNG terminal could be completed, ICONA favored a land-based terminal. This view was based upon the specific interest of having available a LNG terminal by 1984, in order to receive

the first imports of Algerian LNG (as was in principle contracted for by Gasunie and approved by the Minister of Economic Affairs, shortly after ICONA's first policy advice) (Tweed Kamer 1977, no.3, p.8). An island terminal would be "impractical" to complete in time for this purpose. The general opinion of ICONA from an energy policy point of view, was that the Algerian LNG contract should be regarded as a "great opportunity" for Dutch energy supply, for securing foreign sources of natural gas at a time there was a (alleged) "sellers market" (ICONA 1978a, pp. 1-3 and 2-5). Considering the different LNG locations included in ICONA's analyses, at Maasvlakte and Eemshaven, the first was given marginal preference within the context of energy policy. Maasvlakte sites were regarded as providing more favorable opportunities for coal-gasification installations in conjunction with a LNG project (ICONA 1978b, p.2-5). Additionally, Maasvlakte was also favored (compared to Eemshaven) in relation to the locations of the major users of natural gas, who are heavily concentrated in the West of the Netherlands, relatively close to Maasvlakte (ICONA 1978b, Bijlage 2, p.7). The latter aspect is closely related to economic considerations (see Section 4.2.5.2.).

4.2.5.2. Economics/Cost

The cost dimension as assessed by ICONA played no relevant role with respect to the first policy question, concerning the desirability of LNG imports into the Netherlands (other than the economic advantages of secure supply of natural gas at an acceptable price). The cost dimension did include consideration of possible use of a foreign LNG terminal, off-shore, but relatively little attention was paid to this option, because it was regarded as undesirable from the strategic energy policy perspective (see Section 4.2.5.1.) (ICONA 1978, p.3-8). Cost of foreign land-based terminals were considerably higher than a Dutch terminal, ICONA concluded. As regards the cost implications of alternative locations for a LNG terminal, ICONA clearly established that the option of an off-shore LNG terminal (on an artificial North Sea Island), was by far the most expensive alternative (see Table 4.3). This option should only be considered, ICONA stated, when financial collaboration with neighboring gas-importing countries could be secured (Tweede Kamer 1977, no. 3, p.9). ICONA concluded that an island terminal would be more expensive by a factor three, compared to a land-based terminal at the Maasvlakte (ICONA 1978a, p.4-29).

Whilst the second ICONA report (1978b) focused on the comparison of an island-terminal and a land-based LNG terminal at Maasvlakte, the third policy advice (1978b) considered the differences between the land-based sites at Maasvlakte and Eemshaven. Regarding the cost dimension ICONA clearly favored a Maasvlakte site, based on the following cost-related aspects (1978b, p.2-30).

- shorter route (compared to Eemshaven) from Algerian suppliers (10%) would result in savings
- LNG terminal closer to major industrial users
- no additional dredging required (contrary to Eemshaven) to allow for the required shipping movements.

Table 4.3.

Site	Cost*
Maasvlakte A and B	520 - 530
Maasvlakte C	1150 - 1325
Voornedam-Maasvlakte (breakwater terminal)	1575 - 1675
Off-shore island	1600

*millions of guilders

Whereas the main other cost-related factors failed to show significant differences between Eemshaven and the Maasvlakte sites, ICONA concluded that the total additional cost of an Eemshaven terminal would be in the order of 250-700 Million Dutch Guilders (for LNG imports ranging from 4-10 x $10^9 m^3$ LNG/year). The cost estimates for the other LNG sites considered by ICONA are summarized in Table 4.3 (ICONA 1978a, p.4-28). From the point of view of economics, ICONA clearly favored a LNG terminal at a Maasvlakte site (ICONA 1978b, p.3-3).

4.2.5.3. Health and Safety

The health and safety dimension of LNG was clearly recognized by ICONA as an important aspect of the decision-making process. The main source of information used by ICONA as regards to the risks involved in the transportation, handling and storing of LNG was a risk analysis performed by TNO (which was included in STUNET's report to ICONA--STUNET 1977b--as an appendix). On the basis of the TNO report and additional information--including advice from CPR (the Committee for the Prevention of Disasters by Dangerous Materials) ICONA discussed the problem of "risk," making a distinction between "factual risk" and "perceived risk." Factual risk was being defined by the mathematical product of the *probability* (of an accident occurring) and the *consequences* (when such an accident occurs). In addition to this "probability x consequences" risk, ICONA discussed "perceived risk," being the apparent risk as perceived by the population. ICONA pointed out that perceived risk is often higher than the factual risk, because of the public "sensitivity" to accidents that have large effect (regardless of the probability of such an accident occurring).

ICONA did not relate directly the risk involved in a LNG project to the policy question of the desirability of LNG importation. The committee merely stated that the balance of risk on the one hand versus the benefits of LNG (secure energy supply, relatively clean energy source, etc.) on the other, would justify a LNG island terminal (Tweede Kamer 1977, no. 3, p.6). As regards a land-based terminal at Maasvlakte, ICONA stated that the risk involved (probability x consequences) would be hardly different from that at an island-terminal, thereby implying that the perceived positive result of the balance between risks and benefits involved in LNG would also apply to a land-based terminal.

Concerning the siting of a LNG terminal in the Netherlands, ICONA compared the "factual risk" of various locations (based on the TNO risk analysis) and concluded that an island terminal would be the safest location and Maasvlakte sites A and B the least safe, but only marginally so (the Eemshaven site was at that point not yet taken into consideration). The results of the comparison of the factual risk of the above mentioned alternatives are summarized in Table 4.4 (ICONA 1978a, p.4-9).

Table 4.4. Factual risks based on TNO data.

Terminal Consequences	Maasvlakte A/B	Island off-shore
no. deaths/yr	0.14	0.12
no. injured/yr	0.12	0.11
material damage/yr	0.15	0.001

(x million Dutch guilder)

ICONA concluded on the basis of these and other data, that the safety gains of an island terminal were relatively small. ICONA furthermore stressed that risk-reducing measures should be introduced. In the case of the Maasvlakte terminal, for example, this would include restricting other shipping movements, whenever LNG carriers are moving near the terminal.

The calculated risks and reduced risks of the four locations initially considered by ICONA are summarized in Table 4.5 (ICONA 1978a, p.29a).

ICONA concluded that an island terminal had the lowest risk factor, having a marginally smaller "factual risk" and a considerably smaller "perceived risk" than the other sites considered. The Maasvlakte sites had the highest perceived risks, ICONA concluded (ICONA 1978a, p.4-29); at the time the Eemshaven site had not yet been properly evaluated by ICONA.

Table 4.5

Locations	Risk[1)]	Reduced Risk*
Maasvlakte A/B	0.135	0.028
Maasvlakte C	0.131[2)]	0.026[2)]
Voornedam (Breakwater)	0.123[2)]	0.024[2)]
Island	0.120	0.022[3)]

NOTES: * Through additional measures
1) statistical no. of deaths per year, obtained by the summation of all products of probabilities x consequences of considered accidents, involving 12 x $10^9 m^3$ LNG per year.
2) estimated
3) considering one pipeline from the island to the shore.

It is important to mention here that in evaluating the above risk date ICONA had noted the advice of the CPR which, among other things, stated that:

1. there are no pre-determined safety criteria; the question to be answered concerns the risks involved vs the benefits of LNG importation,
2. the TNO study had under valued the importance of "perceived risk" and "psychological shock" of large scale effects among the population.
3. risk involved in LNG is comparable with other risks, already publicly accepted.

On the basis of this advice and other inputs made to ICONA, and its own evaluation, the advisory committee concluded that in addition to the (safer) island terminal, also a LNG terminal at the Maasvlakte sites is "not unacceptable to society" (ICONA 1978a, p.4-30)--referring to already "accepted" risks in the Maasvlakte area and elsewhere in the Netherlands.

ICONA strongly stressed that the safety dimension could not be used as the sole criteria for the selection of a site for the LNG terminal. It acknowledged for example, that an island-terminal would be the safest alternative, but immediately emphasized that the safety dimension was the *only* aspect favoring an island terminal, thus requiring comparison with other sites which were preferred because of other aspects. Considering the risk vs. cost trade-off, ICONA concluded that the higher cost of an island could not be justified by the limited reduction of factual risks, this

an option would bring about (ICONA 1978a, p.4-30). How exactly this trade-off was evaluated has not been made explicit by ICONA. In its conclusions little mention is made of "perceived risk" involved in the various alternatives. ICONA stated that this aspect of risk is difficult to assess objectively (i.e., by ICONA) (ICONA 1978a, p.4-30) and believed the decision procedures at the local authority level could perhaps provide more insight in this respect.

By the time the advisory committee was requested to include Eemshaven in its considerations, the basic position of ICONA as regards the assessment of risk and the importance which should be attached to this dimension (in relation to the other dimension) had already been spelled out. Having considered the Eemshaven site (in its third report: 1978b) ICONA concluded (on the basis of CPR advice):

- the maximum consequence of a LNG accident would be lower at Eemshaven by a factor of 10;
- longer route to Eemshaven counterbalanced this act, because of the increased probability of accidents at sea;
- the perceived risk--for the local population in the Eemshaven area--would be considerably higher in this area of the Netherlands, compared to the Maasvlakte area, where industrial activities were already very much developed.

The most important conclusion as to the comparison of risks between Maasvlakte and Eemshaven, however, was the relative lack of implications derived from the safety dimension, as a determining variable in relation to the outcome of the policy questions addressed by ICONA. ICONA concluded that on the basis of its assessments (between the two sites) "no clear preference can be made on the basis of the safety aspects" (ICONA 1978b, p.3-1). ICONA noted, however, that more insight into the importance of "perceived risk" could possibly be obtained through further study at a later stage of the decision-making process (ICONA 1978b, p.3-5), involving local authorities' views.

4.2.5.4. Socio-Economics/Industrial and Regional Policy

This dimension was interpreted by ICONA as comprising mainly environmental land use planning aspects and the impact of LNG developments upon local economic activities, particularly employment. As regards planning, ICONA concluded there were no objections to the Maasvlakte site for the location of a LNG terminal. In ICONA's early reports, discussion mainly focused upon the Maasvlakte sites, since it was widely expected that this area would provide the only viable option. Both Maasvlakte and Eemshaven sites were considered to be viable from the perspective of planning (ICONA 1978a, p.4-22). The only reservation concerned the requirements of the governmental electricity supply plans, which could possibly rule out a LNG terminal in the same area of a nuclear power plant.

The major source of information on the aspect of planning was a study (commissioned by ICONA) of the State Land Use Planning Committee, RPC. On the basis of this study ICONA concluded that:

(a) from the point of view of planning, both Eemshaven and Maasvlakte locations were feasible for a LNG terminal;

(b) there were not structural objectives for the two sites from the point of view of land use planning.

The socio-economic dimension was heavily biased towards the employment effects of LNG developments. ICONA did stress, however, several general advances of LNG developments in the Netherlands, initially focusing upon Rotterdam area, as the most desirable LNG terminal site. ICONA concluded:

1. LNG could form an important stimulus for Dutch employment (positive effects on employment in such sectors as building contracting, ship building, etc.),
2. indirect industrial activities associated with LNG (e.g., cryogenics) would be stimulated,
3. LNG terminal in the Netherlands would enhance know-how on LNG industry,
4. LNG terminal at the Maasvlakte could mean a welcome extension of Rotterdam's harbor activities (ICONA 1978a, p.4-23).

The initial assessment of the employment effects of a LNG terminal showed that they are proportionally related to the investment involved in the LNG project, thus having the smallest impact at the Maasvlakte sites. The ICONA assessment on economic activity, in terms of employment is summarized in Table 4.6 (ICONA 1978a, p.4-29a).

Table 4.6: Employment Generation.

Site	Economic Activity*
Maasvlakte A/B	5880 - 6840
Maasvlakte C	13840 - 14520
Voornedam (Breakwater)	17160 - 18360
Island	16850
Eemshaven	7150

* No. of man years/per year (approx.): employment involved in shipbuilding excluded.
Source: ICONA 1978b, p.2-22.

The direct employment effect on the construction of the LNG terminal were equal for the Maasvlakte and Eemshaven sites, ICONA concluded. As regards the permanent employment involved in operating the LNG terminal 50 man-years/per year were estimated for both sites. Additionally, ICONA concluded, Eemshaven would give rise to a further 70 man-years of permanent employment as a result of infrastructural activities (ICONA 1978b, p.2-23).

Prospects for additional employment for "external" industrial activities related to LNG, were better at the Maasvlakte, however, ICONA concluded mainly as a result of the then existing industrial infrastructure (ICONA 1978b, p.2-23). The expected stimulus for the Dutch ship building industry would in any case go to Rotterdam, regardless of the location of the LNG terminal ICONA concluded (1978b, p.2-24). On the socio-economic effects (employment) ICONA thus concluded that the direct employment was somewhat more positive at Eemshaven; the "external" indirect, employment effects, however, were more promising at the Maasvlakte (1978b, p.4-25).

The slight advantage of Eemshaven as regards the socio-economic dimension resulted from the employment benefits of 300 temporary and 70 permanent additional man-years of employment (ICONA 1978b, p.3-3). The Eemshaven site had, on the other hand, less external socio-economic and employment effects, relative to the Maasvlakte site. On this basis ICONA concluded that the regional effect as regards employment were not significantly different at the considered sites (1978b, p.3-5) and on the basis of the expected qualitative employment effects of LNG "no clear preference was made by ICONA for either side" (1978b, p.2-25).

Finally, it should be mentioned that ICONA specifically stated in its advice that it considered it inappropriate to give its opinion as regards the *importance* that should be attached to the "political" dimensions of regional policy (1978b, p.3-6).

The ICONA representative of the Ministry for Economic Affairs stated, however, (in a separately worded final conclusion) that if the Cabinet decided to favor an Eemshaven site because of regional economics the trade-off with respect to the (higher relative) cost involved in the Eemshaven site should be fully taken into account (1978, p.3-6).

4.2.5.5. Environmental Impact

ICONA acknowledged that the operation of a LNG terminal would have negative consequences for the environment, such as noise, water pollution and air pollution. It pointed out, however, that natural gas is a relatively clean energy source from an environmental point of view, compared to oil or coal (1978a, p.4-16). As far as disruption of the marine environment is considered, ICONA concluded that the Eemshaven site will cause the strongest negative effect, primarily as a result of the required dredging operations in that area. The ranking of the various sites as regards the disruption of the marine environment is given in Figure 4.3 (ICONA 1978a, p.4-29a and 1978b, p.2-14).

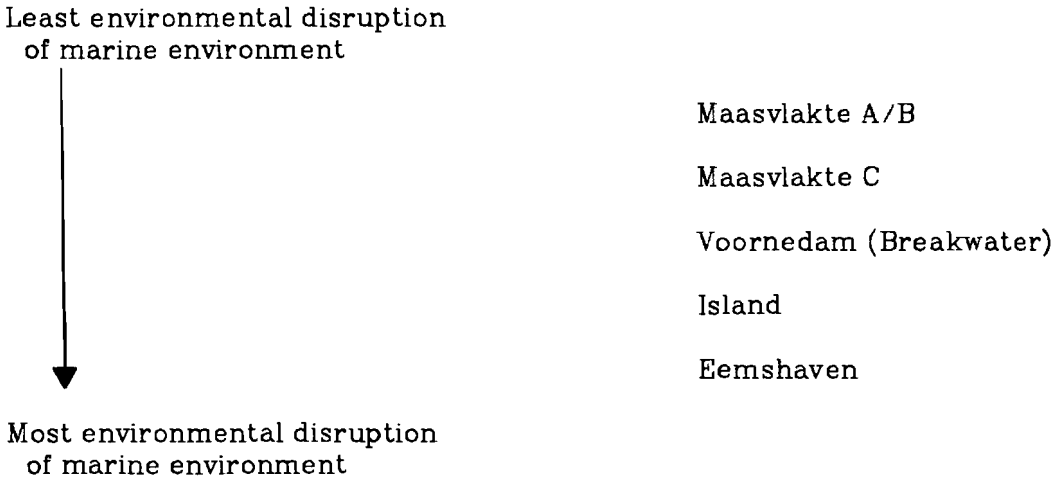


Figure 4.3. Environmental impact.

ICONA based its assessment on a study performed by the Interdepartmental Committee for Environmental Hygiene (ICMH) (Appendix 6 to ICONA 1978b). ICONA supported the view of ICMH which lead to the conclusion that from the environmental point of view (excluding safety aspects) the larger negative consequences can be expected at Eemshaven, than compared to the Maasvlakte sites (ICONA 1978b, p.2-16).

As regards recreational activities near the considered sites, ICONA concluded the Maasvlakte to be closer to recreational areas. The shipping route to the Eemshaven, however, would pass several islands which are being used for recreation, and the Eemshaven site will thus also have negative effects from this point of view, ICONA stated. ICONA concluded that as far as the environmental impact (affecting nature and the landscape) is concerned, neither the Maasvlakte sites, nor the Eemshaven location give rise to any "fundamental objections" (ICONA 1978b, p.2-2).

In its final conclusion, ICONA stated that the dimension of environmental impact favored the Maasvlakte--primarily because of the dredging requirements at the Eemshaven site, which could result in considerable disruption of the sea environment.

4.2.5.6. Minority Views

Before further analysis is made of ICONA's perspective and "aggregate view" on LNG, it is important to note, that there was no unanimous agreement about its position, among the representatives from the various ministry departments, which make up the advisory body. As a result, the representatives of three departments, notably of the Ministry for Health and Environmental Protection, published their specific reservations as appendices to the ICONA reports. The representative for the Ministry of Health and Environmental Protection aired its disagreement with the

conclusions of ICONA regarding several major issues. The following positions were stated in this respect:

1. it is not absolutely clear that LNG importation into the Netherlands is needed for Dutch energy supply,
2. LNG detonation is not impossible and may have disastrous effects,
3. the STUNET project Group on LNG should have considered the "maximum credible accident",
4. public concern of the local population in the Rijnmond area is justified because of the dangers of industrial activities in this area.

On the basis of the above (and other) factors the Public Health Ministry representative concluded that "location of a LNG terminal at the Maasvlakte is *unacceptable*" (bijlage, ICONA 1977; emphasis added). This position was stated in two of ICONA's policy reports (1977 and 1978a), which in both cases did not involve assessment of the Eemshaven area as a viable option for a LNG terminal.* It is also of interest to note that the representative of the Ministry for Housing and Physical Planning stated in the second ICONA report (1978a, p.5-7) to take a position "close" to the Health Ministry's view, without thereby refusing the overall policy advice submitted by ICONA to the Cabinet. The representative of the Minister for Science Policy, focused its critical note (with respect to the first ICONA report, 1977) upon the structure of the analyses of ICONA, especially in relation to the assessment of alternatives (Tweede Kamer 14626, no. 3, p.14-15).

In the final ICONA report to the Cabinet--where for the first time the Eemshaven alternative was re-evaluated--no reservation concerning its outcome by any of the ministerial representatives was made.

4.2.5.7. ICONA Policy Perspective

Considering the overall ICONA policy perspective and the evaluation of the various policy questions, the above minority views once more emphasize the fact that the information used by ICONA and the weight attached to the various dimensions included in its analysis, can be interpreted in different ways.

There seems to be a clear *hierarchy of dimensions*, as considered by ICONA, when evaluating the different policy questions at stake. ICONA's own decision-making logic can be illustrated by Table 4.7. The dimensions of cost and energy policy have taken a high position in ICONA's dimensional hierarchy. This can perhaps be related to the fact that an island-terminal was rejected by ICONA as a desirable option, despite the recognized (albeit small) safety advantages of an off-shore terminal, in relation to the high costs. The relative lack of influence of dimensions of safety and socio-economics upon the final policy outcome of ICONA can be gathered from the explicit statement that these dimensions should be used as

*On the basis of earlier nautical/safety studies, Eemshaven was concluded to be unsuitable as a LNG harbor.

Table 4.7. ICONA views on main policy questions.

	Policy Question	*Major* Dimension(s)	Outcome
decision chronology ↓	LNG Importation?	1. energy policy	Yes
	Dutch terminal?	1. energy policy	Yes
	Land-based vs. off-shore?	1. economics/cost 2. energy policy 3. health and safety	Land-based off-shore*
	LNG site?**	1. economics/cost 2. energy policy 3. environment	Maasvlakte

NOTES:
- * Although ICONA eventually supported a land-based terminal on the grounds of economics/cost and energy policy, in its first policy advise (1977) it concluded that from the viewpoint of health and ***safety only***, an off-shore site should be preferred. Later policy advice, however, rejected the island alternative.
- ** This is based on the policy advice of ICONA as submitted in 1978 (ICONA 1978a,b).

criteria to distinguish between the final two alternative sites (Maasvlakte and Eemshaven) (rather than be resolved as part of underlying policy issues; e.g., acceptability). Although the safety dimension was extensively explored by ICONA--incorporating studies and advice by TNO and RPC--the *policy implications* of the safety factors seems to have been rather limited, in comparison to considerations of cost and energy policy.

Finally, Table 4.8 indicates which of the dimensions considered by ICONA played a decisive role in determining the outcome of each of the policy questions, ICONA was faced with in its analysis.

The above analysis thus indicates that energy policy and cost were the most important dimensions in relation to ICONA's policy advice *outcome*. The great relative importance attached to these two dimensions help to explain how ICONA arrived at its final policy recommendations.

Table 4.9 illustrates the implications of this dimensional hierarchy for the various policy questions. This table also indicates that there is not only a dimensional hierarchy but also a *hierarchy of policy questions*, determining in which order each of the policy issues is being analyzed and answered. The outcome of a previous policy question decided on the basis of dimensional criteria--thus sets the context for each policy question and its resolution.

Table 4.8. ICONA views on dimensions on policy questions.

Policy Question / Dimension	LNG Import?	Dutch Terminal?	Land-based?	Siting: a) Maasvlakte	Siting: b) Eemshaven
1. energy policy	+	+	+	+/-	-/+
2. economics/cost	+/-	+[1)]	+	+	-
3. environmental impact	+	o	+/-	+	-
4. health and safety	+/-	o	-/+	o	o
5. socio-economics	+	+	+	o	o
Outcome	Yes	Yes	Yes	Yes	No

KEY:
- \+ favorable
- \- unfavorable
- +/- indecisive: marginally favorable
- -/+ indecisive: marginally unfavorable
- o no preference; not affecting outcome
- 1) when land-based terminal was considered; in case of off-shore terminal, foreign LNG terminal would yield lower cost.

tion and its resolution.

4.3. LOCAL AUTHORITIES ROTTERDAM/ZUID-HOLLAND

4.3.1. Background and Involvement

Most of the discussions concerning a large-scale LNG terminal in the Netherlands up to late 1977 have emphasized the Rotterdam area as the prime site for a LNG terminal. Consequently the local authorities relating to Rotterdam became involved in the LNG decision-making process, at a relatively early stage. Early 1977, Gasunie applied to the City of Rotterdam for approval for a LNG terminal site at the Maasvlakte—before any firm contract for the importation of foreign LNG had been agreed upon. In particular Gasunie itself, had always been very outspoken about its

Table 4.9. Implications of dimensional views

Dimension	Implications for LNG Policy
1. energy policy	LNG Importation required Dutch terminal desired
2. economics/cost	Land-based terminal favored alternatives reduced to: Maasvlakte A/B and Eemshaven
3. environmental impact	Maasvlakte preferred
4. health and safety	No obvious implications
5. socio-economics	No obvious implications

hierarchy of policy questions ↓

intentions of establishing its LNG terminal at the Maasvlakte (adjacent to its LNG peak shaving plant).

The local authorities responsible for activities in the Rotterdam harbor area concern three levels:

1. The City of Rotterdam (including the Rotterdam Harbor Authorities)
2. Public Authority Rijnmond
3. The Province of Zuid-Holland (to which Rotterdam belongs)

The responsibilities and interests of these three local authorities overlap only to a limited degree, and it is therefore necessary to consider their respective positions vis-a-vis LNG separately.

To a limited extent, however, the activities concerning LNG by these three levels of local authorities were being co-ordinated. The main joint activity in the LNG decision-making process concerned the preparation and publication of an information brochure for the public. It was published in April 1978 and set the context for the discussion at the respective local levels about the official positions concerning a LNG terminal in their areas of responsibility. Although all three parties had involved themselves in the LNG decision-making process before the publication of their brochure (Zuid-Holland 1978a), it provides an indication of the common perspective shared by the local authorities as regards a LNG terminal in the Rotterdam harbor area.

The brochure, entitled "LNG at the Maasvlakte: Yes or No", relied heavily upon information provided by reports of STUNET, ICONA and reflected the government's stated energy policy. In it, the local authorities largely acknowledged the need for LNG importation into the

Netherlands from the perspective of Dutch energy policy. They also stressed the economic importance for the Rotterdam area to become the site for a LNG terminal, as well as the expected socio-economic benefit it was thought to bring with it. The main policy question addressed by the local authorities, increasingly shifted towards the *conditions of acceptance* for a LNG terminal in the area, having taken into account the economic and socio-economic benefits LNG could bring to the Netherlands (energy supply) and the Rotterdam area in particular.

The way in which each of the local authorities perceived the question of a LNG terminal in their region of responsibility and the position they took as regads the various dimensions of the decision problem, is discussed in the following sections. Official involvement of the local authorities in the LNG decision-making process, commenced on 21st March 1978, following a Cabinet request to submit official views concerning LNG to the Cabinet by 1st July, 1978.

It is important to note here, that by the time the local authorities were formally involved in the LNG decision process, the Cabinet was considering only *two* alternative LNG sites: Maasvlakte (A or B) and Eemshaven. Local authorities responsible for the Maasvlakte sites, however, took into consideration other potential LNG sites, outside Maasvlakte sites A and B, as requested by the Cabinet. In Table 4.10 the various sites involved in the LNG decision process as far as the local authorities around Rotterdam were concerned are summarized, also listing some important characteristics.

In the following sections the respective views of the three relevant local authorities concerning the Maasvlakte LNG sites are assessed. Each of these authorities have a two-tier internal decision structure of a board of governors formulating policies and a council of representatives finalizing the policy decisions. Following consultation with various external organizations the three local authorities formulated their respective policy positions and informed the Cabinet. Figure 4.4 illustrates the decisional network involved.

4.3.2. City of Rotterdam

4.3.2.1. Background and Responsibilities

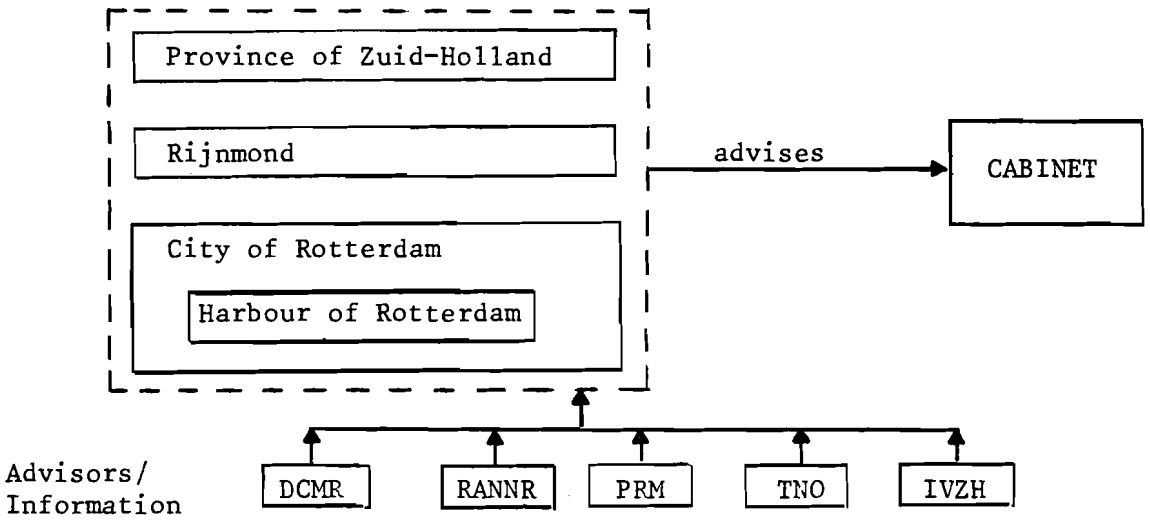
The City of Rotterdam was one of the first parties to be involved in the LNG decision process in the Netherlands. The plans of the Gasunie for a possible terminal for the importation of LNG via tanker into the Netherlands resulted in a request (8 February 1977) by the Gas industry to the City of Rotterdam for approval of a site at the Maasvlakte for a LNG terminal. This particular site would be adjacent to the Gasunie's own LNG peak-shaving plant in the southeastern region of the Rotterdam harbour area (referred to as Maasvlakte site A), which had been in use by Gasunie for a number of years. As early as 1976 the Harbour of Rotterdam had carried out an initial feasibility study on the costs and economic benefits of LNG activities ("Aanvoer van vloeibaar methaan naar de Maasvlakte," Rotterdam Havenbedrijf, March 1976).

Table 4.10.

LNG Terminal Sites	Details
Maasvlakte (site A)	South-western corner of Maasvlakte, adjacent existing Gasunie peak shaving plant; relatively small site; distance to nearest towns Hoek van Holland - 5 km, Oostvoorne - 4 km.
Maasvlakte (site B)	North-western point of Maasvlakte; larger than site A; distance to nearest towns Hoek van Holland - 6 km; Oostvoorne - 8 km (shipping route sites A and B kead 2 km from centre of Hoek van Holland).
Maasvlakte (site C)	extension west of existing Maasvlakte area to be constructed; size of area can be designed as required; distance to nearest towns Oostvoorne -7 km, Hoek van Holland - 9 km.
Voornedam Breakwater (short or long)	extended dam to be constructed 7 or 10 km in shipping route does not interfere with other Rotterdam Harbour traffic; nearest distance to Oostvoorne 10-13 km (short or long dam)
Island location	artificial island to be built 27 km off Dutch coast; connected via pipeline to Maasvlakte or other part of Dutch coastline.
Off-Shore Tunnel Terminal System	platform 4 km off-shore from Maasvlakte for reception of LNG; underwater pipeline for transport of LNG to storage site at Maasvlakte; distance to nearest town Hoek van Holland - 11 km.

The City of Rotterdam is responsible for giving planning permission and issuing a building permit, whilst it also has an advisory function with respect to legislation concerning environmental hygiene and investment plans.

Activities of the Harbour area are the prime concern of the City of Rotterdam. Rotterdam Harbour is the largest in the world--with a goods turnover exceeding 270 million tons; together with the petrochemical industries the Harbour is at the Centre of Rotterdam's economy. Consequently economic interest in attracting LNG to Rotterdam has been high and the authorities of the Harbour of Rotterdam has been high and the Authorities of the Harbour of Rotterdam played a particularly important



KEY:

	DCMR	Dienst Centraal Milieubeheer Rijnmond
	RANNR	Raad van Advies voor Natuurbehoud en Natuurbeheer Rijnmond
	PRM	Provinciaale Raad voor de Milieuhygiene
	IVZH	Inspectie Volksgezondheid Zuid-Holland

Figure 4.4. Local authorities Maasvlakte sites.

role in this respect. The Harbour of Rotterdam clearly perceived it to be of great importance for Rotterdam to be involved in LNG activities. Large scale importation of LNG into Western Europe was thought to result in a reduction in demand for oil, thereby impairing Rotterdam's harbour activities; two-thirds of Rotterdam's harbor trade concerns oil and oil products (1978, p.46).

The general agreement on the benefits of LNG activities for Rotterdam was a major contextual factor in the LNG decision-process in the City of Rotterdam which stated to gain momentum in early 1977. Following the Gasunie's request, the mayor and aldermen of Rotterdam officially involved the Harbour of Rotterdam. The Harbour authorities subsequently prepared advisory reports for the governors of Rotterdam on the feasibility of and requirements for the establishment of a LNG terminal at the Maasvlakte.

Two reports were completed in October 1977--one of which concerning the commercial economic aspects--was never made public. A second, published report (Rotterdam 1977a) dealt with the requirements for LNG activities, the harbor infrastructure, the risks and safety aspects, environmental aspects and cost-benefit analysis. This report forms one of the information inputs of the analysis below. More important, however, is the position stated on LNG by the governors of Rotterdam (mayor and

aldermen) and the City Council, which ultimately led to the final official view of the City of Rotterdam, as communicated to the national Cabinet.

The Rotterdam Harbour Authorities provided direct input to the Mayor and Aldermen of Rotterdam on LNG, and they seem to have been the strongest proponents of LNG at the Maasvlakte. The various informational inputs and organizational relationships concerning LNG decision-making in the City of Rotterdam are depicted below (see Figure 4.5).

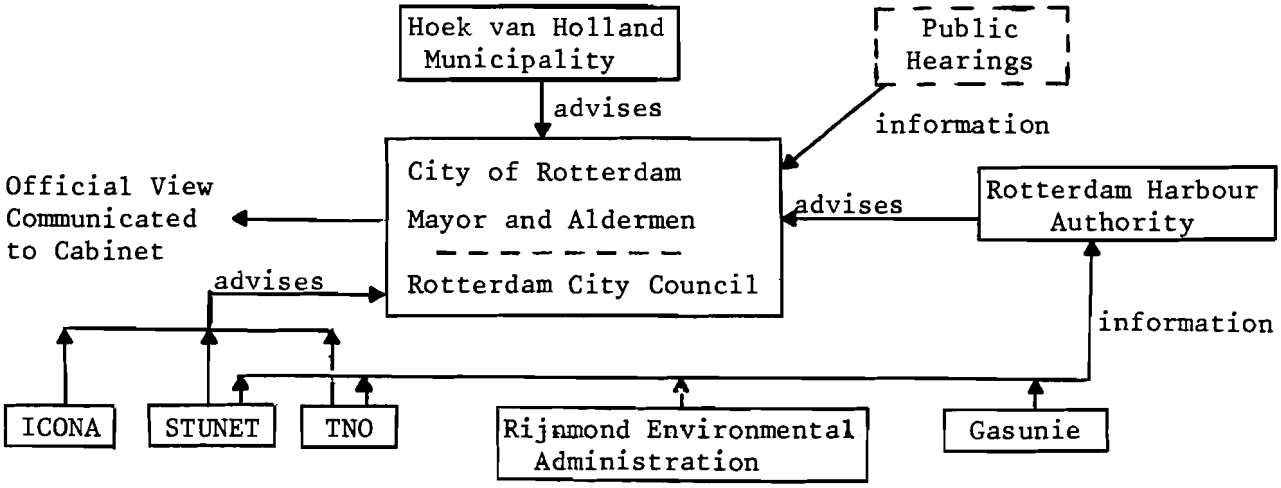


Figure 4.5.

Advisory input to the City of Rotterdam Mayor and Aldermen was also provided by the municipality of Hoek van Holland, closest to the Maasvlakte sites, and within the greater Rotterdam area (see section 4.3.2.8). Other information inputs to the Rotterdam Mayor and Aldermen and Council included the information given in a public hearing at Rotterdam on 9 May 1978, following two "information days" at Oostvoorne and Hoek van Holland municipalities (see also Section 4.6.8).

4.3.2.2. Problem Definition

The City of Rotterdam did not involve itself in a comparison between different LNG sites in the Netherlands, but focused instead upon determining the most suitable location for LNG in the Rotterdam area. Its involvement in the decision-making process stemmed from the initial request from the Gasunie to approve a LNG site at the Maasvlakte. The principle policy questions the City of Rotterdam were subsequently addressing, were the following:

1. Is a LNG terminal site at the Maasvlakte feasible and desirable?
2. (Under what conditions) is a LNG terminal at the Maasvlakte acceptable?

3. Which site is recommended?

The City of Rotterdam was thus primarily concerned with the following dimensions:

(a) economics/costs
(b) health and safety/risk
(c) socio-economic/industrial and regional planning
(d) environmental impact

The dimensions of (e) energy policy strictly falls outside the City of Rotterdam's concern. Attention was, however, paid to this aspect to provide a specific context for discussion of the above policy questions.

4.3.2.3. Energy Policy

The City of Rotterdam was not directly concerned with issues of Dutch national energy policy, but the attention which was in fact paid to this dimension, provided a context for the discussion of the other dimensions of the LNG decision process. The City of Rotterdam largely acknowledged the view put forward by STUNET and ICONA with respect to energy policy. It emphasized the importance of natural gas in the Dutch energy mix and argued that importation of natural gas was therefore desired (Rotterdam 1978c, p.1052). The City of Rotterdam underlined ICONA's position that LNG was the only viable way of importing natural gas from such distant suppliers as Algeria. It also agreed with ICONA on the absence of any other alternatives, such as the exchange of contracts with importers of Dutch natural gas (Rotterdam 1978a, p.14).

The City of Rotterdam had no doubts that "the importance of LNG importation into the Netherlands (was) in the interest of the national economy" (Rotterdam 1978a, p.64). In the context of the Rotterdam itself, it seems to have emphasized the need for LNG importation mainly for strategic reasons: the desire to attract a major new energy activity to Rotterdam. The underlying reasons for this position related to the fact that LNG was thought to stimulate the Rotterdam infrastructure, to help maintain Rotterdam's position as Europe's "energy harbor" and become an impulse for LNG ship building in the area (see also section 4.3.2.6. on socio-economics).

4.3.2.4. Economics/Cost

Since Rotterdam was not concerned with selecting the best LNG site from a national point of view, the dimension of economics largely centered around the economic benefits a LNG terminal could bring to Rotterdam and at what price.

In order to establish whether a LNG terminal would be attractive to Rotterdam from an economic point of view, the Harbour Authorities of Rotterdam performed a qualitative cost-benefit analysis of a LNG project (Rotterdam 1977a, Chapter 12). The outcome of this analysis was to determine the desirability of the project: a benefit: cost ratio of more than 1 would mean that "LNG is acceptable from a societal point of view" (Rotterdam 1977a, p.84). The different elements of the cost-benefit

analysis used by the Harbour of Rotterdam are listed below:

COST FACTORS

purchase of natural gas
transport by sea
infrastructure investments
infrastructure maintenance
traffic control
suprastructure (terminal building, etc.)
operation suprastructure
cost of re-export of gas
possible delays shipping
blocking of harbour (not quantified)
risk of accidents (not quantified)
environmental impact (not quantified)

BENEFIT FACTORS

Savings cost of foreign storage and gasification
savings cost of foreign transport (via pipeline)
harbor income
lease of land
savings of cost of oil (if LNG were to be substituted by oil as energy source)
savings of measures against SO_2 pollution (associated with oil)
avoidance of other air pollution (not quantified)
savings on storage oil reserves
contribution to GNP and employment
possible benefit to ship building industry (not quantified)
income from re-export on natural gas
diversification of energy supply (not quantified)
applications of low-temperature activities (not quantified)
other benefits after year 2000.

Based on calculations assuming a maximum import of 25 x $10^9 m^3$ LNG per year (including a large amount for re-export) all Maasvlakte sites considered by the Harbour of Rotterdam report yielded positive results, as summarized in the Table 4.11 (Rotterdam 1977a, pp.94-95):

If, however, the maximum imports are set at only 8 x $10^9 m^3$ LNG per year, solely for Dutch internal gas demand, the benefit/cost ratio become smaller than 1: 0.73, 0.71, and 0.67 respectively (Rotterdam 1977a, pp.96-97). On this basis the Harbour of Rotterdam report concludes that when ***large quantities*** of LNG are imported, a Maasvlakte LNG terminal is of social-economic importance to the Netherlands (Rotterdam 1977, p.9; emphasis added).

The governors of Rotterdam (and especially the Economic/Harbor Committee) made heavy use of the Harbour's report on LNG, when they argued their case before the Rotterdam City Council. As regards the economics dimension they stressed the overall economic importance of LNG to Rotterdam. The economic benefits of LNG are to safeguard the economic future of the Harbour of Rotterdam and maintain Rotterdam as

Table 4.11.

Site	Benefit/Cost Ratio
Maasvlakte A	1.09 ± unquantified factors
Maasvlakte B	1.08 ± unquantified factors
Maasvlakte C	1.07 ± unquantified factors

a major energy port (Rotterdam 1978a, pp.64/65; 1978c, p.1043). It was expected that increased LNG imports into Western Europe would lower oil demands and thus lower Rotterdam's economic activities related to oil products. The City of Rotterdam was convinced that with respect to the position of Rotterdam as energy centre in Western Europe LNG import at the Maasvlakte was very important (Rotterdam 1978a, p.54; 1978c, p.1054). The maintenance of Rotterdam's international position was a major factor used to argue in favor of a Maasvlakte site for LNG and against a LNG terminal at Eemshaven (Rotterdam 1978b, p.12).

The City of Rotterdam welcomed new activities in support of the economic structure of the Harbour of Rotterdam area (1978a, p.63). Having established the desirability of attracting LNG to Rotterdam, the City of Rotterdam concluded that there was no clear preference for one of the specific Maasvlakte sites, based on the cost-benefit analysis (performed by the harbour authorities) (Rotterdam 1978a, p.52).

As regards the investment cost of a LNG terminal, Table 4.12 indicate the figures that were used (Rotterdam 1977a, p.12/13; 1978c, p.1051). The third Maasvlakte site (C) was left out of further consideration by the City of Rotterdam governors (1978a, p.25); a major factor in this respect was the high cost.

Rotterdam Harbour had also indicated its clear preference for Maasvlakte site A and B, from the point of view of economics. The total quantifiable cost seemed, however, to be little different between the three sites, as the following Table 4.13 indicates (Rotterdam 1977a, pp.94-97).

Cost comparison between the Maasvlakte sites and Eemshaven showed that the latter was 700 million guilders more expensive, according to the figures of the City of Rotterdam (1978b, p.12).

Table 4.12. Investment cost.
(millions of Dutch guilders)

Maasvlakte A	32.9	(three berths)
Maasvlakte B	39.0	(three berths)
Maasvlakte C	417.5	
Voornedam	1100.0	

Table 4.13. Total quantifiable cost.
(million of Dutch guilders)

Site	(max. $25x10^9 m^3$ LNG per year)	(max. $8x10^9 m^3$ LNG per year)
Maasvlakte A	18,574.0	3,824.8
Maasvlakte B	18,684.8	3,935.6
Maasvlakte C	18,942.7	4,196.5

4.3.2.5. Health and Safety

Assessments of the Health and Safety aspects by the City of Rotterdam was largely based upon the reports by the Rotterdam Harbour Authorities and the TNO risk analyses. The Rotterdam Harbour Authorities (1977a, p.41) were critical of the TNO study (e.g., with respect to the reliability of statistical data based on limited data bases), but nevertheless stated that its conclusions were in line with its own calculations. The Harbour Authorities made use of the definition of risk = probability x consequences and--despite its critical comments--made use of the TNO data to compare the risks associated with LNG with those of other activities.

The Harbour of Rotterdam did not include in its evaluation the risk of detonation. Its comparison between the risk of LNG and other statistical changes of death due to other activities is shown in Table 4.14 (Rotterdam 1977a, p.54). On this basis the Rotterdam Harbour Authorities concluded

that "the risks of LNG constituted only a slight increase of the 'daily' risks experienced by the population--even without any risk reducing measures (Rotterdam 1977a, p.54).

Table 4.14. Chances of death.

in traffic, at home	1:1,000
at work	1:10,000
due to LNG import	1:70,000
due to fire	1:100,000
due to flooding	1:10,000,000

The Rotterdam Harbour report (1977a, p.15) also included a contribution of the Rijnmond Environmental Administration (DCMR). It concluded that LNG does not represent a danger to the population when the closest populated area is 3 to 5 km away from the LNG terminal. The environmental administration estimated the probability of a major accident occurring 1:100,000, whereby windows in buildings would be shattered by an explosion up to 3 kilometers away (5 km if detonation occurs). The Environmental administration recommended that no industrial installation should be closer to the terminal than 1.5 kilometers or be able to withstand pressures of 0.1-0.3 bar.

As regards the acceptability of a LNG terminal at the Maasvlakte, the Harbour Authorities report (Rotterdam 1977, p.55) concluded that a LNG terminal at either of the three Maasvlakte sites considered would not "effect demonstrably" the risk of accidents in the area. Maasvlakte site C is further away from the populated area and can thus be regarded as safer, the report concluded. Referring, however, to STUNET conclusion that the risk (probability x consequences) of a LNG terminal off-shore would be virtually the same as for the Maasvlakte site A (which is closest to the populated area), the Harbour Authorities concluded that the difference between Maasvlakte sites A and C are "undoubtedly even smaller."

The City of Rotterdam--relying heavily on risk-analytical data from TNO--concluded that the location of a LNG terminal is no more dangerous than many another industry in the Rotterdam Harbour area (Rotterdam 1978a, p.38). This conclusion is mainly based on considerations of "factual risk" (probability x consequences), rather than "perceived risk," which is only briefly mentioned in the City of Rotterdam reports.

In the Rotterdam analysis, the safety objections with respect to LNG had been split up into three aspects:

(1) industrial safety--technical nature

(2) nautical safety--technical nature, and

(3) psychological nature.

With respect to the psychological safety aspect much value was being attached to the government's pledge (to Rotterdam local authorities) that a LNG terminal at the Maasvlakte would effectively rule out the siting of a nuclear power plant in the Rotterdam area (Rotterdam 1978c, p.1053).

Concerning the technical safety aspects, the City of Rotterdam argued for stringent safety requirements, without proving specific details. The City of Rotterdam failed to specify under which exact safety conditions a LNG terminal would be acceptable or not. The "rest-risk" of LNG activities--once risk-reducing measures have been employed--should be evaluated against the societal advantages of a LNG terminal, it argued (Rotterdam 1978c, p.1054).

The overall conclusion of the City of Rotterdam was that LNG activities "will not impair the present safety level in the area (Rotterdam 1978a, p.62; 1978c, p.1053).

It also notes that the safety system which should be developed for LNG shipping activities could in fact also benefit the safety of transport of other dangerous materials in the area (Rotterdam 1978c, p.1053). The City of Rotterdam thus concluded that there were no objections to a LNG terminal at the Maasvlakte from the point of view of risk and safety (Rotterdam 1978a, p.54)--assuming certain risk reducing measures (Rotterdam 1978a, p.63).

Rotterdam's approval of a LNG terminal at the Maasvlakte was specifically linked to the following three factors:

- strict traffic control requirements for shipping;
- location of nuclear power plant in the area is ruled out with LNG;
- risk reducing measures must be agreed upon (Rotterdam 1978a, p.66).

Concerning the relative safety of the three Maasvlakte sites; the City of Rotterdam states that it gives preference to Maasvlakte site B from the viewpoint of ***safety***.

As regards comparison between Eemshaven and the Maasvlakte sites, the City of Rotterdam argues that the risk of tanker collisions is lower at the Maasvlakte than at Eemshaven, mainly because of the larger scope for strict waterways control and the availability of better navigational aids at Rotterdam (1978a, pp. 3 & 11). Additionally, the City of Rotterdam argues that the shipping route to Eemshaven increases the dangers, because it leads close to the West-German island of Borkum (Rotterdam 1978a, p.31). From the perspective of safety, the Maasvlakte sites should thus be preferred to Eemshaven, according to the City of Rotterdam.

4.3.2.6. Socio-Economics

The City of Rotterdam concerned itself with the dimension of socio-economics in two major ways:

(a) general improvement of socio-economic activities in the Rotterdam area; and

(b) employment generation resulting from LNG activities.

The position of Rotterdam as the "energy centre" of Western Europe played a major part in the discussions on LNG in Rotterdam. The City of Rotterdam viewed it as extremely important that a major energy activity such as LNG would be attracted to Rotterdam and improve the socio-economic situation of the Harbour of Rotterdam.

The position of the City of Rotterdam was directly related to its policy for harbor activities which stressed (among other aspects) the improvement of harbor infrastructure, maintenance earning capacity of the harbor, and the creation of jobs--all of which were thought to be enhanced by a LNG terminal at the Maasvlakte (Rotterdam 1978a, p.62). In this context, the City of Rotterdam also stressed the need for additional economic activities in the Rotterdam area and the scope for generating new activities alongside LNG, such as a cryogenics industry, which would in turn have a positive effect upon employment in the region (Rotterdam 1978a, p.63).

As regards to permanent employment due to a LNG terminal at the Maasvlakte, the City of Rotterdam concluded that for the operation of the terminal 40-50 people would be employed (Rotterdam 1978a, p.47). These figures are probably taken from the report by the Harbour of Rotterdam (Rotterdam 1977a, p.91), which showed the following figures for the three Maasvlakte sites considered (see Table 4.15). The report by the Harbour of Rotterdam, furthermore showed the following number of man-years of employment generated by a LNG project at the Maasvlakte sites (Rotterdam 1977a, p.90).

Table 4.15.

	Maasvlakte Sites		
direct employment	**A**	**B**	**C**
(man-years)	40	52	52

Additional employment could also be expected--according to the Harbour Authorities--due to (support services at the LNG terminal during arrival, handling and departure of LNG tankers. No direct estimate is made of this employment effect.

Table 4.16. Employment during construction (man-years)/year

	Maasvlakte Site		
employment	**A**	**B**	**C**
direct -- infrastructure	50	50	175
direct -- suprastructure	1200	1320	1320
indirect	1750	1918	2093
Total	3000	3288	3588

From the figures provided by the Harbour Authorities on the estimated financial gains of this employment effect, it can be deduced that the employment generation in this respect is highest for Maasvlakte site C and lowest for site A--the difference being relatively small (less than 15%).

Concerning the construction of a LNG tanker, the City of Rotterdam estimated that a 125,000m^3 LNG tanker would require 400 million guilders of investment and provide employment for 1800 people (Rotterdam 1978a, p.48). This figure is not dependent on the exact location of the LNG terminal.

In addition to the increase in employment expected because of LNG, the City of Rotterdam also warned against the dangers of loss of jobs, due to a reduction of oil-related activities in the Rotterdam Harbour area and over-capacity of the chemical industry. LNG activities were seen to be able to offset these downward employment trends in the Rotterdam area (Rotterdam 1978b, p.12) and to increase the number of economic activities in the area (Rotterdam 1978c, p.1054).

4.3.2.7. Environmental Impact

The City of Rotterdam paid relatively little attention to the environmental aspects of LNG. The report prepared by the Harbour of Rotterdam calculated air pollution figures for LNG activities (including tankers and terminal activities) for NO, CO, SO_2 and carbohydrates--without making a distinction between different emissions between the various sites.

The use of natural gas as a substitute for oil, was seen as having a positive effect upon the environment, since the polluting emission product of natural gas are much lower than in the case of oil (Rotterdam 1978c, p.1053/1054). This would result in savings of costs otherwise incurred through pollution-reducing measures. In the cost-benefit analysis performed by the Harbour of Rotterdam, all Maasvlakte sites were considered as providing the same extent of benefits in this respect. Other environmental effects were not quantified by the City of Rotterdam.

The City of Rotterdam concluded that it has no environmental objections to a LNG terminal at the Maasvlakte (Rotterdam 1978c, p.1055).

4.3.2.8. Hoek van Holland Advice to Rotterdam

The municipality of Hoek van Holland, near the Maasvlakte area, lies within the greater Rotterdam area and gave official advice to the Mayor and Alderman of Rotterdam with respect to a LNG terminal at Maasvlakte. The municipal council of Hoek van Holland debated the LNG issue on 23 May 1978 and concluded the following:

- storage of LNG at Maasvlakte is acceptable, but reception and handling is to take place off the Maasvlakte shore; shipping along the Nieuwe Waterweg (the channel between the North Sea and Rotterdam harbor) by LNG carriers is not acceptable;
- LNG import should benefit local industry in the area in terms of its required gas supply, in order to limit air pollution (due to other energy sources);
- siting of a nuclear power station at Maasvlakte is not possible (if LNG terminal accepted)

The municipality stated that in case its advice concerning safety would not be followed up by the relevant higher authorities, as regards LNG siting, and a LNG terminal would be sited in the area, it was only permitted after a set of conditions were implemented. These included a new official organization to be set up for the control and regulation of all shipping movement in the area, operational use of an advanced radar system, and specially designed safe transport ships with gas tanks up to 5,000 m^3 capacity (Rotterdam 1978c, p.1049).

4.3.2.9. City of Rotterdam Policy Perspective

The nature of the policy questions addressed by the City of Rotterdam had implications for the ways the different dimensions were interpreted both absolutely and as regards relative importance. The first policy question on the feasibility and desirability of a LNG terminal at the Maasvlakte, largely concerned the technical feasibility on the one hand and the economic and socio-economic dimensions on the other. The economic and socio-economic aspects of the LNG discussion were thus important dimensions in the decision process. The energy policy dimension played a very limited role.

Once the question of desirability of LNG was answered positively the second context policy question on acceptability became merely a constraint for LNG activities. The question thus shifted towards a discussion of the *conditions* of LNG activities in the Maasvlakte area, largely focusing upon the aspect of risk. The City of Rotterdam stressed, however, that safety could not be evaluated by itself, but should be assessed in relation to the economic costs and benefits involved in deciding upon a safe site. The question of acceptability thus largely became a discussion of a *cost vs. safety trade- off*. This discussion could only take place after the City of Rotterdam had stated that

1. LNG activities would not be more dangerous than other industrial activities already in the area, and
2. it would not increase the "cumulative" level of risk in the region.

As regards the final question concerning the location of the LNG terminal economic and socio-economic dimension seemed to have had the upperhand. Although no specific public statement were made as regards the final trade-off in this respect, it seems that Maasvlakte site C was ruled out because of its high cost. As regards the choice between sites A and B, the latter was favored by the City of Rotterdam, because it enabled industrial activities to be developed alongside the LNG terminal.

The dimensions which seem to have played the dominant role in resolving the three man policy questions addressed by the City of Rotterdam are summarized below (see Table 4.17). The following Table 4.18 illustrates the role played by the various dimensions in relations to the policy questions identified in Table 4.17.

Table 4.17. City of Rotterdam Policy Views.

decision chronology ↓

Policy Question	Major Dimension(s)	Outcome
LNG terminal feasible and desirable? (at Maasvlakte)	1. socio-economics 2. economics/cost	Yes
LNG terminal acceptable? (at Maasvlakte)	1. health and safety	Yes*
Preferred Maasvlakte site?	1. economics/cost 2. socio-economics	site B*

*One of the conditions for acceptance of LNG was that the (future) siting of a nuclear power plant at Maasvlakte would be ruled out by the national government.

4.3.2.10. Rotterdam City Council

The proposals of the Mayor and Alderman of the City of Rotterdam were discussed in the Council of Representatives of Rotterdam (on 29 June 1978). Despite apparent opposition from some parties of LNG siting (mainly on safety grounds), the majority of the council was in agreement with the governors proposal and a motion against LNG at the Maasvlakte was defeated (Rotterdam 1978d, p.242). The council subsequently approved a final position on LNG based on the following considerations (Rotterdam 1978d, p.220):

Table 4.18.

Policy Question / Dimension	LNG at Maasvlakte desirable?	LNG at Maasvlakte acceptable?	Preferred site?
1. economics/cost	+[1)]	+[2]	A
2. socio-economics	+	+[2)]	B
3. health and safety		+[3)]	C
4. environmental impact		+/-	o
Outcome	Yes	Yes	site B

KEY:
- \+ favorable
- o no preference / not considered/not relevant
- +/- marginally favorable

NOTES:
1) depending on quantity imported
2) if LNG would provide economic benefit; LNG tanker built in Rotterdam; supply supply in area to be guaranteed
3) no nuclear power plant in Rotterdam area was condition

-- LNG will have positive economic effects for Rotterdam Harbour;
-- 15 x $10^9 m^3$ LNG per year is maximum for importation;
-- long-term gas supply in Rotterdam (industrial) area is guaranteed;
-- LNG tankers are to be built in the Rotterdam area.

The official position of the City of Rotterdam was the following:

(1) in-principle decision in favor of a LNG terminal at the Maasvlakte Site B;

(2) acceptability depends upon strict traffic control, the absence of nuclear power plant in the area, and the introduction of risk reducing measures;

(3) specific requirements and conditions would be formulated at a later stage in the decision process.

4.3.3. Rijnmond Public Authority

4.3.3.1. Responsibilities and Involvement

Rijnmond Public Authority is collective of 16 municipalities in the Rotterdam Harbour area, including the City of Rotterdam itself. The Public Authority provides advice and governs regional activities with respect to environmental planning, housing policy, transport, health and safety and pollution control, and other areas. By law the Rijnmond Public Authority is responsible for drafting guidelines to the municipalities on a wide range of policies in the separate municipalities. One of the main areas of interest of Rijnmond is the environment, a special Rijnmond Environmental Administration (DCMR) was set up in 1971. It provides assistance on environmental matters and pollution control and has a wide network of sensors in the Rijnmond area for the monitoring of environmental conditions.

Rijnmond Public Authority has a strong tradition of special interest in environmental affairs and safety. Environmental control is probably its main single area of active responsibility; Rijnmond public authority was the first local authority in the Netherlands to initiate (industrial) safety studies and risk analyses, and to become involved in pollution and noise surveillance and control.

Rijnmond Public Authority was initially responsible for the approval of industrial activities at the Maasvlakte (e.g., LNG) with respect to the pollution act. In 1978 this responsibility moved to the Province of Zuid-Holland. Consequently, Rijnmond Public Authority was left with only an advisory function in relation to the LNG decision process in connection with legislation on investment, environmental planing and pollution.

In 1977 the Rijnmond Public Authority became involved in the decision process on LNG, when the Gasunie approached Rijnmond for discussions on the siting of a LNG terminal at the Maasvlakte. In October, 1977, Rijnmond received a request from the Ministry of Economic Affairs to start procedures which led to an official position concerning the acceptability of a LNG terminal at Maasvlakte (PW Groningen 1978).

Following questions in the Rijnmond Council and anticipating a ministerial request for advice on LNG, the Public Authority, a first public information brochure on LNG was published in October 1977 (Rijnmond 1977b). As part of the Rijnmond decision procedures on LNG, public hearings were also planned at a relatively early stage. At one stage interest surfaced within Public Authority Rijnmond to stage a special "public participation program" as part of the LNG decision-process. Although such an initiative never actually materialized, it is perhaps indicative of its concern about LNG developments and public acceptability.

The official request from the Cabinet for Rijnmond's view as to Maasvlakte site A and B for the location of a LNG terminal, came in March 1978. Another public information brochure was prepared--this time in collaboration with the City of Rotterdam and the Province of Zuid-Holland.

Based on the outcome of the public hearings, previous reports on LNG by ICONA, STUNET, TNO and the Harbour Authority of Rotterdam, the Governors of Rijnmond prepared a policy paper on LNG in June 1978 (Rijnmond 1978a). It also made use of a specially requested advice from the State Inspection for Public Health in Zuid-Holland and the advice of the General Energy Council of the Netherlands. Following discussions in the Rijnmond of the policy paper, a final official position on LNG was formulated. The various information inputs and outputs as well as organizational structures are depicted in Figure 4.6.

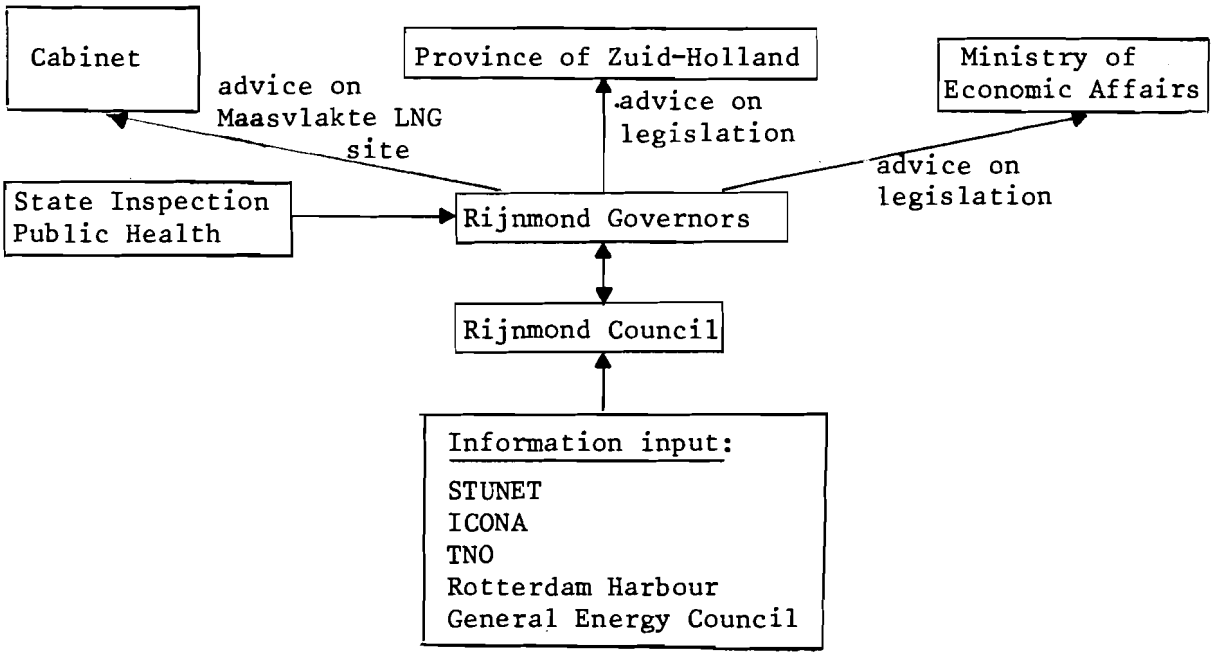


Figure 4.6.

4.3.3.2. Problem Definition

Rijnmond Public Authority seems to have concerned itself with most of the major aspects relating to the siting of a LNG terminal in the Rijnmond region. Rijnmond (1977b, p.25) initially distinguished two major policy questions:

(1) whether to import LNG, and

(2) where to site a LNG terminal.

These questions were evaluated within the context of the following dimensions:

Energy Policy
Economics/Cost
Health and Safety
Socio-Economics/Industrial and Regional Policy
Environmental Impact

The official request by the Cabinet for Rijnmond Public Authority to establish its position vis-a-vis a LNG terminal at Maasvlakte sites A or B, provided a more limited question, focusing on the acceptability of these two sites. Rijnmond Public Authority decided, however, to evaluate LNG activities in a wider context, addressing the following major policy questions:

1. Is a LNG site in the Rijnmond region desirable?
2. Under which conditions is importation, handling and storage of LNG acceptable?
3. Which site is recommended for a LNG terminal?

Rijnmond Public Authority acknowledged that questions of national energy policy were in the first instance maters of the Cabinet, and these issues should remain at the background of the policy discussions on LNG in the Rijnmond region.

The discussion of siting policy of LNG by Rijnmond Public Authority was not limited to the evaluation of Maasvlakte sites A and B, as requested by the Cabinet. According to Rijnmond, the assessment of the different relevant dimensions required also to take account of alternative locations for LNG within or near the Rijnmond area (Rijnmond 1978a, little c., p.3). Consequently, the Rijnmond Public Authority considered the following possible sites for LNG activities:

- Maasvlakte site A
- Maasvlakte site B
- Maasvlakte site C
- Voornedam breakwater dam
- Off-shore Tunnel Terminal System (OTTS)
- Off-shore artificial island

In the following analysis, the prime sources of information are the Rijnmond Public Information brochure of 1977 (Rijnmond 1977b) and the policy paper prepared by the Rijnmond governors for discussion in the Rijnmond Council (Rijnmond 1978a).

4.3.3.3. Energy Policy

Rijnmond Public Authority largely accepted the position of ICONA and the Cabinet as regards the necessity for importing natural gas from the perspective of energy policy. Additionally, Rijnmond acknowledged that natural gas imports could only be realized by means of LNG tankers, rather than via pipeline from less distant sources (Rijnmond 1977b, p.6).

Rijnmond also quoted the advice from the General Energy Council to the Cabinet, which argued strongly in favor of LNG importation into the Netherlands, for reasons of energy supply. The Rijnmond Public Authority also stressed the importance of maintaining a high percentage of natural gas in the Dutch energy supply mix in the future and the associated environmental advantages over oil.

The option of using a foreign LNG terminal for Dutch natural gas was not discussed by Rijnmond Public Authority in any major way. Rijnmond Public Authority considered national energy policy primarily a matter for central government. The Dutch government's intentions to import LNG at a Dutch terminal, therefore became the underlying *premise* for the Rijnmond Public Authority in its evaluation of its position on the siting of a LNG terminal (1978a, p.67).

4.3.3.4. Economics/Cost

Rijnmond Public Authority considered the economic importance of LNG for the Rotterdam harbour area in the same way as the City of Rotterdam: LNG activities could of-set some of the expected decrease of oil-related activities in the Rotterdam Harbour. LNG activities should therefore be welcomed from an economic point of view, according to the Rijnmond Public Authority (see also Section 3.3.6. socio-economics). As far as the investment cost of a LNG terminal was concerned, the Rijnmond Public Authority made use of various estimates by the Rotterdam Harbour Authority, ICONA, State Public Works and industrial contractors, to arrive at the cost figures illustrated in Table 4.19 (Rijnmond 1978a, p.42).

The final evaluation by Rijnmond Public Authority on the preferred site for a LNG terminal does not seem to have been influenced significantly by the difference in investment cost. The economics dimensions was, however, taken into account as far as the broader economic benefits for the Harbour of Rotterdam was concerned (see 3.3.6. Socio-economics).

4.3.3.5. Health and Safety

The assessment by Rijnmond Public Authority on the health and safety aspects of LNG siting was based entirely on data and analytical methods of other organizations, such as TNO, ICONA and the Rotterdam Harbour Authority.

Rijnmond concluded that STUNET in its estimates had overvalued the risk involved in an off-shore LNG island. Consequently the Rijnmond Public Authority concluded that the risks involved in a LNG terminal at the Maasvlakte sites A and B were considerably higher than the risk (probability x consequences) at a LNG island-terminal. The Rijnmond Public Authority also argued that the government had too much emphasis upon the "total" risk involved in LNG activities at the different sites.

According to Rijnmond the risk should be separated into those aspects which are independent of the location of the LNG terminal, such as risk to the LNG tanker crews, terminal personnel, etc., and the risk specific to a particular site, such as the risk to the local neighboring population. Rijnmond Public Authority concluded that not enough weight had been given to the location-specific risk factor.

Table 4.19. Estimated investment cost.
(millions of 1977 guilders)

Location	Harbour Estimate	Public Works Authority	Ballast Nedham (industry)	Ogem Industry
Maasvlakte				
A	63	30		
B	87	40		
C	315	450-775		
(different options)				
Voornedam (long dam)			850	
Voornedam (short dam)		1000	600	
LNG - Island		1000-1220		
OTTS				390

OTTS = Off-Shore Tunnel Terminal System
1) 1978 prices
2) 1976 prices

Rijnmond did not put forward definite safety requirements under which LNG terminal siting would or would not be acceptable, but confined itself to questions of the acceptability of Maasvlakte sites A and B. With respect to the location-specific risks, Rijnmond Public Authority does, however, consider the different estimated deaths involved in major LNG accident (resulting in detonation). The results are summarized in Table 4.20 (Rijnmond 1978a, p.67).

Rijnmond Public Authority believed that the number of casualties which are independent of the precise terminal location is only of relevance to the policy question of whether LNG should be imported. As regards the siting of a LNG terminal only the risk to the neighboring population etc. is relevant, according to Rijnmond Public Authority.

Table 4.20.

Location	Average Number of Deaths Among Neighboring Population
Maasvlakte A or B	5,500
Island	0[1)]
Voornedam (long)	0
Voornedam (short)	220
OTTS	475

1) only the deaths among island crews

Within this context Rijnmond believed that the question of acceptability of LNG should be separated into two aspects:

(1) storage of LNG; and

(2) transport and handling of LNG.

Rijnmond Public Authority concluded that the storage of LNG had relatively small safety risks and the handling and transportation of LNG constituted the major danger to the population. It therefore came to the conclusion that reception and handling of LNG should take place at sea at an off-shore terminal, whilst the storage of LNG could take place at a land-site.

Rijnmond Public Authority also concerned itself with the risk of LNG as perceived by the local population. With respect to the acceptability of increased risk in the Rijnmond region it noted that the Rijnmond area is already experiencing higher risks than the rest of the Netherlands which has led to a "mental pressure" upon the local population. According to Rijnmond, the siting of a LNG terminal in the Rijnmond area would increase the "psychological-social" pressure among the population, in particular because an accident with LNG at Maasvlakte would have a large effect, even though the probability of such an incident is very small (Rijnmond 1978a, p.66).

As regards the safety dimension, Rijnmond finally concluded that the storage of LNG at Maasvlakte sites A or B constituted relatively small risks. The reception and handling of LNG on the other hand, could have large consequences for the local population in case of an accident, Rijnmond concluded. This was largely due to the shipping route to terminal sites A and B, which lead only about 2 kilometers from the town of Hoek van Holland. Consequently Rijnmond Public Authority concluded that

reception and handling of LNG at the *Maasvlakte sites A and B* was *not acceptable* (Rijnmond 1978a, p.68). For reasons of safety the governors of Rijnmond therefore also argued for the locational separation of storage of LNG on the one hand, and the reception and handling of LNG on the other.

4.3.3.6. Socio-Economics/Industrial and Regional Policy

The assessment of the siting of a LNG terminal in the Rijnmond region was considered by the Rijnmond Public Authority against the background of regional economic development. The economy of the Rijnmond area was facing difficult times, the Rijnmond Public Authority argued, and LNG activities would provide welcome new opportunities for economic activities (Rijnmond 1978a, p.63)

As far as increased employment benefits were concerned, Rijnmond concluded that the number of man-years required for the infrastructure of a LNG terminal would be approximately proportional to the investment involved. Consequently off-shore locations for LNG would bring about the greatest socio-economic benefits to the area. In line with the estimates by both ICONA and the Rotterdam Harbour Authority, Rijnmond Public Authority concluded that an off-shore terminal would provide 3 times as much additional employment than a terminal at Maasvlakte sites A or B.

The Rijnmond Public Authority mentioned three main reasons why a LNG terminal is of socio-economic importance--and therefore of importance to the Rijnmond region (1978a, p.67).

(1) stimulus for employment: direct (construction of terminal) as well as indirect (supporting activities, ship building industry);

(2) possibilities for broadening the economic infrastructure through cryogenics industry around terminal; and

(3) the contribution which handling and storage of LNG could bring for the maintenance of the base of the national economy.

These advantages were seen to apply to any LNG site; Rijnmond Public Authority argued, however, that in particular with respect to the development of related industries (e.g., cryogenics), Rijnmond region provided optimal conditions.

Regional-economic considerations led Rijnmond Public Authority to argue in favor of a LNG terminal site in or near the Rijnmond area. The two main reason for this conclusion were:

(1) major natural gas users are in the Rijnmond area; and

(2) LNG activities could be combined wit large scale LPG activities, which were anticipated to be located in the Rijnmond area.

As mentioned earlier, the Maasvlakte site A and B were, however, rejected by Rijnmond Public Authority for the siting of a LNG terminal.

4.3.3.7. Environmental Impact

Rijnmond Public Authority paid relatively little attention to the dimension of environmental impact. Like most other parties involved in the LNG decision process, Rijnmond Public Authority acknowledged that in comparison to oil, natural has considerable environmental advantages due to lower air pollution emissions.

Rijnmond Public Authority made use of STUNET's data concerning sources of environmental pollution of the soil, thermal pollution and noise. The overall conclusion of Rijnmond Public Authority with respect to environmental impact of a LNG terminal, was that pollution of the air, water, soil as well as noise, would be limited to such a degree, that no objection on these grounds was anticipated (Rijnmond 1978a, p.68).

4.3.3.8. Rijnmond Council

The proposals of the governors of Rijnmond Public Authority were discussed in the Rijnmond Council of representatives in June and July 1978. The initial policy position of the Rijnmond governors concluded the following views:

(a) reception and handling of LNG at Maasvlakte sites A and B is rejected; and

(b) preference for spatial separation between LNG storage (which is acceptable at Maasvlakte) and the reception and handling of LNG (which should be off-shore).

By and large the majority of the Rijnmond Council seem to have been in agreement with mot of the views put forward by the Rijnmond Governors (Rijnmond 1978a). One political party, however, did think Maasvlakte B was acceptable for a LNG terminal, whilst another did not think LNG was acceptable at the Maasvlakte sites at all. The desirability of LNG importation received relatively little attention by the Council.

Following debates in the Rijnmond Council, the second part (b) of the proposed position was narrowly defeated. Instead a separate motion was narrowly carried by the Rijnmond Council, stating that *storage* of LNG at Maasvlakte sites is acceptable.

The final position of Rijnmond Public Authority, as communicated to the Cabinet in July 1978 (Rijnmond Council 120th and 121st session, 26th June and 6th July, 1978), thus became:

1. reception/handling of LNG at the Maasvlakte sites is not acceptable.
2. storage of LNG is acceptable at Maasvlakte.

This position, in fact, implied a choice in favor of the so-called OTTS-system (Off-shore tunnel terminal), which had been suggested by an industrial group (OGEM), but had been rejected on the grounds of maritime objections. (Modifications to the original plan in order to enable a technically and nautically feasible terminal location would require further study of approximately two years, according to ICONA.)

4.3.3.9. Rijnmond Policy Perspective

Rijnmond Public Authority thus rejected a LNG terminal at Maasvlakte sites A or B, but were by no means uninterested in attracting LNG activities to the Rijnmond area. Rijnmond was primarily concerned with the socio-economic infrastructure of the region and argued strongly in favor of a LNG terminal in or near the Rijnmond area. A major concern was, however, health and safety; it was within this context that Rijnmond Public Authority rejected a terminal for LNG at the Maasvlakte sites (involving both reception and handling as well as storage). This concern was directly related to Rijnmond's special *responsibility* for environmental and safety affairs in the region.

Rijnmond's position on the three main policy questions identified before, are summarized in Table 4.21 in relation to the major dimensions

Table 4.21.

Policy Question	Major Dimension(s)	Outcome
LNG desirable for Rijnmond area?	1. socio-economics 2. economics/cost	Yes
LNG acceptable in Rijnmond area?	1. health and safety	Yes/No[1)]
Where to site LNG terminal?	1. socio-economics 2. health and safety	in/near Rijnmond; not at Maasvlakte[2)]

1) as far as Maasvlakte sites A and B were concerned:
storage--acceptable;
handling/reception--not acceptable

2) handling/storage combined LNG/LPG terminal off-shore.

which seem to have governed their outcome. The position of Rijnmond Public Authority thus was a trade-off between the desire to attract LNG to Rijnmond area for socio-economic reasons, and to resist on-shore handling and reception of LNG out of concern for safety of the local population.

The Governors of Public Authority Rijnmond, in further contact with the Cabinet and parliamentary committeen 14626, argued in favor of a *combined* location for reception and handling of *LNG* and *LPG* at an off-shore terminal. This policy position related to the concern on the part of Rijnmond Public Authority about the safety aspects of LNG and LPG, anticipating increasing requirements for supply and transport in the Rijnmond region (Rijnmond 1978d; 1978e).

4.3.4. Province of Zuid-Holland

4.3.4.1. Involvement and Decision Procedure

The Province of Zuid-Holland became officially involved in the LNG decision process, following the application from Gasunie for a LNG terminal at Maasvlakte. The Province of Zuid-Holland was responsible for approval of the site within existing legislation concerning pollution, planning and housing regulations. Following the Cabinet's request of March 1978 the Province of Zuid-Holland was obliged to prepare its position with respect to approval of a LNG site at Maasvlakte sites A or B--which would be binding in connection with subsequent approval in the context of the different national planning laws mentioned above.

In preparing its policy statement, the Governors of Province of Zuid-Holland made use of information from STUNET, ICONA and TNO and furthermore requested advice from the Provincial Council for Environmental Hygiene (PRM). It also set out to incorporate information and opinions on LNG from public hearings and through "public objections" which were received by the Province. A policy statement was subsequently produced by the Provincial Governors in May 1978 and discussed by the Provincial Council. The main part of the analysis below is based upon the published policy statement by the Governors of Zuid-Holland. Following the council debate a final provincial position was communicated to the Cabinet in late June 1978.

The different organizations involved in the provincial decision procedure on LNG and the main sources of information are depicted in Figure 4.7.

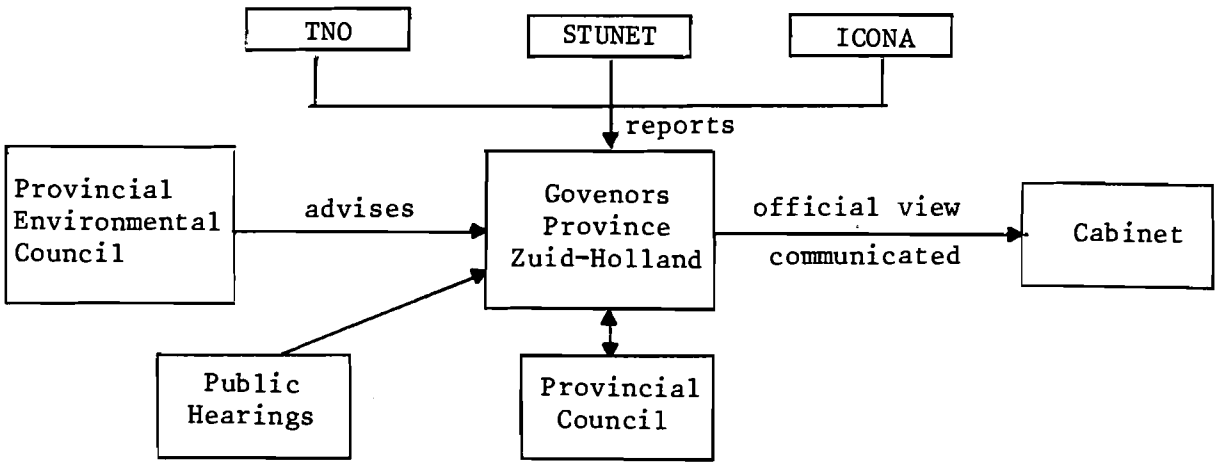


Figure 4.7.

4.3.4.2. Problem Definition

The Cabinet's request for an official position on LNG from the Province of Zuid-Holland strictly concerned only Maasvlakte sites A and B, sine the other sites in the Zuid-Holland region had by then been ruled out by the Cabinet. The Governors of Province of Zuid-Holland, however, decided to include in its analysis and advice possible alternative LNG sites (Zuid-Holland 1978b, p.3), in the area. The Province of Zuid-Holland thus considered the following alternative LNG sites:

1. Maasvlakte site A;
2. Maasvlakte site B;
3. Maasvlakte site C (requiring an extension of the harbor area); and
4 Voornedam (breakwater dam).

The major policy question addressed by the Province of Zuid-Holland were almost identical to those considered by the City of Rotterdam--with the exception of the (technical) feasibility of a LNG project. It thus faced the following major questions:

1. Is LNG importation at the Maasvlakte desirable?
2. Is a LNG terminal in the Zuid-Holland region acceptable?
3. Which site should be preferred for a LNG terminal?

In evaluating these question the Province of Zuid-Holland assessed the following dimensions:

1. energy policy
2. economics/cost
3. health and safety
4. socio-economics

The environmental impact of LNG was briefly discussed by the Provincial Governors as part of the health dimension. No separate treatment of the environmental dimension and its implications for LNG siting was given. The different positions with respect to these dimensions are assessed in the sections below (based primarily on the main policy paper of the Provincial Governors Zuid-Holland 1978b).

4.3.4.3. Energy Policy

The position of the Province of Zuid-Holland with respect to energy policy provided the background for the discussion of the major policy question. The Province simply had to respond to the national energy policy which planed to import LNG into the Netherlands. The Provincial Governors of Zuid-Holland supported the Cabinet's view that the dimension of energy policy justified the importation of LNG and it believed LNG should be imported via a Dutch LNG terminal, rather than via a pipeline from a foreign LNG terminal in one of the neighboring countries (Zuid-Holland 1978b, p.22).

The discussion of the energy policy aspect by the Governors had implications for answering the question of the need for LNG importation in general, but it did not address the question of desirability of a terminal at the Maasvlakte.

4.3.4.4. Economics/Cost

The purely economic aspects of LNG importation played a limited role in the decision process on LNG in the Province of Zuid-Holland. The province accepted the view expressed by the Rotterdam Harbour Authorities, that it was of economic importance to locate a LNG terminal in the Rotterdam Harbour area.

As regards the investment cost of a LNG terminal at the considered sites, the Provincial governors based their assessment on figures from ICONA. The results (as provided by the Provincial Governors) are summarized in Table 4.22 (Zuid-Holland 1978b, section 10).

Table 4.22. Cost LNG terminal Zuid-Holland
(millions of Dutch Guilders)

	Maasvlakte			Voornedam	
	site A	site B	site C	(1)	(2)
cost infrastructure	30	40	600	1100	850
investment terminal	500-600	500-600	500-600	500-600	500-600

(1) breakwater dam 10 km
(2) breakwater dam 7 km

Based on these figures the Provincial Governors concluded that the Voornedam sites are disadvantageous from an economic point of view (Zuid-Holland 1978b, p.23). It is important to note here that the Provincial Governors of Zuid-Holland--unlike the City of Rotterdam--decided not to carry out a comprehensive cost/benefit analysis, mainly because of the lack of complete data in this respect. The quantification of certain aspects, such as environmental impact, give rise to additional gaps in such an analysis, the Governors concluded.

4.3.4.5. Health and Safety

In its evaluation of the health and safety aspects of LNG activities, the Provincial Governors referred largely to figures on risk (defined as probability x consequences) of the TNO risk analysis and the information contained in the reports by ICONA. With reference to STUNET they concluded that a gas cloud explosion (following a spill of LNG) with pressures of 0.03 bar (under which most buildings would collapse) could take place 3km from the terminal. The Provincial Governors therefore believed that it is required that the minimum distance from the terminal to any built-up area should be 3 to 5 km (Zuid-Holland 1978b, p.17). They furthermore concluded that from the point of view of safety, the terminal should be built at the largest possible distance from other industries.

The Province of Zuid-Holland assessed the safety aspects of each of the considered sites (Zuid-Holland 1978b, pp. 19-21). The results are summarized in Table 4.23.

Table 4.23.

Maasvlakte A	- shipping route leads 2 km from Hoek van Holland (danger zone) - small site; relatively dangerous - terminal 4 km from nearest town
Maasvlakte B	- safer site - larger and shorter pipes from ship to terminal required - shipping route leads 2 km from Hoek van Holland - negative safety aspect: 2 LNG ships are side by side attached to a single jetty - terminal 6 km from closest town
Maasvlakte C	- attractive from point of view of nautical safety - LNG traffic can be kept separately from other shipping; minimal probability of fatal collision - nearest town: 7 km

The Provincial Governors concluded that from the perspective of health and safety (as well as environmental impact) the "stand still" principle should become a "boundary condition" for LNG activities, i.e., no decrease of environmental condition and/or safety as a result of the introduction of large-scale LNG activities would be acceptable. They furthermore concluded that risk-reducing measures should be employed--in particular in view of the environmental/risk burden upon the population in the area, resulting from existing activities (Zuid-Holland 1978b p.22).

From the point of view of safety and the environment, the Governors of Zuid-Holland concluded that Maasvlakte site A and B would not be favorable; the limited distance of moving tankers to the town of Hoek van Holland (2km) played an important role in this respect (Zuid-Holland 1978b, pp.21/22). The Voornedam location would be the most attractive LNG site from the safety and environmental point of view, the Provincial Governors concluded (Zuid-Holland 1978b, p.23).

4.3.4.6. Socio-Economics

The Governors of Zuid-Holland considered the socio-economic benefits of LNG activities in the Rotterdam area and distinguished three main areas of concern (Zuid-Holland 1978b, p.6):

- -- implications for harbor activities;
- -- development of economic activities based on cold-energy LNG;
- -- employment in operational phase of LNG terminal.

They largely supported the position of the Rotterdam Harbour Authorities that LNG would provide a positive stimulus for economic activities in the harbor area. As regards indirect socio-economic activities related to LNG (such as cryogenics), the Provincial Governors believed it would have a positive effect, which could, however, not be quantified (Zuid-Holland 1978b, p.7).

As far as the direct operational employment prospects were concerned, the Governors of Zuid-Holland expected the net-gain to be limited--in the order of several tens rather than hundreds of (relatively highly-skilled) jobs. These figures are most likely taken from previous ICONA reports. They quoted the following employment gains for each of the LNG sites considered (in man-years)--see Table 4.24.

Concerning the direct *operational* employment, the Governors of Zuid-Holland concluded that there was no significant difference between the LNG sites. The major difference between the different sites as regards socio-economics, concerned the scope for adjacent industrial activities near the LNG terminal, which were rather limited for Maasvlakte sites A and C. The Provincial Governors concluded that both the Maasvlakte site C and the breakwater sites would provide better opportunities for LNG related industrial activities (Z 1978b, pp.20/21).

From the perspective of regional and industrial policy, the overall conclusion of the Provincial Governors was, that all considered sites would result in socio-economic benefits (Zuid-Holland 1978b, p.22). As far as the socio-economics dimension was concerned, the province of Zuid-

Table 4.24

Employment	Maasvlakte			Voornedam	
	site A	site B	site C	(1)	(2)
w.r.t. infrastructure and LNG preparations (x 1000 man-years)	6-7	6-7	14-15	17-18.5	15-17

(1) breakwater dam 10km
(2) breakwater dam 7km

Holland thus saw no need for "boundary conditions" for the siting of a LNG terminal.

As regards the evaluation of the different sites, the Provincial Governors concluded that Maasvlakte site A was unacceptable because of the lack of scope for related industrial activities, whilst they also had some doubt about the socio-economic advantages of Maasvlakte site C.

The Governors of Zuid-Holland favored the Voornedam site for a LNG site, partly because of the socio-economic developments which it would enable with respect to the handling of either dangerous material from the same terminal site (7 or 10 km from the Maasvlakte). The construction of the Voornedam breakwater stretch would furthermore provide additional employment, the Provincial Governors concluded (Zuid-Holland 1978b, p.23).

4.3.4.7. Policy Perspective Zuid-Holland

Table 4.25 summarizes the implications of each of the dimensions for the three main policy questions addressed by the governors of the Province of Zuid-Holland. It should be realized that the outcome of the policy decision in the body of Governors of Zuid-Holland was only reached after a careful trade-off between the different aspects for which the basis or criteria are not known in detail. The above table does suggest, however, that with respect to the final decision of siting the safety dimension played a dominant role (Zuid-Holland 1978d). With this apparent concern for safety, it is perhaps surprising that there was relatively little discussion about the desirability and acceptability of LNG importation in general, and in the Zuid-Holland region in particular. Although, the Provincial Governors apparently found it important to include alternative sites—to the Maasvlakte A and B sites, which were the only ones, considered by the government in their analysis, they seem to have gone along without many objections with the assumptions and premises of the Cabinet.

As regard the final preferred selection of a LNG site, in addition to the safety dimension, the socio-economic dimension seemed to have played a major role. The Provincial Governors ***rejected*** Maasvlakte site A mainly because of its lack of space for related industrial activities and

Table 4.25.

Policy Question / Dimension	LNG terminal in province desirable?	LNG terminal in province acceptable?	Preferred site?
1. energy policy	+	[]	[]
2. economics/cost	+	+	Maasvlakte A or B
3. health and safety	[]	+[1)]	Voornedam
4. socio-economics	+	+	Maasvlakte B
Outcome	Yes	Yes	Voornedam

KEY: + favorable
[] not considered; not relevant

NOTES: 1) condition: risk-reducing measures

were against Maasvlakte C mainly because of reasons of regional planing. In view of the additional dominant role of socio-economic arguments put forward by the Provincial Governors in relation to the policy questions of desirability of a LNG terminal in the area of Rotterdam, the socio-economic dimension was perhaps the major aspect governing the decision outcome. It is thus concluded that the dominant dimensions in the decision process for the Governors of Zuid-Holland were socio-economics and health/safety. The provincial governors' preference for Voornedam related to their belief that the existing environmental burden in the Rijnmond/Rotterdam region was such that a decision in favor of alternative, potentially less economical, sites was justified (Zuid Holland 1978b, p.23).

Finally it must be noted that the provincial position vis-a-vis LNG siting as proposed by the Governors of Zuid-Holland did not directly respond to the Cabinet's request, which was solely concerned with a local authority's view of Maasvlakte sites A and B. Instead the Provincial Governors put forward an alternative LNG site for consideration by the Cabinet: Voorndam.

4.3.4.8. Provincial Council

The proposal by the Governors of Zuid-Holland was discussed in the provincial council on 15th June 1978. This debate focused around the governors' policy statement and the proposed policy statement, which concluded that Voornedam was the preferential site for a LNG terminal.

Following the debate in the provincial council a motion was carried, which resulted in a new official policy position by the Province of Zuid-Holland. This position made specific mention of

(1) the short period of time which had been available to consider the mater,

(2) the abundance of sometimes contradictory information on LNG, and

(3) the fact that consideration of alternative off-shore sites were not incorporated in the request from the Cabinet to the Province of Zuid-Holland.

The basis of the new policy position were the following considerations:

- LNG importation in the region was of outstanding importance to Rotterdam as an energy harbor;
- the risk of LNG at Maasvlakte, on the other hand, was considerable; especially at site A, due to proximity of populated areas;
- the scope for additional activities near Maasvlakte site A and B were small; and
- the pros and cons of possible alternative LNG sites had not been adequately explored.

On the basis of the above, the provincial council of Zuid-Holland concluded that its official position would be that:

> "a forced choice between Maasvlakte site A and B ... has to lead to a rejection of site A, whilst it cannot lead to a positive choice in favor of site B, until other seemingly more attractive alternatives (including Voornedam) are explored and reconsidered."

The Province of Zuid-Holland furthermore decided to urge the responsible Minister for Traffic and Public Works to allow further study into the alternatives (Zuid-Holland 1978c, p.4361). A motion declaring outright *opposition* to a LNG terminal at Maasvlakte and requesting further information on alternatives for further reconsideration at a later date, was rejected by the majority of the Provincial Council (Zuid-Holland 1978c, p.4366;4370).

4.4. LOCAL AUTHORITIES GRONINGEN

4.4.1. Introduction

The local authorities in the Province of Groningen which were involved in approval of a LNG terminal at Eemshaven concern three main levels:

1. Province of Groningen--legislature and provincial water authorities
2. Municipality of Uithuizermeeden (Which includes Eemshaven area)
3. Harbour of Delfzijl (which is responsible for managing Eemshaven harbor).

By and large the local authorities in Groningen were able to present a common position with respect to a LNG terminal at Eemshaven, and many activities and discussions were in fact coordinated, either by the provincial authorities or the harbor of Delfzijl. Figure 4.8 shows the major parties involved at the local authorities level in the province of Groningen, and the various groups which provided advice and/or comments to the provincial authorities concerning the siting of a LNG terminal at Eemshaven. The respective views of the provincial and municipal authorities are discussed in sections 4.4.4. to 4.4.8. Views of other groups, such as trade unions, and environmental groups are discussed separately (section 4.6), despite the fact that to some extent their views have been incorporated in policy statements of the provincial governors of Groningen.

4.4.2. Background and Involvement

Until late 1977 the local authorities in the province of Groningen were not significantly involved in the major policy discussions concerning a Dutch LNG terminal. Before 1977, Eemshaven was generally considered as an unviable option for the siting of a Dutch LNG terminal, mainly on nautical grounds (relating to the limited depth of part of the shipping route approaching the harbor). STUNET, ICONA and Gasunie are believed to have based their early rejection of Eemshaven largely upon a 1976 report carried out by the Netherlands Maritime Institute (NMI 1976).

Eemshaven is a newly-built harbor complex in the province of Groningen established mainly in a governmental move to stimulate economic activities and employment in the relatively under-developed northern parts of the Netherlands. Eemshaven was officially opened in June 1973. By 1977 it had become evident that various attempts to attract to Eemshaven large-scale "development projects"—such as shipyards and other related industries—had largely failed. Delfzijl Harbour authorities , which were to manage Eemshaven activities, and the provincial authorities of Groningen continued to search for (industrial) users for Eemshaven. As late as January 1977, Delfzijl harbour authorities approached Gasunie to inquire about possible interest for using Eemshaven, but the response remained negative.

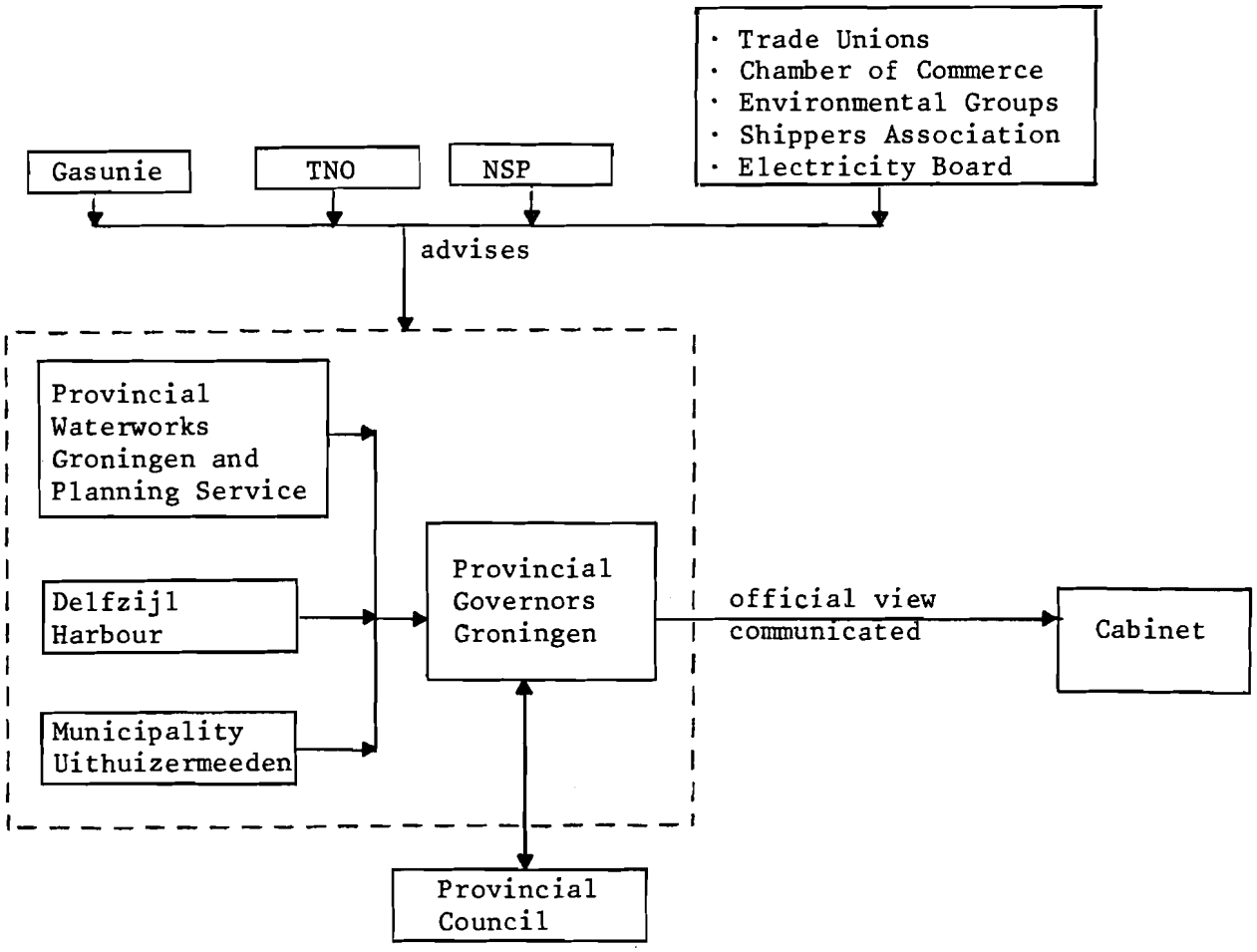


Figure 4.8. Local Authorities Eemshaven Site

By late 1977, however, Gasunie was experiencing considerable opposition and delays as regards the approval of a LNG terminal site in the Rotterdam area which was favored by Gasunie and generally supported by advice of ICONA. In an attempt to investigate the feasibility for alternative sites, Gasunie formally approached the Delfzijl Harbour authorities on December 1, 1977, with the specific request to initiate a study into the possibilities for a LNG terminal at Eemshaven.

The study was carried out, within 2 1/2 months, by a working group involving in addition to Delfzijl Harbour authorities, Gasunie and the Provincial and State Waterworks authorities of the province of Groningen. The Delfzijl Harbour authorities furthermore commissioned studies into the feasibility and risks involved in a LNG terminal at Maasvlakte with respectively the Netherlands Shipping Testing Station (Nederlands Scheepsbouwkundig Proefstation, NSP) and TNO.

Following the internal study by the working group, which indicated the feasibility of using Eemshaven as a LNG terminal site (in the light of new evidence), Gasunie made the formal request to the relevant local authorities to announce their position vis-a-vis the acceptability of importation of LNG at a terminal at Eemshaven (Report to Board of Delfzijl Harbour February 28, 1978).

An official appeal was made to the national government by the Provincial Authorities of Groningen and Delfzijl Harbour Authorities in February 1978, requesting to take into consideration Eemshaven harbor as an additional option for a site for the Dutch LNG terminal. Positive response by the national government came 5 weeks later (21 March 1978) when the Provincial Authority and the municipality of Uithuizermeeden were invited to prepare their official positions with respect to the siting of a LNG terminal at Eemshaven and to inform the Minister for Traffic and Public Works (in his capacity of coordinating Ministry) about their respective views by July 1, 1978 (letter Ministry for Traffic and Public Works, 21 March 1978, HW/NZI 21257).

It meant that at this point Eemshaven was given the same treatment by the national government as the Maasvlakte sites. It accelerated activities in the province of Groningen in terms of approval procedures of a LNG site at Eemshaven, an induced a concerted effort by the provincial governors to emphasize the advantages of Eemshaven over the Maasvlakte sites.

The following discussion concerning the various dimensions of the LNG siting perspectives in Groningen, relates in the first place to policy statements and documents by the provincial authorities. Specific policy statements by the Delfzijl Harbour Authorities and the municipality of Uithuizermeeden are discussed separately when relevant.

4.4.3. Problem Definition

Involvement by local authorities in the province of Groningen as regards the siting of a LNG terminal at Eemshaven, started largely against a background of longstanding interest to attract economic and industrial activities to Eemshaven harbor. When a renewed approach was made to the province by Gasunie to re-assess the viability and acceptability of Eemshaven as a possible LNG site, the local authorities in Groningen therefore excluded any discussions on the desirability of LNG importation in general, but directly set out to consider the following policy question: "Is LNG importation at Eemshaven acceptable?" This central policy question could, only be pursued realistically after it was established to what extent LNG importation at Eemshaven was in fact a feasible option in terms of technical and nautical requirements. Initial problem definition as regards the importation of LNG at Eemshaven therefore include the following issue: "Is LNG importation at Eemshaven feasible?" The latter question was not related directly to policy-making but a positive outcome on the matter of feasibility was a prerequisite for addressing the major *policy* question as regards acceptability.

In its evaluation of the acceptability of Eemshaven as a LNG site the local authorities in Groningen assessed the following major dimensions:

1. Economics/cost
2. Health and Safety
3. Socio-economics/regional policy
4. Environmental impact

In the following sections the positions of the local authorities in Groningen are discussed in relation to these various dimensions.

4.4.4. Economics/Cost

The cost dimension seems to have played only a minor role in the policy discussions in Groningen concerning LNG. The provincial governors acknowledged that LNG importation would involve additional financial cost, compared to a Maasvlakte site, but noted that the yearly additional cost incurred was not a determining factor as regards the acceptance or rejection of LNG at Eemshaven (Groningen 1978e, p.276). Early policy papers of the provincial governors did not quote costs figures for additional expenses incurred at Eemshaven for the establishment and operation of a LNG terminal. It was merely noted that the final "return" (rendment) on the undertaking "would be positive"(Groningen 1978b, p.56-6).

The province of Groningen authorities acknowledged that a LNG terminal at Eemshaven would result in additional expense for importing LNG from Algeria by tankers (of 125,000 tons) relating to the following two factors:

(1) outlays to cover adjustments and changes to harbor water access routes for handling LNG tankers of 125,000 tons weight, and

(2) the longer shipping route from Algeria to Eemshaven (160 miles longer than to Maasvlakte sites).

In relation to the first factor, an investment of 30 million guilders was estimated of which a considerable part would be financed by the national government (Ministry for Traffic and Public Works), as part of a 1971 agreement, designed to make Eemshaven harbor accessible for ships up to 70,000 tons (Groningen 1978f, p.4).

With respect to the total additional cost involved in an Eemshaven LNG terminal, compared to a siting at Maasvlakte, the province of Groningen did not indicate disagreement with the estimate made by ICONA, of 250 million guilders (Groningen 1978g, p.2). The provincial governors argued, however, that the additional cost should not be attributed entirely to the siting of a LNG terminal, since part of the required investment would be allocated under existing investment subsidies to industrial development (some of which would not apply to investment in the Rotterdam area). They also stressed that the extra financial cost involved in bringing LNG to Eemshaven, should be considered within the broad governmental mechanisms for providing financial support to regional industrial development, rather than as a separate investment solely for a LNG terminal (Groningen 1978g, p.3).

The province of Groningen argued that the major part of the estimated (by ICONA) total investment of 700 million guilders for siting a LNG terminal at Eemshaven could be incorporated in the sales price of natural gas to Dutch consumers, resulting in an increase in price of 1 guilder per 1000m^3 of gas (0.1 cent/m^3). The only major direct investment involved in making eemshaven accessible for large LNG tankers was estimated at 42 million guilders, of which 14 million would be covered by the national government under previous arrangements. Net figure would result in an investment of 28 million guilders--according to the provincial authorities comparable to investment required at Maasvlakte. Additional costs involved in an Eemshaven LNG site was quoted as being a yearly figure of 2.8 million for dredging operations (Groningen 1978h, p.6).

In relation to cost comparison with Maasvlakte, the Groningen provincial authorities stated that operations and handling of LNG tankers would be cheaper at Eemshaven, because LNG shipping movements within the Rotterdam harbor area would have to be accompanied by a helicopter for safety reasons, and other shipping movements would be delayed--at a total estimated cost of 5 million guilder per year. Finally, the provincial governors stressed with respect to the cost dimension, that the lack of use of Eemshaven would lead to capital "losses," given the considerable investments made in the past for the Eemshaven harbor infrastructure (Groningen 1978h, p.6).

The provincial authorities in Groningen submitted a policy statement arguing their case to members of parliament in early October 1978, prior to the parliamentary debate on the decision by the Cabinet to site the LNG terminal at Eemshaven. In this final policy paper (Groningen 1978i) the local authorities of Groningen put forward somewhat different financial figures, as summerized below (see Table 4.26).

Table 4.26. Cost figures Eemshaven LNG terminal site-additional investment required (in Dutch guilders).

Investment for access and operation of Eemshaven for LNG tankers (of which 55 million was already allocated by national government for 70,000 ton ships)	111 million
Additional transportation cost due to longer shipping route for 4 x $10^9 m^3$ LNG/year	144 million

In addition to the above cost figures, the provincial authorities mentioned further capital costs involved in distribution of LNG to major consumer areas (which are closer to Rotterdam than to Groningen area) resulting in a figure of 45 million guilders per year (Groningen 1978i, p.14). The additional cost incurred in using Eemshaven as a LNG terminal will (partly) be covered by the user of the terminal, Gasunie, the

provincial governors stated. Assuming a national gas consumption in the Netherlands of 50 x $10^9 m^3$ year, the additional finance could be incorporated in the gas price charged to domestic consumers, resulting in an increase of figures put forward here by the provincial governors, the main line of argument as regards the cost dimension remained unchanged.

4.4.5. Health and Safety

The Groningen provincial authorities made use of two main studies relating to the risk of LNG in the Eemshaven area:

- -- a study carried out by the National Shipping Test Station (NSP 1978); and
- -- the 1978 TNO risk analysis for LNG in the Eemshaven area (TNO 1978).

The risk data from these studies was used by the provincial authorities to assess the acceptability of the LNG siting plans.

The provincial water authorities of Groningen which were commissioned to analyze the risk data, concluded that the risks involved in a LNG site were neither unacceptable nor outright acceptable. It concluded that the level of risk involved in a LNG site belonged to the category of risk where further tests were required to determine that acceptability. According to the provincial authorities of Groningen, this implied that "taking into account the conditions outlined in the report and the safety measure to be determined, the location of a LNG terminal is acceptable" (Groningen 1978a, p.5).

It is of interest to note that the initial risk estimate involved in a LNG site would not have been acceptable within the limits set by the 1976 provincial policy memo on environmental norms (Nota Milieunormen). At the time LNG was discussed in early 1978, however, moves were already underway to make changes to the proposed environmental limits. Within the new, lower, limits, the siting of a LNG terminal was acceptable the provincial authorities concluded (Groningen 1978a, p.6/7). The level of acceptable individual risk as used in the adjusted environmental limits was 10^{-5}/year (Groningen 1978b, p.56-10). The report by the provincial authorities concluded that the risk for the population in neighboring municipalities to a LNG terminal at Eemshaven would be 0.5 to 2% of the risk limit set by the environmental regulations. These calculations were based on a volume of imported LNG of 4 x $10^9 m^3$/year. The provincial authorities concluded, however, that the importation of LNG at Eemshaven would also be acceptable at volumes of 10-15 x $10^9 m^3$ (Groningen 1978f, p.10).

The risk figures quoted by the provincial authorities of Groningen were those provided by (i) ICONA, (ii) TNO, and (iii) the Provincial Water Authorities. A summary of the relevant figures are given below (see Tables 4.27 and 4.28).

As regards the numbers of casualties at or near the terminal of an accident at Eemshaven, the following TNO figures are quoted by Groningen Province authorities:

Table 4.27. Risk to population LNG terminal at Eemshaven.

Eemshaven (1978 empty state)	10^{-4}
Eemshaven (in full use)	10^{-3}
Borkum (island)	10^{-4}
Schiermonnikoog (island)	10^{-5}

Table 4.28. Number of casualties Eemshaven LNG accident.

Eemshaven (empty)	0-1
Eemshaven (full)	1-15
Borkum	1-6
Schiermoonikoog	1-9

The above figures did not take into account detonation. "Only in the *very unlikely* case of detonation, will the number of casualties rise to several hundreds" (my emphasis), stated the provincial authorities of Groningen (Groningen 1978i, p.8).

The Groningen provincial authority stressed that the levels of risk for a LNG terminal at Eemshaven are considerable lower than those present at the Maasvlakte sites, by a factor 10-100 (Groningen 1978i, p.8), due to the large concentration of population and industry in the Rotterdam area and the higher traffic of in and outgoing ships, compared to the Eemshaven area (Groningen 1978b, p.56-11; 1978i, p.8). The provincial authorities acknowledged that the risk of a shipping accident on route to the Eemshaven harbor was larger in comparison with Maasvlakte sites, because of the increased length of the shipping route (from LNG suppliers such as Algeria) (Groningen 1978h, p.3).

As regards the risk experienced by the population ("ondervonden risico") the province of Groningen did acknowledge that this "psychological" factor was higher in the case of Eemshaven compared to the Maasvlakte sites. It concluded, however, that such a relative increase in the risk factor would have occurred with respect to *any* new industrial activity in the Eemshaven area. Consequently, the provincial authorities concluded that in terms of considering the acceptability of a LNG terminal at Eemshaven, this particular aspect was an unrealistic (irreeel) argument to advance against a LNG terminal at Eemshaven (Groningen 1978h, p.4).

The overall conclusion of the provincial authorities in Groningen was that "the safety aspects of the transport by ship of LNG has been subject to detailed research and the unanimous conclusion of all researchers is that the objective risk is not unacceptable, compared to other sizeable industrial projects" (Groningen 1978i, p.8).

The way the province of Groningen formulated its policy position vis-a-vis LNG siting at Eemshaven, indicated that the safety dimension was *not* of *primary* concern. The provincial authorities of Groningen argued in favor of LNG at Eemshaven on the grounds of socio-economic factors (see section 4.4.6); the *other* aspects considered in the debate in Groningen on LNG included the safety dimension, but "these factors ... do not result in arguments which will alter our overall conclusion [on the desirability and importance of LNG at Eemshaven]" according to the provincial authorities (Groningen 1978b, p.56-11/12).

4.4.6. Socio-economics

Socio-economic factors are at the center of the involvement and interests in a LNG terminal by the province of Groningen. The local authorities responded positively to the issue of a LNG terminal at Eemshaven because of the role industrial activities in Eemshaven were expected to play in creating new employment. The unemployment situation in the province of Groningen and the disappointing take-up by other potential industrial users of Eemshaven (e.g., petro-chemical company DSM, which at one stage was considering locating a large facility at Eemshaven) spurred the local authorities to approach the issue of a LNG terminal positively, right from the start (Groningen 1978a, p.7).

The positive response by Groningen local authorities to the request by Gasunie to investigate the possibilities for a LNG terminal at Eemshaven related first of all to the positive effect it was perceived it could have in terms of employments (Groningen 1978b, 56-1). The Eemshaven was one of the cornerstones of the province's employment generation program, and the LNG activities were seen as a part of Groningen local authorities' intention to create 14,000 new jobs in the province by 1985 (Groningen 1978b, p.56-5).

Primary employment affects of the siting of a LNG terminal at Eemshaven were estimated by the local authorities of Groningen as summarized in Table 4.29. (The figures were largely based on ICONA estimates--Groningen 1978b, p.56-5; 1978h, p.2). The employment which is generated by the siting of a LNG terminal at Eemshaven was equivalent to that expected at a Maasvlakte site (or any other). The local authorities

Table 4.29. Employment effects LNG terminal.

Temporary Employment:	
building infrastructure	330 man-years
downstream employment (transport, materials supply, etc.)	4,000 man-years
construction of terminal	2,650 man-years
Permanent Employment:	
maintenance	70 man-years/year
terminal operation	50-70 man-years/year
indirect employment (support)	150 man-years/year

in Groningen claimed however that given the higher unemployment figure in Groningen compared to the Rotterdam area, the direct employment generated by such activities is relatively and "qualitatively" more important in the Eemshaven area (Groningen 1978g, p.4).

The local authorities saw the siting of a LNG terminal at Eemshaven of real importance for the start of industrial development of the harbor, and the main argument put forward by the Province to the national government in favor of Eemshaven concerned the importance of LNG to regional socio-economic policy. The local authorities stated repeatedly that with the issue of siting a LNG terminal gave the national government "a unique opportunity" [following its numerous policy statements on regional development] to show its sincerity as regards its policy of regional distribution of new activities and to show that it acknowledges the advantages of Eemshaven and that it takes seriously the socio-economic problems of the province of Groningen" (Groningen 1978b, p.56-12; 1978f, p.11).

In addition to the direct employment effects of a LNG terminal, the provincial authorities of Groningen saw an important "psychological" effect of such an activity at Eemshaven in that it would stimulate other interest in Eemshaven by other industrial users. The local authorities argued that if the national government would show its confidence in Eemshaven, this would act as a stimulus for other new investments in the area. Specifically the local authorities of Groningen pointed at two industrial activities related to the siting of LNG terminal, which could be generated: (i) a coal gasification plant, and (ii) cryogenics industry

(Groningen 1978f, p.4). At the center of Groningen's position vis-a-vis the siting of a LNG terminal was thus the importance for regional policy and socio-economic factors such as employment. The local authorities of Groningen argued in favor of Eemshaven, compared to Maasvlakte sites on the grounds of three main factors:

(1) direct and indirect employment generation more significant in Groningen high-employment area (Groningen 1978h, p.2);

(ii) national government confidence in Eemshaven and start-up of industrial activities in the new harbor would stimulate further investments in the region; and

(3) Groningen very suitable for related industrial activities such as coal gasification (high calorific gas produced could be distributed through gaspipes from natural gas fields located in Groningen) and cryogenics industry (Groningen 1978b, p.56-6).

4.4.7. Environmental Impact

The environmental impact of a LNG terminal was given relatively little attention by the province of Groningen. The environmental impact as discussed by the local authorities concerned three aspects: (i) water pollution, (ii) noise, and (iii) visual impact.

Water pollution can occur when cooled water of the LNG gasification plant is discharged (Groningen 1978f, p.7). The cold energy can be used for other industrial ends, or for cooling of a power station. The negative environmental impact can hereby be minimized. As regards the visual aspect, it is anticipated that storage tanks for LNG will have to be installed of 55 meters tall; these tanks would be visible from the sea (Waddenzee) at a distance of 12 kilometers. This visual impact may be partly alleviated by building the tanks partly underground, the local authorities of Groningen concluded (Groningen 1978i, p.9). The third environmental impact factor concerns the noise involved in LNG operations. Also in this respect the provincial authorities of Groningen stated that it will be possible to limit this factor to "acceptable levels." (Groningen 1978h, p.7).

Overall it was concluded by the Groningen provincial authorities that the negative environmental effect of a LNG terminal are small, and can be kept within acceptable limits, both for populated areas and the Waddenzee region (Groningen 1978h, p.8).

4.4.8. Local Authorities Groningen Policy Perspectives

The policy perspective of the local authorities in Groningen was mainly determined by a desire--shared by most local parties involved--to stimulate industrial development in the province at large and at Eemshaven in particular. The policy question addressed by the local authorities largely concerned the *conditions* which should be attached to the siting of a LNG terminal at Eemshaven--if indeed Eemshaven was technically feasible as a LNG harbor. The most important dimension determining the outcome of the Groningen policy perspective was that of *socio- economics* with the safety aspects playing only a secondary role.

Groningen local authorities did not assess the desirability of the importation of LNG into the Netherlands, but restricted the discussion--as requested by the national government--to the question of acceptability of a LNG terminal at Eemshaven. In particular in the later stages of the national policy discussion, the local authorities of Groningen also addressed the relative strength of a Eemshaven over a LNG site at the Maasvlakte. Here again, the socio-economic dimension and the safety aspect respectively played the dominant roles. The following table summarizes the main dimensional perspectives of the local authorities of Groningen with respect to the policy questions which were addressed (Table 4.30).

Table 4.30. Local authorities Groningen dimensional views on policy questions.

Policy Question / **Dimensions (in order of significance)**	**LNG at Eemshaven acceptable?**	**Eemshaven preferred to Maasvlakte?**
1. socio-economics	+	+
2. health and safety	+	+
3. economics/cost	+	-
4. environmental impact	+	o
5. energy policy	[]	[]
Outcome	Yes	Yes

KEY:
+ favorable
- unfavorable
o no preference; not affecting outcome
[] not considered; not relevant

4.5. NV NEDERLANDSE GASUNIE

4.5.1. Introduction

Decision developments in relation to the importation of LNG into the Netherlands were initiated by the plans of N.V. Nederlandse Gasunie, the semi-state company (hereafter referred to as Gasunie) responsible for Dutch national gas supply. The relationship between the Dutch State and Gasunie is institutionalized, primarily via the Minister for Economic Affairs, the latter being responsible for Dutch energy policy. Gasunie's close links with the national government and direct contacts with local authorities relevant to the LNG terminal siting issue, enabled the gas company to make relatively few public statements about its views on the respective positions vis-a-vis LNG siting. To a greater extent than in the preceding sections, information on Gasunie, therefore, was based upon a series of interviews, with Gasunie representatives and others (held during 1980 and 1981).

4.5.2. Responsibility and Involvement

N.V. Nederlandse Gasunie was established in April 1963, in order to manage the sale and distribution of natural gas from the Dutch gas fields. Gasunie was also made responsible for all matters concerning supply of natural gas to Dutch users--including importation of foreign sources. Whilst institutionally connected and partly owned by the Dutch State, Gasunie operates as a commercial company.

Gasunie shares are divided as follows:

The State of the Netherlands	10%
DSM Aardgas B.V.	
(DSM-Dutch State Mines is itself a State Company)	40%
Shell Nederland BV	25%
Esso Holding Company Holland, Inc.	25%

The Dutch state thus holds 50% of the shares of Gasunie. This division of shares ensures that no decisions can be made without the consent of the State and Dutch State Mines. State representation in the governing body of Gasunie, takes place through the Ministry for Economic Affairs. In addition to this formal institutionalization, there is a separate agreement between the Dutch State and Gasunie, stipulating that approval is required from the Minister for Economic Affairs, for decisions concerning the annual sales plan, the gas price and the construction of transport lines and other equipment for transport and storage of gas (Tweede Kamer 1974, p.85).

Within the mandate set by the governmental policy paper on Energy (Energienota, Tweede Kamer 1974) Gasunie corporate policies were designed to conserve the Dutch natural gas fields as long as possible. This strategy included the policy of importing foreign supplies of natural gas including LNG. In 1978 natural gas contributed 52% of total energy supplies and long term security of supply to the Dutch users was one of the major stated aims of Gasunie (Gasunie 1979a, p.5). First efforts in this field date back to the early seventies; the first contract for importation of Norwegian natural gas, via pipeline, was concluded in early 1973.

Its contribution to Dutch gas supplies was about 2%, in 1978 (rising to 3% in f979). Annual gas consumption in the Netherlands is about 40-45 x $10^9 m^3$ (Gasunie 1978b, p.5).

Gasunie involvement with LNG started in 1972, when first discussion were held with the Rotterdam Harbour Authorities and local authorities responsible for the Rotterdam region, concerning plans for siting a LNG peak shaving plant at Maasvlakte. The plans related to an area of 12 hectares and the preference for Rotterdam as a location related to commercial and strategic interests to site Gasunie's LNG activities close to the major gas users in the Netherlands and in the region of the harbor. The Maasvlakte site was selected by Gasunie specifically to enable further LNG activities--such as a LNG terminal--to be carried out from the same commercially attractive site, if required at a later date.

Official planning permission for the LNG peak shaving plant at Maasvlakte was requested in October 1974. After considerable political discussion, including consideration of the safety aspects, (especially encouraged by Rijnmond local Authorities), the peak shaving plant was approved by local authorities around Rotterdam. The LNG storage plant became operational in May 1977 (Gasunie 1978a, p.14).

In the preceding years Gasunie had carried out extensive discussions with the Algerian state company Sonatrach for the supply of LNG and Gasunie was seriously investigating the opportunities for a Dutch LNG terminal. Although Gasunie had indicated preference for a LNG terminal at Maasvlakte, next to its peak shaving plant, at an early stage, the gas company was also involved in moves to investigate alternative LNG terminal sites, both on-shore and off-shore. Gasunie"s contract with the Algerian company Sonatrach was finally reached in 1977 as part of the arrangements made by a West German consortium of which Gasunie was a partner (other partners were Ruhrgas AG and Salzgitter GmbH).

Gasunie saw its prime role in relation to the siting of a LNG terminal in indicating its preference considering two main dimensions:

1. energy policy and
2. economics/cost.

Both these dimensions are related to Gasunie's *commercial* interests. The dimension of energy policy may be said to relate closely to its longer-term strategic interests, such as competitive survival whilst the cost dimension may refer to the corporate strategy of profit maximization. Other dimensions could be said to have been treated as "operational conditions," i.e., once a site was selected by Gasunie on the grounds of energy policy and economics/cost, the feasibility and acceptability of the site was to be determined in terms of aspects such as nautical access, safety, environmental impact, socio-economics, etc.

Gasunie was primarily concerned with one policy question in relation to the LNG siting process: "What is the optimal site for a LNG terminal?" This policy question resulted from Gasunie's prime responsibility as the sole company in charge of Dutch gas supplies. Gasunie did not involve itself in further discussion on the issue of the necessity of importing natural gas and LNG into the Netherlands, since this official policy line was incorporated in the 1974 governmental energy policy paper and had

been approved by the Dutch parliament.

In the following sections, the dimensional views of Gasunie in relation to the central policy question on the LNG terminal site are discussed.

4.5.3. Energy Policy

The dimension of energy policy, i.e., in the case of Gasunie, the supply of natural gas to the Netherlands was of prime concern for Gasunie, in selecting an appropriate LNG terminal site. The Dutch governmental energy policy was designed to conserve Dutch national gas reserves and to supplement its own natural gas sources with foreign supplies.

The corporate philosophy of Gasunie with respect to importation of natural gas, was to maximize *flexibility* for gas supplies in the Netherlands and commitments which had been made in the past for sales of Dutch gas to other Western European countries. Such a policy included buying in foreign supplies of natural gas on a commercial basis (Gasunie 1978c, p.1).

Against the background of the governmentally approved policy of conserving Dutch national gas fields, Gasunie was able to pursue its corporate strategy of strengthening its role as main gas supplier in Western Europe. Pipelines from the Groningen gas fields in the Netherlands to France, FRG, Belgium, and Italy already existed, and Gasunie was supplying about half of Western Europe's natural gas needs.

In order to enlarge its role as major supplier of natural gas-- in the first instance to be able to secure long-term Dutch gas supply--Gasunie thought the importation of LNG to be necessary. It was seen in the interest of Dutch energy policy to import LNG at the most economical cost and this was the first factor that lead Gasunie to select Rotterdam as its prime site.

The main users of natural gas in the Netherlands were located in the West of the country, and in this context Rotterdam harbor was the logical choice for Gasunie, in relation to Dutch energy supply. From a broader perspective of energy policy, Rotterdam would give Gasunie and Dutch gas policies greatest flexibility in its operations of buying and selling of natural gas. Rotterdam was the largest and most important harbor of Western Europe, strategically placed in relation to the major western European buyers of natural gas. In the 1960s Gasunie had signed long-term contracts with several Western European countries which would continue until the 1980s or 1990s, for the supply of natural gas (initially) from its national fields. Exports of natural gas from the Netherlands total approximately $50 \times 10^9 m^3$ per annum.

An additional reason why Rotterdam was favored as a LNG terminal site by Gasunie, related to the timescales involved in agreeing upon contracts and in constructing the terminal. The LNG market was perceived by Gasunie at the time as being a "sellers market," which was expected to experience considerable growth in the late 1970s and beyond. It was therefore seen in the interest of Dutch energy policy to be able to agree upon foreign supply contracts for LNG at the earliest possible time and to minimize the time which would be required for ensuring a suitable LNG terminal. The infrastructure of Rotterdam and the presence of a LNG

peak shaving plant at Maasvlakte, operated by Gasunie, would ensure that the time involved in establishing a LNG terminal--once a LNG supplier was found--would be minimized.

The concern about timely access to a terminal, by the time the contracted LNG from Algeria would be supplied to Gasunie, also forced Gasunie to look for alternative sites, in addition to Rotterdam. Discussions with Eemshaven harbor were initiated by Gasunie in late 1977 (less than a year before the LNG terminal site was to be announced) once it became clear to Gasunie that the considerable opposition in the Rotterdam region(on the part of the local authorities) could--at best-- cause substantial delays. In 1978, whilst remaining broadly in favor of a Rotterdam LNG site, Gasunie declared that an Eemshaven location would also be acceptable--albeit as a second choice (Gasunie 1978c, p.2/3).

4.5.4. Economics/Cost

The dimension of cost was an important factor in Gasunie's decision to opt for a Rotterdam LNG terminal, rather than for alternative sites, off-shore, at Eemshaven, or elsewhere.

Gasunie's stated justification for selecting Rotterdam as its preferred LNG site included the following issues (Gasunie 1978c, p.2/3):

- Importation of LNG at Maasvlakte was the cheapest option. The shipping route to Maasvlakte is shorter than to Eemshaven. Whilst addition of imported gas to the national gas supply network was feasible both at Eemshaven and at Maasvlakte, the largest concentration of demand for natural gas is in the western part of the Netherlands. The construction of an island terminal, off the Dutch cost was rejected because of the high costs involved.
- Unloading and storage of LNG in insulated tanks and subsequent regasification of LNG, could be seen both technically and economically as an extension of the LNG peak shaving activities, already existing at the Maasvlakte and operated by Gasunie. This factor would be optimized in the case of Maasvlakte location A.
- From the point of view of cost, a Maasvlakte site for LNG enabled better opportunities for supplying imported gas to neighboring countries which could result in economies of scale, with consequent economic benefits.

In particular in the early period of planning for a LNG terminal by Gasunie, it was a significant factor that the most cost-effective location was at Maasvlakte, next to Gasunie's existing LNG peak shaving plant. In fact, the possibilities for extending Gasunie's Rotterdam facilities to include a terminal for importing LNG was an important consideration for siting the LNG peak shaving plant at Maasvlakte in the first half of the 1970s. The Maasvlakte site already had considerable infrastructure, which would be required for a LNG terminal, and Gasunie had operational facilities at the site.

As regards the additional costs involved in siting a LNG terminal at a location other than the most cost-effective Maasvlakte site, Gasunie specifically stated that if such an alternative site was indeed selected by the national government, the finance for infrastructure, etc. should be covered by the government, rather than by Gasunie (Gasunie 1978c, p.4).

4.5.5. Policy Perspective

Gasunie's policy perspective was provided by the desire to minimize the financial cost involved in the establishment of a LNG terminal. The cost dimension, together with its responsibility to Dutch energy policy, resulted in a clear preference by Gasunie for locating the LNG terminal at Rotterdam. The dimension of safety did not enter Gasunie's selection process, apart from the fact that it was assumed that, whatever the selected site, the location of a LNG terminal "should fulfill the safety requirements in an acceptable manner" (Gasunie 1978c, p.3).

The interests of Gasunie, in terms of Dutch gas supply policy and commercial importance, for completing the details for the supply of Algerian LNG (as was contracted for) was significant. In an attempt to find a politically acceptable LNG site, before the stipulated deadline in the contract with Sonatrach, Gasunie eventually was willing to accept a LNG terminal at Eemshaven, as a second choice (Gasunie 1978c, p.3). Other alternatives including an island terminal, were never seriously considered by Gasunie because of the high financial costs involved and/or lack of technical feasibility as perceived by Gasunie.

Table 4.31 summerizes the policy perspective as it was formulated by Gasunie on the major policy question concerned.

4.6. INTEREST GROUPS AND THE PUBLIC

4.6.1. Introduction

In this section a brief overview is given of the main interest groups which were involved in the discussion on LNG siting in the Netherlands. In most cases, the organizations involved have no formal power or responsibility with respect to the outcome of the decision-making process on LNG, although in some cases they were invited by local or national authorities to express their respective views on the issues. In section 4.6.8. a brief discussion is given of the two public hearings on LNG which were organized by local authorities in the Rotterdam and Groningen regions respectively. It must be stressed that public hearings in the Netherlands are usually meeting of relatively short duration--typically less than one day--in which the local population is informed about planned developments and is given the opportunity to formulate its objections and express its views on the issues at stake.

The following interest groups are discussed in the sections below:

- *Werkgroep Noordzee* -- the North Sea Working Group, an environmental organization for the protection of the North Sea environment working in collaboration with broader (environmental) interest groups in the Netherlands;*

*North Sea Working Group collaborated with the following organizations: Landelijke Vereiging tot Behoud van de Waddenzee (national organization for protection of the Waddenzee),

Table 4.31. Gasunie policy views.

Policy Question / Dimension	Optimal Site for LNG Terminal?	
	a. Rotterdam	b. Eemshaven (2nd choice)*
1. energy policy	+	+/-
2. economics/cost	+	+/-
3. health and safety	[]/o	[]/o

KEY:
- + favorable
- +/- indecisive: marginally favorable
- o no preference; not affecting outcome
- [] not considered; not relevant
- * Only considered if Rotterdam site could not be approved within required time limits.

-- *FNV Federatie Nederlandse Vakvereniging* -- the largest and main employees' organization in the Netherlands, Dutch federation of trades unions;

-- *Werkgroep Eemsmond* -- environmental group concerned with the area of Eemsmond (the mouth of the river Eems), north and north-east of the province of Groningen;

-- *Kamer van Koophandel en Fabrieken voor de Veenkolonien en Oostelijk Groningen* -- Chamber of Commerce for Eastern Groningen;

-- *Electriciteitsbedrijf voor Groningen en Drenthe* -- Electricity corporation for the provinces of Groningen and Drenthe;

-- *Koninklijke Nederlandse Redersvereniging KNRV* -- Dutch association of shippers.

In addition to the above interested parties, most of which submitted written presentations to local and national government, views of interest groups and individuals were also submitted at two public hearings on 24 April 1978 in Uithuizermeeden and on 9 May 1978 in Rotterdam in the

Stichting Natuur en Milieu (foundation for nature and the environment), Nederlandse Vereinging tot Bescherming van Vogels (Dutch association for the protection of birds), Verbond van Wetenschappelijke Onderzoekers (association for scientific workers), Vereinging Milieudefensie (organization for environmental protection), Wereld Natuurfonds Nederland (Dutch section of Worldlife Fund) as well as a number of interested individuals.

province of Groningen.

4.6.2. KNV Federation of Dutch Trades Union Organizations

The main dimension focused upon by FNV with respect to the siting of a LNG terminal was the dimension of *socio- economics*. The organization stressed the structural weakness of the northern provinces (including Groningen) in the Netherlands and pointed out that LNG activities at Eemshaven, could play an important role in starting industrial development in the Eemshaven region and could stimulate further economic activities. FNV recommended the siting of a LNG terminal at Eemshaven.

As regards *energy policy*, FNV did not state any objections to the importation of LNG into the Netherlands, but the organization believed that the LNG developments should in no way negatively affect the search for alternative sources and developments towards greater conservation of energy. The dimension of *safety* was only briefly discussed by KNV. The organization subscribed to the definition of risk = probability x consequence and by and large supported the views put forward for by the local authorities of Groningen, concluding that a terminal for LNG at Eemshaven was acceptable, (at quantities of 4 x $10^9 m^3$/year) (KNV 1978).

4.6.3. Werkgroep Noordzee (North Sea Working Group)

The North Sea Working Group played an important role in promoting a critical discussion at various levels about the plans for LNG importation and the siting of a LNG terminal. Although primarily concerned with aspects related to the environment, including safety, the organization also questioned the governmental policy on energy, in particular the need to import *liquefied* gas.

The North Sea Working Group opposed the establishment of a Dutch LNG terminal at the time the governmental discussion took place, and stressed the need for further investigation of various aspects and consideration of alternatives for the importation of LNG. The main views put forward by the group are summarized below.

According to the group it was not possible to acquire a considered view as to the *risk* dimension of LNG, because of lack of experience with LNG transporting and handling. The great uncertainties notwithstanding, the group believed the probability of an accident with LNG (as calculated by TNO) to be *unacceptable;* in this respect the group quoted the California norms for a LNG terminal siting (Senate bill 1081, par.5582), showing that at both Eemshaven and Maasvlakte sites, the population density would be too high to be within acceptable safety limits (Noordzee 1978b, p.5). As regards the *environmental impact* of a LNG terminal the organization believed the effects had been underestimated by official advisory bodies and the government, and it urged more research to assess the possible damage to the environment (Noordzee 1978b, p.7). With respect to *energy policy* the North Sea Working Group questioned the need for importing gas in liquefied form and suggested that alternatives (e.g., imports via pipeline, involving exchange of contracts with customers for Dutch natural gas such as Italy) should be further investigated before a final decision on LNG was taken. An off-shore terminal for LNG was rejected by the group in the grounds of environmental considerations

(Noordzee 1978a). The *socio- economic importance of a LNG terminal, in terms of* employment and further local economic activities, had generally been over-estimated, the North Sea Working Group claimed. It pointed out that the risks involved in LNG activities could in fact have a negative effect upon prospective industrial developments in the region, and this factor should deserve more attention, before a siting decision was made on the basis of socio-economic considerations (Noordzee 1978b, p.8).

In the light of the above aspects, the North Sea Working Group, called for a postponement of the decision on the importation of LNG and the subsequent siting of a LNG terminal in the Netherlands.

4.6.4. Werkgroep Eemsmond (Eemsmond Working Group)

The Eemsmond Working Group has expressed views on LNG similar to those of the North Sea Working Group, but at some points the group was somewhat more specific in its criticism of the issues as formulated by the national and local government. The Eemsmond Working Group was opposed to the importation of LNG at both Eemshaven and Maasvlakte, but focused its attention to the first. The *risk* involved in the shipping and handling of LNG to and at Eemshaven (taking it past populated areas and islands) was thought to be *unacceptable* to the group (Eemsmond 1978b, p.4). The group state that the definition of risk as the product of probability x consequence can not be used as a meaningful variable as the effects become very large, since certain consequences are not acceptable, to the public at large, under any circumstances (Eemsmond 1978a, p.4).

The group also discussed *environmental* aspects of LNG activities at and around Eemshaven, such as the negative effects upon the wildlife and the seabed. It stresses the importance of the Eemsmond area as an unpolluted ecologically attractive area (Eemsmond 1978b, p.6).

In relation to *energy policy* the Eemsmond Working Group questions the necessity of importing LNG (at the time it was being discussed) pointing at the lower gas consumption in the Netherlands, compared to the figures originally anticipated by the Gasunie and the 1974 governmental energy policy plan (Eemsmond 1978b, p.3). Eemsmond Working Group indicated that the *cost* advantage of importing liquefied gas compared to transport via pipeline from Algeria, would virtually vanish, in the case of LNG tanker having to take a longer shipping route to the Netherlands, avoiding the busy English Channel route (Eemsmond 1978b, p.9).

The group discussed possible alternatives for the importation of liquefied gas into the Netherlands, and concluded that given the high risks involved in LNG preference was given to transport via pipeline. As long as transport via pipeline was technically and economically a feasibility, the group concluded that a LNG terminal was undesirable (Eemsmond 1978a, p.3).

4.6.5. Kamer van Koophandel en Fabrieken voor de Veenkolonien en Oostelijk Groningen (Chamber of Commerce Eastern Groningen)

The local Chamber of Commerce of Eastern Groningen argued in favor of a LNG terminal at Eemshaven, based on *socio- economic* arguments. It stressed the importance of stimulating new economic activities in the structurally weak province of Groningen. LNG activities were expected to have a positive effect in terms of strengthening the economic development in the region. The Chamber of Commerce concluded that the importation of LNG and subsequent storage at Eemshaven was acceptable, both on grounds of *environmental* aspects and in terms of *safety* (Kamer van Koophandel 1978, p.2).

4.6.6. Electriciteitsbedrijf voor Groningen en Drenthe GDE (Electricity Corporation for Groningen en Drenthe provinces)

EGO, the electricity corporation for Groningen and Drenthe Provinces, submitted a brief statement to the provincial authorities of Groningen, concerning the *safety* aspects of a LNG terminal at Eemshaven. EGD stated that the consequences involved in a possible accident with LNG, involving detonation, would be such that its electricity power station (in the vicinity of Eemshaven) would be seriously damaged. The *risk* involved in a LNG terminal at Eemshaven was thus judged to be *unacceptable* by EGD (EGD 1978).

4.6.7. Koninklijke Nederlandse Redersvereniging KNRV (Royal Dutch Shipowner's Association)

The Dutch ship-owners' association KNV argued in favor of a LNG terminal at Maasvlakte site B., mainly on the grounds of nautical *safety* and considerations relating to optimal nautical feasibility. The main objections to a LNG terminal at Eemshaven, concerned nautical aspects, including the increased probability (compared to Maasvlakte) of running a ground in the narrow passages en route to Eemshaven and the difficulties in maneuvering the LNG tanker on its approach to the harbor. Another objection to Eemshaven--as formulated by KNRV--concerned the limited times of entry to the harbor; entry maneuvers can only be carried out during high tides (resulting in waiting periods), whilst safety requirements dictate entry should take place during day light. According to KNRV, waiting periods outside the harbor would lead to problems with "boil off" of gas.

Considering the nautical safety aspects of LNG, the Dutch shipowners' association concluded that Maasvlakte site B should be preferred over Eemshaven and other sites. The organization noted, however, that approval of LNG operations at a Rotterdam terminal should be conditional to future measurements to limit transport of dangerous substances (inc. LNG) through the main approach to Rotterdam Harbor (KNRV 1978).

4.6.8. Public Hearings

A public hearing was organized in Uithuizermeeden in the province of *Groningen* on 24 April 1978, to enable the public to give its reaction to the possible siting of a LNG terminal at Eemshaven. The meeting took 2 1/2 hours and mainly consisted of brief statements and questions by Eemsmond environmental working group and the Dutch trades unions KNV (Northern section), followed by replies from representatives from the provincial authorities of Groningen. No new viewpoints of significance were put forward (Groningen 1978j). In the *Rotterdam* region a public hearing was held at Rotterdam on 9 May 1978, following two information meetings (at Oostvoorne and Hoek van Holland), where the interested public was made aware of the issues involved in LNG siting, as presented by the local authorities and Gasunie. The public hearing took place in the context of Dutch legislation concerning pollution and "nuisance," which stipulates the need for public involvement before local approval of a site may be granted.

At the public hearing, local political parties, environmental organizations and trade union groups put forward their respective views and comments. A major point concerned the aspect of *safety* and risk. Environmental groups and the (left-of-center) political parties represented, stressed the importance of the safety factor and argued against location of a LNG terminal at Maasvlakte. Some argued that a decision on LNG siting should be postponed to allow for further research on the safety aspects. Others believed the risk factor had been underestimated in the discussions at local and national level (including the perceived risk to the population in the Rijnmond region). The need for further investigation of alternatives of importing

4.7. CABINET/NATIONAL GOVERNMENT

4.7.1. Introduction

The policy perspective of the national government was formulated in a final policy paper presented to parliament on 15 September 1978, by the Cabinet. The Cabinet's view is a resolution of positions and interests from different ministerial departments involved (which themselves do not represent necessarily single objectives or interests). This section summarizes the major aspects of Dutch government policy on the siting of LNG terminal, as formulated in the policy documents agreed upon by the Cabinet and submitted to Parliament (Tweede Kamer 14626; especially nr. 11; which is referred to as Tweede Kamer 1978). Where relevant, the government's statements made during the parliamentary debate on LNG are also mentioned.

The following sections discuss the Cabinet's view on the major policy dimensions with respect to the main questions surrounding decision-making on LNG siting in the Netherlands.

4.7.2. Problem Definition

The Cabinet considered three interrelated policy questions (Tweede Kamer 1978, p.5):

(1) the desirability of importing LNG into the Netherlands;

(2) the desirability of importing LNG at a *Dutch* terminal;

(3) the selection of the location of a Dutch LNG terminal.

The Cabinet based its decision on the advice given and studies carried out by a large number of organizations, notably ICONA, STUNET, the state land use planning commission RPC, and the inter-departmental committee for environmental hygiene ICMH. The central position of the Cabinet in relation to other parties involved in decision-making on LNG, is illustrated in Figure 4.9 (based on TNO 1980).

The final governmental policy paper on LNG, outlining the Cabinet's final position on LNG (Tweede Kamer 1978) identified nine different aspects in relation to the selection of a LNG terminal site in the Netherlands. In the context of this study (and in line with earlier discussions on party perspectives) the Cabinet's policy views will be discussed in relation to the following five (re-grouped) major dimensions:

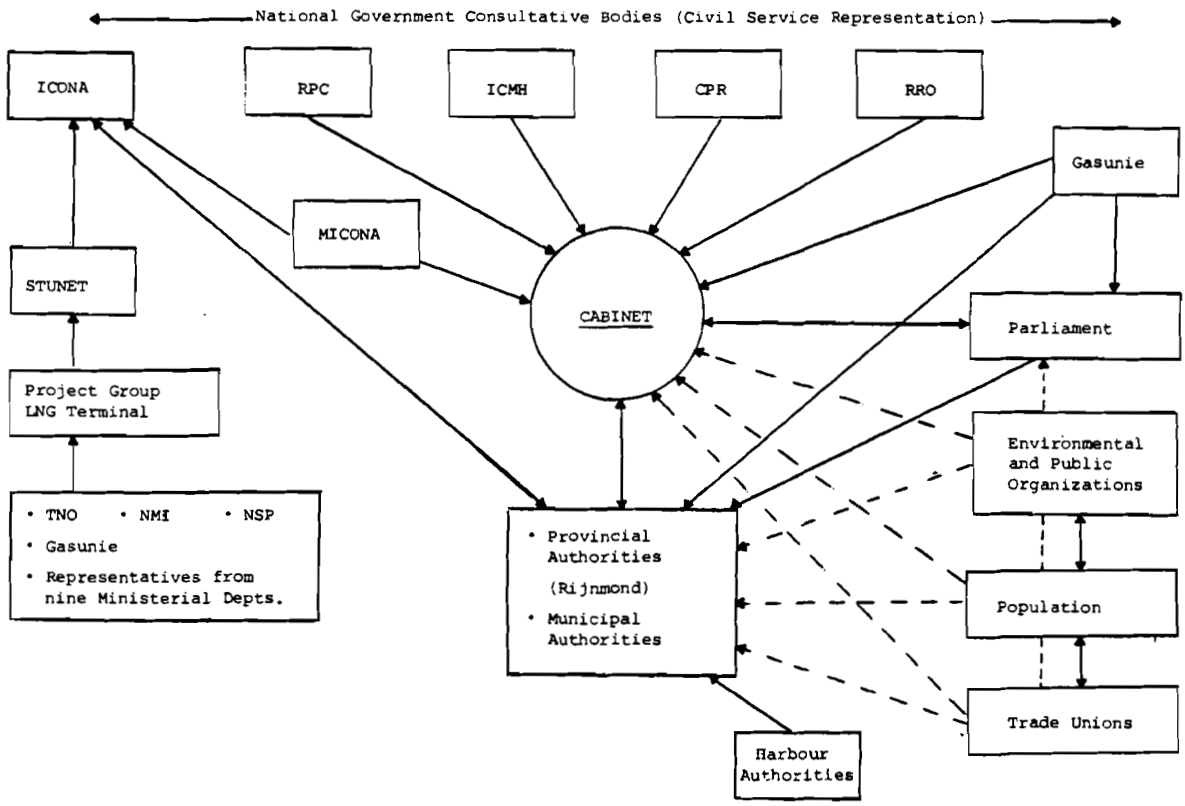
1. energy policy
2. economics/cost
3. safety/risk
4. socio-economics/regional policy and planning
5. environmental impact

Other factors which were part of the *Cabinet's* policy paper on the siting policy for a LNG terminal--but which are not discussed separately in the sections below--are: technical/nautical aspects, international agreement, the required time for completion of the terminal, and the (expected) approval of a LNG site by relevant local authorities.

4.7.3. Energy Policy

The issue of LNG importation was considered by the Cabinet within the context of the 1974 governmental policy (approved by Parliament) of importing natural gas, in order to guarantee long-term supply of natural gas supplies in the Netherlands and to conserve Dutch national gas fields (*Energienota* Tweede Kamer 1974). In principle, the government had two options with respect to the importation of natural: via pipeline or as LNG by ship. (Both were mentioned in the 1974 Energy policy paper.) The Cabinet concluded that whilst in general it would prefer the importation via pipeline, nearby suppliers of natural gas would be very limited in Western Europe; more distant natural gas suppliers would necessitate transport of gas to the Netherlands in liquid form. The potential supply of natural gas via pipeline from Western European countries was not considered as being particularly "abundant" (Tweede Kamer 1978, p.7).

Furthermore, the Cabinet believed that the demand for imports of natural gas in Western Europe was considerable and competition would make it more difficult for a country like the Netherlands to fulfill its demands for natural gas from nearby Western European suppliers



KEY TO ADVISORY AND GOVERNMENTAL CONSULTATIVE BODIES (Civil Service):

ICONA	Interdepartmental Coordinating Committee for North Sea Affairs
STUNET	North Sea Island and Terminal Steering Committee
TNO	Organization for Applied Scientific Research
NMI	Netherlands Maritime Institute
MICONA	Ministerial Committee North Sea Affairs
RPC	State Planning Committee
ICMH	Interdepartmental Committee for Environmental Hygiene
CPR	Committee for the Prevention of Disasters due to Dangerous Substances
RRO	Council for Land Use Planning

Figure 4.9. Decisionmaking organization and Input into the Dutch Cabinet Regarding the LNG Siting Decision (based on TNO 1980)

(Tweede Kamer 1978, p.7). In view of the small number of potential Western European suppliers, which could deliver the gas via pipeline, the Cabinet concluded that a Dutch capability for importing *LNG* would be desirable for longer-term energy policy for the Netherlands.

With respect to the option of transporting the *Algerian* LNG contracted for by Gasunie by means of a pipeline to the Netherlands, the Cabinet noted that this route would be 30% more expensive than transport via LNG tanker (Tweede Kamer 1978, p.7). (To some extent this option was considered to be an academic one, since at the time the government formulated a final position on LNG importation, Gasunie had already signed (and the Ministry of Economics Affairs had approved) a contract with Algeria for the supply of *liquefied* natural gas.) It is important to keep in mind here that the Algerian contract concerned an amount of 4 x $10^9 m^3$ per annum for the period 1985-2005; the Cabinet anticipated, however, that total Dutch LNG imports would be further increased to reach 8-12 x $10^9 m^3$ LNG per year by 1990 and 10-15 x $10^9 m^3$ LNG/year by the year 1995. from the point of view of long-term Dutch energy supply access to a LNG terminal would thus become increasingly important.

The Cabinet ruled out the possibility of involving in the LNG issue, the contractual arrangements with foreign customers of Dutch natural gas, such as France, Italy, and Norway and to come to a redistribution of Dutch and foreign natural gas resources being re-exported from the Netherlands (e.g. Norway) (Tweede Kamer 1978, p.8). The main problem identified by the Cabinet in relation to an "exchange" of contracts involving the supply of natural gas to and from the Netherlands, was the "unique" nature of the different supply contracts already agreed upon in the past. Each contract involved different timescales, amounts and calorific values of the natural gas, conditions of sales, etc. An additional problem cited in the Cabinet policy paper was the fact that several customers for Dutch natural gas had signed (or intended to sign) contracts themselves with Algeria (Tweede Kamer 14626, nr.9, p.7/8). Furthermore, as regards the possibility of having Algerian gas supplied via pipeline to long-time contracted buyers of Dutch gas, such as Italy, was considered to be unattractive, practically and financially (among other things because the Dutch-Italian gas pipeline would have kept available to guarantee supplies to Italy in all circumstances (Tweede Kamer 14626, nr.9, p.9). Further problems of decision making changes to the arrangements with Algeria, was the fact that the contract was agreed upon in collaboration with West German LNG buyers (Tweede Kamer 14626, nr.13, p.17).

Once the need for importation of LNG was established by the Dutch Cabinet, the question of the location of a terminal was addressed. The Cabinet policy paper considered the issue of a foreign versus a Dutch national terminal and concluded that on grounds of energy policy, employment and the acquisition of technical knowledge, preference should be given to a Dutch terminal (Tweede Kamer 1978, p.9). The major factor underlying the Cabinet's position, concerned the "flexibility" of controlling supplies of natural gas to the Netherlands. The Cabinet believed that dependence upon a foreign LNG terminal--thereby affecting the practical ability for the Netherlands to negotiate supply contracts for LNG--could be detrimental to the Dutch policies of active natural gas imports and diversification of supply sources (Tweede Kamer 1978, p.9).

Factors concerning energy policy also related to the policy question of selecting the exact location of a LNG terminal in the Netherlands, although both major prospective sites (Maasvlakte and Eemshaven) were technically feasible in terms of transport and handling of LNG. The Maasvlakte sites were, however, more accessible for larger LNG carriers--especially those with a capacity exceeding 165,000m^3 (ships up to this capacity could be handled at Eemshaven after carrying out necessary harbor modifications). From the perspective of energy policy, it was noted that the use of large LNG tankers would enhance supply opportunities as well as diversification of foreign sources of supply (Tweede Kamer 1978, p.10). Mention was made of the possibility of combining LNG operations with a coal gasification plant--to enable mixing of the LNG and coal gases to bring the gas to the calorific level required for use in Dutch gas supply. The Cabinet clearly emphasized, that coal gasification and LNG activities would *not* necessarily have to be combined geographically, thereby separating this particular energy policy factor from any preference for one or another LNG site under consideration (Tweed Kamer 1978, p.10).

4.7.4. Economics/Cost

The governmental decision to import natural gas in liquefied form, using LNG tankers, was directly related to the dimension of economics/cost. Transport of natural gas via pipeline was considered to be economically attractive only when it involved supplier which were relatively close to the Netherlands. For distant supplier of natural gas, such as Nigeria or Middle Eastern countries, transport via pipeline was considered too expensive by the Dutch government, to be an appropriate option (Tweede Kamer 14626, nr.9, p.5).

The analysis of the Dutch government was based on the difference in cost structure between gas transport via pipeline and by LNG carriers. The cost of transport via pipeline would increase more rapidly with larger distances, compared to transport by LNG tanker. The difference in cost structures--as represented by the Dutch Government--are illustrated below (see Figure 4.10), indicating that at a certain large transport distance, transport via LNG tanker becomes more economical than transport via pipeline (Tweede Kamer 14626, nr. 9, p.5).

In the specific case of transport of natural gas from Algeria to the Netherlands, the Dutch government indicated that the investment cost for transport via pipeline would be about 50% higher, than for transport via tanker in the form of LNG. The investment costs figures presented by the Cabinet are given below in Table 4.32 (Tweede Kamer, 14626, nr.9, p.6).

The option of "exchanging" contracts for natural gas supply with Italy, which receives Dutch natural gas via pipeline (and which could in principle be supplied with the Algerian gas, contracted by the Netherlands), was rejected as a viable option by the Dutch Cabinet. Apart from the difference in delivery timescales involved and other practical considerations, the Cabinet concluded that financial savings of this option would be very limited because:

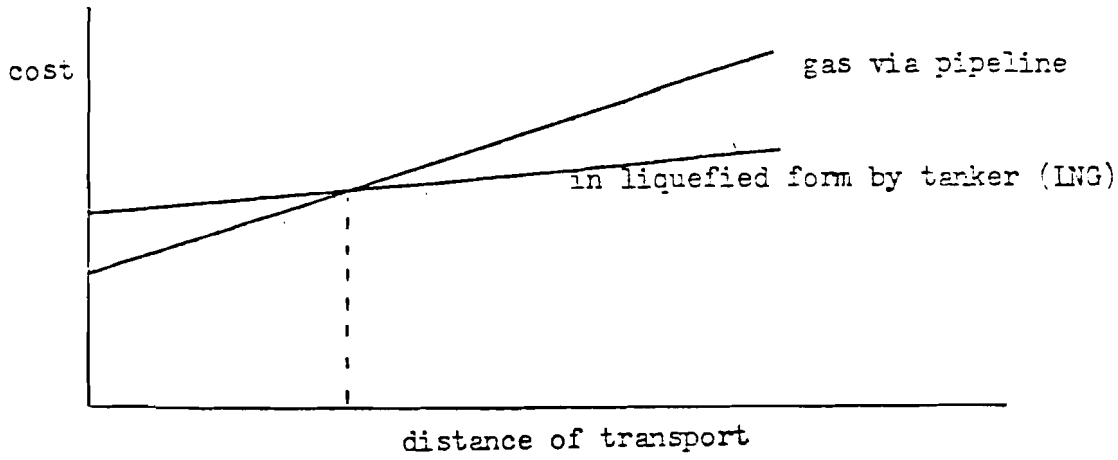


Figure 4.10. Natural gas transport cost structure.
(as presented by both ICONA and the Cabinet)

(a) the Netherlands-Italy pipeline would have to be kept available;

(b) the cost of transporting Algerian gas by LNG carrier to the Netherlands would differ little from the cost of transporting natural gas by pipeline to Italy (Tweede Kamer 14626, nr.9, p.9).

On the basis of the above economic and other factors the Cabinet decided that transport of the Algerian gas was preferred in liquefied form as LNG, rather than via pipeline (Tweede Kamer 1978, p.7).

As regards the policy question of a Dutch versus a foreign LNG terminal, cost considerations do not seem to have played a significant role, if any. The cost dimension did play an important role, however, in relation to the policy question of the exact location of a LNG terminal in the Netherlands. Firstly, mainly based upon figures calculated by ICONA, the Dutch Cabinet concluded that an island terminal for LNG was considerably more expensive than land-based terminals being considered. In this respect, the Cabinet followed the advice of ICONA (from October 1977) that the option of an island terminal would lead to excessive costs (Tweede Kamer 14626, nr.3, p.8).

The governmental decision process in the Netherlands about the siting of a LNG terminal followed a path characterized by ***elimination***. A large number of potential land sites were judged to be unfeasible, on the grounds of nautical and technical considerations. The main site being considered in 1977 was in the Maasvlakte area--the island option effectively being considered too expensive. Following the re-introduction of Eemshaven as potentially viable LNG site, the cost dimension came again to the fore, as the government considered the selection of sites which by 1978 had narrowed down to the choice between a land-site at Maasvlakte or Eemshaven. The Voornedam alternative and the OTTS terminal were also taken into consideration by the Cabinet; the first was

Table 4.32. Investment cost gas Algeria to the Netherlands ($12 \times 10^9 m^3$/year) Millions of Dollars (1977).

	Pipeline	LNG
pipeline to Algerian coast		350
liquefaction plant		1200
six LNG carriers 125,000 m^3	750	
LNG terminal		230
2500 km pipeline: Algerian gas field to N-Italy (via Tunesia, Sicily)	3000	
pipeline N-Italy to the Netherlands (1000km)	800	
Total	3800	2530*

*Three quarters of this cost would be accounted for by the Algerian government in the case of pipeline transport only 1/6 to 1/7 of the costs would be paid by Algeria. (Source: Tweede Kamer 14626, nr. 13, p.3)

introduced as a serious option at a later stage of discussions, at the requests of Zuid-Holland provincial counsellors (Tweede Kamer 14626, nr.9., p.34).

As regards cost, the Dutch Cabinet stated that the cost of *construction* for a LNG terminal at Eemshaven and Maasvlakte would be identical, with both Voornedam and OTTS options considerably higher (Tweede Kamer 14626, nr.9, p.21). Taking into account the infrastructural requirements needed for the different options a clear cost difference was noted, however. The total cost for a LNG terminal at the different sites, including infrastructure (harbor modifications, etc.) transport cost were cited by the Dutch government as follows in Table 4.33 (assuming $12 \times 10^9 m^3$ LNG transported per year).

The cost difference between Maasvlakte and Eemshaven sites were, however, less pronounced in the case of a LNG transport amounting to $4 \times 10^9 m^3$ LNG per year. By mid-1978 the Cabinet had narrowed down the choice of a LNG site to Eemshaven versus Maasvlakte. In its final analysis it concluded that the Eemshaven option would be considerably cheaper. The following Table 4.34 summarizes the Cabinet's cost comparison (Tweede Kamer 1978, Bijlage 2). The government figures thus clearly indicated that in terms of *economics/cost* alone, the Maasvlakte site was the most attractive option.

Table 4.33. Total cost siting LNG terminal.

Site	Total Cost*
Maasvlakte A and B	520-530
Eemshaven	1170-1260
Voornedam	1575-1675
OTTS	approx. 1580

*in millions of guilders
(Source: Tweede Kamer 14626, nr.9, p.22)

4.7.5. Safety/Risk

The dimension of safety does not seem to have played a major role in the resolution of the first policy question, concerning the desirability of importing LNG into the Netherlands, nor did it affect the governmental view that the Netherlands should give preference to its national LNG terminal. In relation to the acceptability of a LNG terminal on Dutch soil, and thereby in respect of the third policy question, that of the selection of a LNG site, the safety dimension did play a significant role.

As a contextual factor it must be mentioned here that governmental concern about safety of a LNG terminal was a major factor influencing the national government to get itself involved in a major way in the decision making on LNG (Approval procedures on the licensing and siting permissions could in principle have been handled by the relevant local authorities). Governmental involvement lead (among other things) to the commissioning of safety/risk studies by TNO and others and official advisory bodies.

On the basis of the advice of ICONA and using various risk studies (notably TNO 1976) the Cabinet first informed parliament in March 1978 about its position vis-a-vis the safety at the various potential LNG sites. The Cabinet concluded that the research had indicated that "the minimal probability of calamities involved in the location of a LNG terminal at an artificial island does not differ essentially from that involved in location at Maasvlakte sites A and B"; furthermore the Cabinet stated that with respect to Maasvlakte site C and the Voornedam terminal site, the same conclusion applied (Tweede Kamer 14626, nr.6., p.2).

Table 4.34. Cost comparison siting LNG terminal Eemshaven/Maasvlakte*

Aspect	Maasvlakte B site	Eemshaven site
Sea transport:		*additional* cost compared to Maasvlakte: 144 million guilders (4 x $10^9 m^3$ LNG/year) 431 million (12 x 10^9 LNG/year)
Gas distribution within the Netherlands		*additional* cost compared to Maasvlakte: 45 million (4 x $10^9 m^3$ LNG/year) 135 million (12 x $10^9 m^3$ LNG/year)
Infrastructure	29.1 million	56-111 million guilders**

NOTES:

* The cost of construction of a LNG terminal was estimated as being approximately equal at all sites, totaling approximately 560 million guilders, for a capacity of 12 x 10^9 m^3 LNG per year (Tweede Kamer 1978, Bijlage 2).

** This figure is calculated on the basis of 125,000m^3 capacity LNG carriers; the exact level depends to what extent modification of the harbor for ships up to 70,000m^3 is counted as separate harbor investment, independent of LNG terminal facilities.

As regards the safety aspect, the government argued that it was practically impossible to use *general* criteria for assessing the acceptability of a LNG terminal site, since for the selection all relevant aspects of a proposed location should be taken into consideration (Tweede Kamer 14626 nr.9, p.5). The Dutch government therefore took an approach of assessing and comparing the risk involved at the proposed sites rather than judging its acceptability on the grounds of *a priori* criteria. Towards the end of the decision-making period, the discussion on safety largely centered around a *comparison* between the prime sites, at Maasvlakte and Eemshaven, once the other sites were eliminated from the discussion.

The approach taken by the government, (albeit never explicitly stated) suggests that the elimination of the other potential sites (excluding Maasvlakte and Eemshaven) took place largely on the basis of technical and economic factors, rather than the concept of *acceptable risk*. It also implied that the risk involved in a LNG terminal was acceptable at either of the two final alternative sites (Maasvlakte and Eemshaven).

The Dutch Cabinet seems to have concluded that its final position on safety be in agreement with the conclusions of ICONA (where representatives of 15 ministerial departments were represented): that the risk involved in LNG operations were acceptable. The acceptance by the Cabinet of the risk involved in a land-based LNG terminal, was almost certainly a political compromise, given the initial objectives by the Ministry for Public Health and Environment, to the acceptance of a Maasvlakte site in 1977. (Within ICONA, the representative of the Ministry for Public Health and Environment had stated that location of a LNG terminal at Maasvlakte was not acceptable, mainly on the grounds of safety; see section 4.2.5.6.).

The risk involved in a LNG terminal located at Eemshaven were considered to be safer (in terms of risk to the population) by a factor of 10, in comparison to Maasvlakte, but it is not obvious to what extent this single factor has played a major role with respect to the seemingly limited degree of official opposition to the selection of the Eemshaven site, on safety grounds by the Ministry for Public Health and Environment. Whatever the potential internal governmental disagreement between different ministerial departments, the final Cabinet view apparently accepted the risks involved in a LNG terminal, and focused its attention upon a comparison, in terms of safety, of the Maasvlakte and Eemshaven sites. The Cabinet seems to have been somewhat reluctant to emphasize the safety dimension of the later stages of the decision processes, since the risk issues involved had not been given much prominence as a *selection criterion* in earlier stages of decision making.

In the comparison between the safety aspects of a LNG terminal at Eemshaven and Maasvlakte respectively differences were concluded, firstly with respect to the transport of the LNG to the terminal. Taking into account the longer shipping route to Eemshaven, in comparison to a Rotterdam site, the government stated that the number of encounters with other ships, and thereby the probability of collisions was not lower in relation to Eemshaven, despite the fact that the sea traffic density on route to Eemshaven was considerably lower (Tweede Kamer 14626, nr.9, p.19). As regards the risk of LNG ships stranding on route to the terminal the government concluded that an Eemshaven terminal would be more dangerous. In this respect the government noted the nearby islands of the Waddenzee on route to Eemshaven. Approach to an Eemshaven harbor was also considered more risky than the route to the Maasvlakte. Reference was made in this context by the government to studies carried out by ICONA. With respect to the risk to the population, in the area of a proposed LNG terminal, the Cabinet clearly acknowledged (on the basis of TNO and other data sources) that the maximum consequences of accidents with LNG are a factor 10 lower in the case of an Eemshaven terminal, in comparison with Maasvlakte); the individual death probability is approximately an order of magnitude lower at Eemshaven, the Cabinet concluded (Tweede Kamer 1978, p.11).

The safety assessment of the different potential LNG sites presented by the Cabinet in its final policy position is summerized in Table 4.35.

Table 4.35. Safety aspects comparison of LNG sites.

Safety Aspects / Sites	Chance of maximum accident (in brackets: after safety measures)	Maximum effect: no. of deaths	Maximum effect: no. of casualties	Maximum effect: material 3rd party damage (Dutch guilders)	Increase in individual death chance	Weighed risk after safety measures (deaths/year)
Maasvlakte B	$3x10^{-7}$ ($3x10^{-8}$)	$0.5\text{-}2x10^{4}$	$1\text{-}4x10^{4}$	$18x10^{9}$	$3x10^{-6}$	0.028
Eemshaven	10^{-7}* ($5x10^{-8}$)	$0.5\text{-}2x10^{3}$	$1\text{-}4x10^{4}$	?	$< 3x10^{-7}$	approx. 0.023
Maasvlakte A	-------	as	Maaasvlakte	Site B	--------	--------
Maasvlakte C	$3x10^{-7}$ ($3x10^{-8}$)	$0.5\text{-}2x10^{4}$	$1\text{-}4x10^{4}$	$< 18x10^{9}$	$3x10^{-6}$	0.026
Voornedam	approx. 10^{-7} (same)	less than	Maasvlakte	$< 18x10^{9}$	$< 3x10^{-6}$	0.024
Island	--	300	--	0	--	0.022
OTTS**	10^{-7} (10^{-7})	less than	Maasvlakte	$< 18x10^{9}$	$< 3x10^{-6}$	0.024

NOTES: * excl. chance and effect stranding LNG tanker
** 4 km off-shore

Source: Tweede Kamer 1978, Bijlage 2

As regards the *total risk* levels used by the Cabinet in its final assessment of the safety of transporting, handling and storage of LNG, the Cabinet concluded that (given the difficulty of quantification) it supported the view of the CPR Committee for the Prevention of Disasters and stated: "on the grounds of risk considerations *no clear preference* can be given in favor of one or the other harbor sites" (emphasis added) (Tweede Kamer 1978, p.1). This conclusion referred to the comparison between Maasvlakte and Eemshaven sites only, particularly taking into account the longer shipping route to the latter site.

4.7.6. Socio-economics/Regional Policy

With respect to the first policy question, the desirability of importing LNG into the Netherlands, the dimensions of socio-economics did not play direct role of any significance. No explicit mention was made by the national government whether it agreed or disagreed with the conclusion of the interdepartmental coordination committee, ICONA, that the importation of LNG would have a positive effect upon Dutch industry, especially the shipbuilding sector (Tweede Kamer 14626, nr.3, p.3).

Once the Dutch government had taken the decision to import LNG, the question of the desirability of a Dutch terminal was considered, and here the aspect of employment was mentioned by the government of being a significant factor. The national government adopted the view that the use of a foreign LNG terminal for the reception of Dutch bought LNG (e.g., Wilhelmshaven) would be "less appropriate" since the positive employment effects should be achieved within the Netherlands if at all possible (Tweede Kamer 14626 nr.5, p.7). The Cabinet concluded that a LNG terminal in the Netherlands would play a positive role with respect to employment, also in relation to other economic activities and the acquisition and development of expertise in the Netherlands in the area of LNG (Tweede Kamer 1978, p.9).

In relation to the *location* of a LNG terminal within the Netherlands, the government's position with respect to the dimension of socio-economics centered on two main aspects:

(1) employment generation; and

(2) promotion of (new) economic activities in the region around the terminal.

As regards the employment effects of a LNG terminal, the national government basically used the figures calculated by ICONA. The following figures were quoted by the Cabinet in respect of direct and indirect *temporary* employment generated by the construction of a LNG terminal and the necessary infrastructure, indicating that the employment effect of a LNG terminal at Eemshaven would be higher than at a Maasvlakte site (Table 4.36) (Tweede Kamer 14626, nr.9, p.3-4). In addition, the government discussed the permanent employment stemming from the exploitation of the LNG terminal and the maintenance of the infrastructure:

Maasvlakte: 50 permanent jobs

Eemshaven: 120 permanent jobs;

Table 4.36. Direct and indirect employment effects (no. of man-years).

Maasvlakte A	4500-5050
Maasvlakte B	5300-5900
Eemshaven	5600-6200

the main area of difference concerns the dredging operations required at Eemshaven to maintain access to the harbor for LNG carriers (Tweede Kamer 14626, nr.9, p.3-4).

In relation the generation of permanent employment the Cabinet stated, in June 1978, that the expected permanent employment at both main locations (Maasvlakte and Eemshaven) was considered to be small in *absolute* terms; the *relative* employment consequences, however, would be greater at Eemshaven--considering the higher unemployment rate in the province of Groningen, in comparison to the Rotterdam area (Tweede Kamer 14626, nr.9, p.26). In terms of employment generation the Cabinet therefore concluded that against the background of the relatively weak regional economic situation in the North of the Netherlands, this factor was more significant when a LNG terminal was sited at Eemshaven (Tweede Kamer 1978, p.2).

As far as secondary socio-economic affects of a LNG terminal are concerned, the national government mentioned the possibilities for further industrial activities related to LNG, such as cryogenics industries. It is important to emphasize that whilst such "external" socio-economic effects played a significant role in the Cabinet's final policy view, earlier governmental statements (e.g., Tweede Kamer 14626, nr.9, p.36-June 1978) seem to have played down this factor. As far as the industrial use of cold energy from LNG activities is concerned, the government noted that the opportunities for cryogenic development could possibly be grater at a Maasvlakte site, than at Eemshaven. The opportunities for follow-on activities at Eemshaven were not considered large by the Cabinet in the short term (Tweede Kamer 14626, nr.13, p.7 and p.18).

A major socio-economic factor mentioned by the government in favor of an Eemshaven LNG site was, however, the so-called "psychological effect" of the actual use of Eemshaven, which was thought to help improve the economic climate in the region and stimulate economic activities (Tweede Kamer 14626, nr.9, p.36; Tweede Kamer 1978, p.12). In its final position the Cabinet stated that the selection of Eemshaven was based in particular upon considerations of regional economic policy and made in relation to the "necessary impulse" to the region in terms of employment

(Tweede Kamer 1978, p.1.) The national government repeatedly underlined the importance of regional industrial policy and the promotion of economic activities in regions such as Groningen, which have traditionally seen slower industrial development compared to other parts of the Netherlands (e.g., Western regions). The Cabinet stated that the decision on the siting of a LNG terminal at Eemshaven was made in that particular context; it also played a role in giving credibility to the government's regional industrial policy, aimed at attracting economic activities to less developed regions (Tweede Kamer 1978, p.12; 1978a, p.862). In relation to the Eemshaven site it is important to mention that LNG would be the first major use of the newly-constructed harbor (Tweede Kamer 1978a, p.862).

The employment involved in the construction of the LNG ships, was considered by the national government not to affect the selection of a LNG terminal location, since the building of the LNG carriers was planned in the Rotterdam region--where Dutch shipbuilding industry is concentrated--regardless of the location of the LNG terminal (Tweede Kamer 1978, p.12). The following Table 4.37 summerizes the socio-economic aspects of the comparison between Various alternative LNG sites, as stated by the Dutch Cabinet (Tweede Kamer 1978, Bijlage 2).

4.7.7. Environmental Impact

The dimension of environmental impact played a minor role in relation to the policy perspective of the national government. As regards the desirability of importing LNG, from the viewpoint of environmental considerations, the national government acknowledged the act that natural gas, compared to other energy sources, is relatively "clean" and is therefore preferred (Tweede Kamer 14626, nr.5, p.8). Because of the limited perceived environmental problems of LNG (excluding safety) the dimension of environmental impact seems to have played no significant role in the national government's position with respect to the policy choice between a Dutch versus a foreign LNG terminal. As regards the dimension of environmental impact in relation to the selection of a Dutch LNG terminal site, the national government based its position predominantly upon advice from ICONA (see section 4.2.5.5.) and ICMH (Tweede Kamer 14626, nr.9, p.21). The natural government concluded that there were no fundamental objections attached to a LNG terminal sited at either of the two prominent land-based sites (Maasvlakte and Eemshaven) (Tweede Kamer 14626, nr.6., p.2).

A major area of environmental impact concerned the effect of a LNG terminal upon the Waddenzee environment, in case an Eemshaven terminal site was selected. In this respect the Dutch government acknowledged that LNG would have environmental consequences, but it judged that compared to other industrial activities, a LNG terminal is relatively "clean" (Tweed Kamer 14626, nr.13, p.20). According to the Cabinet, studies had indicated that with "adequate provisions" a LNG terminal would not in itself create unacceptable environmental consequences (Tweede Kamer 1978a, p.866).

Table 4.37. National government policy perspective socioeconomic aspects.

Socio-economic Aspects / Alternative Sites	Temporary employment (man years): LNG terminal + infrastructure construction	Permanent employment (man years): exploitation terminal	Permanent employment (man years): maintenance infrastructure (dredging)	Employment in shipbuilding**	Attraction follow-on activities	Regional Policy Implications
Maasvlate B	5300-5900	50	--	interesting prospects multivessel tanker* **	limited	compensation possible of potential negative effects upon oil/petrochemical activities
Eemshaven	5600-6200	50	70	limited prospects multivessel tanker**	very limited	stimulus North Netherlands; prefer w.r.t. distribution economic activities; strong psychological effect
Maasvlate A	4500-5050	40	--	interesting prospects multivessel tanker **	limited	as Maasvlakte B
Maasvlakte C	11280-13560	50	--		limited	
Voornedam	15600-17400	50	--		limited	
Island	15000-15600	60	--		very limited	

Notes: * if multivessel tanker proves feasible
** employment 125,000m^3 LNG tanker construction to Rijnmond region--in all circumstances

As far as the comparison between Eemshaven and Maasvlakte LNG sites is concerned the Cabinet concluded in terms of the environment aspects (excluding safety), that the siting of a LNG terminal at Eemshaven would have greater negative environmental consequences, due to the required dredging, and taking into account the "special character" of the"Waddenzee environment" (Tweede Kamer 1978, p.11). From the viewpoint of environmental impact, the national government therefore concluded that a Maasvlakte LNG site should be preferred (Tweede Kamer 1978, p.14).

The following Table 4.38 summerizes the Cabinet's policy view with respect to the environmental impact of a LNG terminal at the various alternative sites (Tweede Kamer 1978, Bijlage 2).

4.7.8. Cabinet/National Government Policy Perspective

The final policy perspective of the national government indicated a perceived need for LNG importation via a Dutch LNG terminal, with Eemshaven as the preferred LNG terminal site. The dominant dimension mentioned by the national government underlying its final siting decision concerned socio-economics, in particular the positive effect siting at Eemshaven could have upon regional development and employment. A *land- based* terminal was favored by the Dutch government mainly on the basis of cost considerations. Table 4.39 summerizes the policy position of the national government in terms of the implications of its dimensional views, as it was stated in *official* governmental publications. Table 4.40 attempts to interpret the national government's position in terms of the relative weight attached to different dimensional aspects.

4.8. Party Perspectives: Risk

Table 4.41 summarizes the various party positions with respect to the acceptability of the risk and safety dimensions of LNG terminal siting. For further discussion of the risk aspects of Dutch LNG decision making that is not featured, reference is made to the Dutch Chapter in the IIASA final report on LEG siting (IIASA 1982).

Table 4.38. National goverment site comparison - environmental impact.

Environmental Impact / Site	Terminal water pollution through drainage chloridated, cold water	Water pollution terminal in case of combination with electricity power station	Water pollution dredging operations	Noise and light effects; potential effects
Maasvlate B	some damage to organisms at sea-bed	positive effects through decreasing temperature and chlorine drainage	limited disruption sea-bed	
Eemshaven	large damage to sea-bed organisms	large positive effects through decreasing temperature and chlorine drainage	large disruption sea-bed; decreased primary production; chemical pollution	disturbances for birds and seals
Maasvlakte A Maasvlakte C	---------- as	Maasvlakte	site B	----------
Voornedam	some damage to sea-bed organisms	supposed not relevant	incidental disruption limited; permanent distruption unknown	
Island	limited damage to sea-bed organisms	not relevant	incidental disruption limited; permanent disruption unknown	
OTTS	some damage sea-bed organisms	not relevant	sea-bed disruption absent?	

Notes: * effects of terminal only
** the positive effects in case of restricted drainage from LNG and power station, through closed-circuit using heated cooling water.

Source: Tweede Kamer 1978, Bijlage 2

Table 4.39 Policy questions and dimensional impact

Policy Question / Dimensions	LNG importation desirable?	Dutch terminal desirable?	Location LNG Terminal: Eemshaven or Maasvlakte?
1. energy policy	+	+	Maasvlakte*
2. economics/cost	+	o	Maasvlakte**(?)
3. health and safety	o/[]	o/[]	o
4. socio-economics	o/[]	+	Eemshaven
5. environmental impact	o/[]	o/[]	Maasvlakte

KEY:
- \+ favorable
- o no preference
- [] not considered/not relevant

NOTES:
- * greater opportunities for larger LNG carriers, if required;
- ** by implication from cost data; policy preference never explicitly stated stated in final governmental view; this dimension was dominant with respect to preference of land-based LNG terminal.

Table 4.40. National government policy perspective.

Policy question	Dominant dimension(s)	Outcome
LNG import desirable?	1. energy policy	Yes
Dutch terminal desirable?	1. energy policy	Yes
Land-based or off-shore terminal?	1. economics/cost 2. energy policy	Land-based
Location LNG terminal? (Eemshaven or Maasvlakte?)	1. socioeconomics	Eemshaven

Table 4.41. Risk Positions of Interested Parties Regarding the Netherlands' LNG Decision.

Acceptable	Too Uncertain	Additional Risk To Population Unacceptable	Unacceptable
Cabinet	Zuid-Holland	Zuid-Holland	(North Sea)
ICONA	Provincial Council	Provincial Governors	Environmental Group
Parliament (majority)			
Rotterdam Harbour	(Eemsmond) Environmental Group	Rijnmond Local Authority	Electricity Corporation Groningen
Rotterdam Municipal Authorities	Noordzee Environmental Group	Minister for Health and Environmental Protection (minority view)	
Groningen Provincial and Municipal Authorities			
RPC			

Key to risk positions:

Group 1--Acceptable: Risks are negligibly small or acceptable in relation to the advantages of LNG;

Group 2--Too uncertain: The risk analyses are too uncertain; too many underlying assumptions and contradictions; it is unacceptable to draw conclusions (at this stage) further investigation of risk and alternative options should be pursued;

Group 3--Additional risk of LNG unacceptable for population: psychological factor/perceptions of risk; at least handling/reception of LNG should not take place at Maasvlakte (parties in this group did not express views on the acceptability of the risk at other locations, or absolute levels of acceptable risk)

Group 4--Unacceptable: possible consequences of an accident are too large; reception/handling as well as storage of LNG on-shore is unacceptable.

SECTION III:
ANALYSIS OF DECISION PROCESS

CHAPTER 5:
DECISION STRUCTURE AND PARTY CONNECTIONS

5.1. DECISION STRUCTURE

Siting decisions and planing approval for large developments in the Netherlands would normally involve the (national) Ministry for Economic Affairs, and, at the local level, the municipal and provincial authorities responsible for the area where siting is proposed.

The most striking aspect of the LNG decision-making process was that these normal procedures only partially applied. The decision structure and procedures with respect to LNG siting in comparison with "normal" large-scale siting decisions different in two major respects:

1. The early involvement of the ***national*** government at a preliminary stage (i.e. before a formal application for a LNG terminal had been made by the eventual applicant, Gasunie), which related to
   (a) the role of the national government in activities of Gasunie as regards energy policy, and
   (b) concern about feasibility and acceptability of alternative LNG sites, (especially with respect to safety); and
2. A special decision procedure which was designed by the national government in order to obtain "in principle" positions from relevant ***local authorities*** on acceptability of a LNG terminal, prior to the formal customary siting approval procedure at the local level.

The result was an unusual combination between decision-making at the national and the local level, with the national government taking the leading role in relation to LNG planning and decisions.

At the level of the national government, the Ministry for Economic Affairs in particular was involved at an early stage in the plans being considered by Gasunie for the importation of LNG, as part of Dutch national gas supply policy. Gasunie is partly state-owned (see also section 4.5.2.), with formal connection with the Dutch government, and in particular with the Ministry of Economic Affairs' energy department. The minister for economic affairs generally approved and supported the Gasunie's plans for the importation of foreign natural gas (2^e Kamer zitting 1978-79; Handelingen 5, p.855, 26 October 1978). The ministry of economic affairs was directly involved in planning the corporate strategies of the Gasunie, within the context of Dutch energy policy and was therefore consulted on the desirability and feasibility of LNG terminal in the Netherlands.

In addition to the involvement of the Ministry for Economic Affairs in relation to energy policy, the national government became involved in LNG siting, through the concern about feasibility and acceptability of a potential LNG terminal site in the Netherlands. Although no *formal* request had been made by Gasunie for a LNG terminal site in the early seventies, the national government was aware of discussions in 1972/73 between Gasunie and LNG suppliers and the intention of Gasunie to import LNG. This awareness and concern on the part of the government triggered the national government to become involved more fully. In particular, this led to the request (in 1974) by the Ministry for Social Affairs (with formal responsibility for safety, etc.) for research into the safety aspects of LNG by a special committee (Commissie Buschmann) and later TNO. The Netherlands Maritime Institute was asked by the national government to evaluate the nautical aspects of potential Dutch LNG sites.

The decision process on LNG siting at the governmental level was subsequently moved into a new phase, when in 1975, Gasunie requested a formal view from the national government with respect to its plans of siting a LNG terminal at Maasvlakte, and more specifically (in relation to alternative sites) the possibility of a LNG terminal off-shore. When in governmental circles this request was linked to stated interest (by industry) in an artificial industrial island in the North Sea (off the Dutch coast) developments led to the setting up of an interdepartmental steering group, STUNET, in 1975. With STUNET's first task to investigate the desirability and modalities involved in a possible LNG terminal in the North Sea, the role of the national government in LNG decision-making grew.

Although matters relating to LNG within the government had up to then been concentrated within the Ministry of Economic Affairs (energy policy) and to some extent Social Affairs (safety), it was becoming increasingly clear that a LNG terminal was not solely a matter of responding to Dutch energy policy (which was the responsibility of the Ministry for Economic Affairs), but that it was a matter of broader concern, involving issues such as health and safety, environmental planning, international shipping arrangements, etc. With the setting up of STUNET under the coordination of the Ministry for Traffic and Public Works, LNG moved

to the interdepartmental level, involving a large number of ministerial departments, which recognized their respective responsibilities for different aspects of LNG importation and handling. It was a first recognition that the ultimate decisions on LNG would eventually involve the level of the Cabinet--notwithstanding the responsibilities of local authorities with respect to site approval.

STUNET was made responsible to ICONA, the inter-departmental coordination committee for North Sea, taking the decision-making on LNG siting into an inter-departmental structure. Such a structure was required in order to prepare Cabinet decisions concerning LNG, involving a considerable number of different ministries with departmental responsibilities. ICONA became the foremost interdepartmental group at the level of the national government, concerning LNG. Involvement by the national government was further enhanced by introducing additional governmental "advisors" into the decision-making process, such as the Interdepartmental Committee for Environmental Hygiene (ICMH) and the State Land Use Planning Commission (RPC)--reflecting governmental concern about environmental and land use planning, as well as safety. It was significant that ICONA incorporated representatives of practically all ministerial departments. ICONA was to advise MICONA, a sub-committee to the Cabinet, which together with the Ministerial Council for land use planing (RRO--Radvoor de Ruimtelijke Ordening), formed the final link to the Cabinet on decisions concerning LNG.

The complicated governmental structure built around LNG decision-making (see Figure 5.1) ensured an unusually high degree of involvement

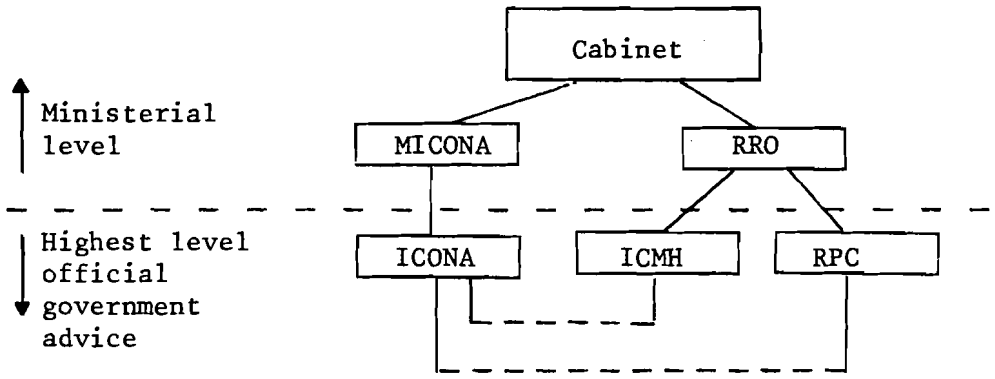


Figure 5.1. Governmental structure of advisory and decisionmaking bodies on LNG.

on the part of the national government in decision-making on LNG siting. In principle, the involvement in LNG decision-making by the national government could have been limited by involvement of the Ministry for Economic Affairs with respect to (i) approval of a contract for LNG importation and (ii) approval of a *selected* LNG terminal site, within the "selective investment" legislation (SIR). If the national government had so decided, all other aspects of the decision-making as regards LNG siting

could have been handled by the relevant local authorities, responding to requests for siting by Gasunie.

At the local level of authorities contacts had been made between Gasunie and local authorities in the Rotterdam region, as well as the Harbour Authorities, about a possible use of Maasvlakte for a LNG terminal. The Maasvlakte site had been Gasunie's preferred LNG-site from the start; a preference which was later strengthened by the fact that the study by the Netherlands Maritime Institute concluded that it was the only feasible land-based LNG site in the Netherlands. This conclusion was later adopted by STUNET in its advice to ICONA (this was before the Eemshaven site was re-introduced in late 1977).

A fundamental change in the decision-making process as regards the involvement of local authorities occurred in mid-1977 when Gasunie signed a LNG contract with Algeria, and the Ministry for Economic Affairs gave its approval. As a result of the limited time-scales specified in the side-letter to the contract as regards the location where the Algerian LNG would be imported, the national government decided to "interfere" in the normal decision procedure of local authorities. A special decision procedure was designed by the national government, specifying the relationship between the national and local authorities and the timescales within which the various decision steps were to take place (see Section 5.2).

5.2. LNG DECISION PROCEDURE AND HIERARCHY

In October 1977 it was decided by the Cabinet that a special decision procedure for LNG was required to take account of the various issues and parties involved. The design of a special procedure was preceded by two factors which can be said to have set the context for subsequent decision events on LNG:

1. Gasunie had signed a contract for the importation of LNG with Sonatrach with full approval of the Ministry of Economic Affairs.
2. The deadline of 31st October 1978 for approval of a site for LNG terminal had introduced a critical time factor in the decision process.

Within these constraints, and in the interest of Dutch energy policy* it was imperative that the national ministerial departments and the Cabinet play a determining role in controlling of the decision procedures on LNG in order to attempt to find a LNG terminal for the contracted LNG. The national government hereby began to play a more dominant role in defining the decision problem, setting its context and assigning responsibilities.

*By this time Gasunie had also been given the official mandate by the national government to pursue contracts for the importation of LNG according to the official energy policy of 1974 (*Energienota*--Tweede Kamer 1974).

The decision procedures designed by the national government for the LNG siting decision involved two levels. First, the preliminary selection of a candidate LNG site by the Cabinet based on advice from ICONA, STUNET, and others. Secondly, local authorities at the provincial and municipal levels (in the area where LNG terminal was proposed) who were to respond officially to the government's proposals thereby indicated whether they would, in principle, approve a LNG terminal within the context of environmental and other planning laws. It is of interest to note that at the time this decision procedure for LNG was being drafted, the government was working with the assumption that the only group of local authorities they had to deal with, would be those responsible for the Maasvlakte sites (i.e., Province of Zuid-Holland, Public Authority of Rijnmond, and the City of Rotterdam), since governmental advisors (NMI, STUNET) had concluded Maasvlakte to be the only viable land-based LNG site.*

The major elements of the LNG decision procedures are depicted in Figure 5.2. The role of public participation or involvement of environmental groups, unions, and other non-governmental organizations did not receive special attention in the national government's decision procedure. By implication, however, public hearings and other channels for airing respective objections to regional developments would be included through customary decision procedures at the provincial and municipal levels.

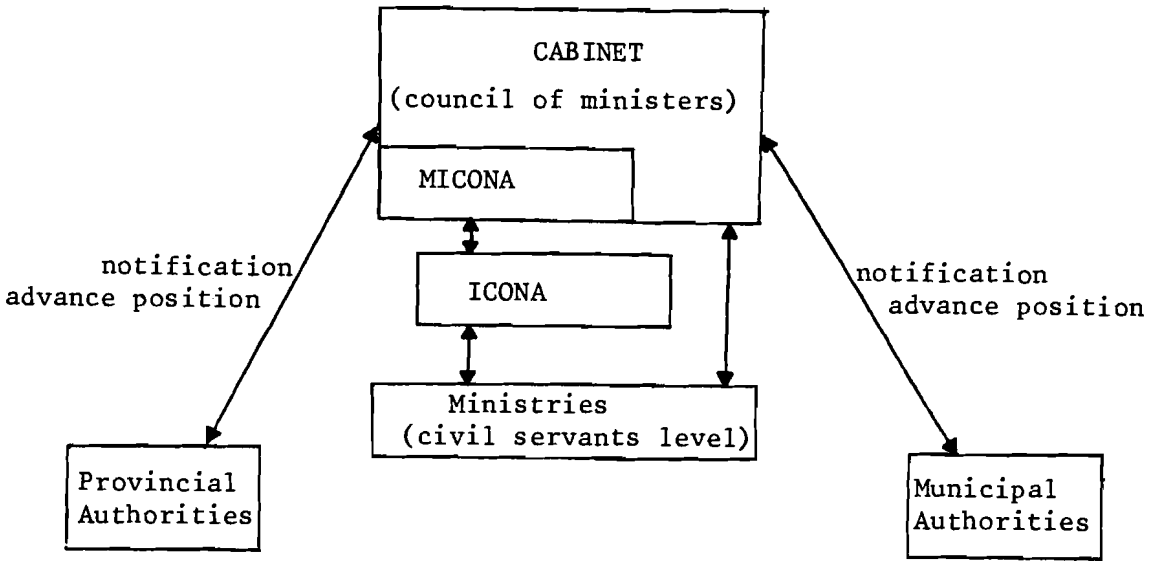


Figure 5.2. Major elements of LNG governmental decision procedures.

*At the time the decision procedure was being designed the national government had not yet officially rejected an island-terminal for LNG as a suitable option; in particular with respect to the high cost and long lead-times of such an alternative, however, a land-based site seems to have been the government's first preference.

The decision procedure was designed to receive an *early position* on LNG by the local authorities on the acceptability of a LNG terminal in its area of responsibility. Formal approval--at a later date--was still required by the local authorities within their legal responsibilities concerning legislation on environmental planning, land use, construction, and environmental pollution.

The decision procedure was designed by the national government against the background of the time-factor which had been introduced by the agreement between Gasunie and the Algerian company Sonatrach. In particular, the Ministry for Economic Affairs was concerned about the implications of delay--within its responsibility for Dutch energy policy. In this respect the position of energy department of the Ministry for Economic Affairs was in line with the interests of Gasunie, which, of course, was anxious to complete the required arrangements with respect to a LNG terminal and to finalize the LNG supply contract.

An implication of the *national concern with respect to energy policy was a relatively* dominant role for the national government in setting the context for decision-making events, leading to the selection of a site for the LNG terminal. The result was the unusual situation that on the one hand the Cabinet was assigned the task of selecting a LNG terminal site and notifying the Algerian suppliers about its *seemingly final* decision, whilst on the other hand, *final* approval in the *formal* sense would still rest with the relevant local authorities at a later date. Within the context of this analysis, however, the final Cabinet decision (and subsequent approval by Parliament) is taken as the final step in the decision-making process on LNG in the Netherlands.

Within the Dutch decision-making procedure the national government was at the center of decision-power, with other parties providing official or unofficial advice and input. The list below (Table 5.1) provides a picture of the decision hierarchy with respect to LNG policy-making, according to the decision powers of the various parties and the extent to which they were consulted by decision-makers, at more influential positions. The different parties involved in making and influencing decisions concerning LNG fell broadly in three categories.

Although the actual decision events did not necessarily reflect the relative positions in the decision hierarchy, as represented above, in the initial configuration of interested parties the national government did play a dominant role in setting the context for the final round of decision-making, in terms of problem definition, time-scales and the selection of interested parties which were assigned a place in the decision-making structure.

Table 5.1. Decision Hierarchy LNG Policy-Making Parties

I.	Cabinet (ICONA)/Ministerial Departments (Civil Service level) Parliament
II.	Local Authorities Officially appointed advisory bodies/organizations Gasunie Parliamentary Committees
III.	Public Interest Groups Trade Unions Environmental Organizations Individuals

5.3. PROBLEM EMPHASIS BY THE NATIONAL GOVERNMENT

The national government was not merely the final decision-making authority on LNG siting, but was also the main party responsible for designing the decision procedure, formulating the problem and setting the contextual background for the LNG decision process, and this had implications for the extent of involvement of different interested parties in the decision process.

The national government designed the special decision procedure in *late 1977* against the background of a set of contextual factors, which included the following:

- Gasunie was anxious to find a LNG terminal in order to finalize the LNG contract with Algeria, within Dutch energy policy objectives;
- Gasunie was in favor of siting a LNG terminal at Maasvlakte, but also showed interest in possible use of Wilhelmshaven;
- ICONA had advised the Cabinet that an island-terminal could ***not*** be completed in time to meet the first delivery date of the contracted LNG supplied by Algeria (Tweede Kamer 14626, nr.3, p.9).

Within the government, the Ministry for Economic Affairs had furthermore indicated that use of a foreign LNG terminal was *less **appropriate to consider***, since a Dutch terminal was preferred from the viewpoint of employment (Tweede Kamer 14626, nr. 5, p.7). It is important to note that the Ministry for Economic Affairs was the main government department in charge of industrial/employment policy, in addition to its responsibility

for energy policy. Other government statements following the approval of the Algerian LNG deal, in October 1977, indicated that of the land-based LNG alternatives, Maasvlakte was considered to be the preferred site, because of its proximity to major Dutch gas users and the nautical and practical objections to alternative LNG sites (e.g., Eemshaven) (Tweede Kamer 14626, nr.5, p.7/8).

By October 1977, when the *Cabinet* was first involved in the siting decision on LNG, the national government was far from announcing an agreed policy position with respect to the siting of a LNG terminal. Nevertheless, the above-mentioned factors reveal some sort of "imperative" in favor of a land-based LNG site at Maasvlakte. This can perhaps be understood, given the dominant role of energy policy within which the LNG siting issue (in relation to the Algerian contract) had first been introduced; in the early stage of governmental decision-making on LNG (1977) the Ministry for Economic Affairs played an important role. The Ministry for Economic Affairs' energy department seems to have been the main government department which had *direct* interest in meeting the October 31, 1978, deadline for the selection of a LNG terminal, in order to secure the delivery of Algerian LNG. The Economic Affairs Ministry was aware of the formal contacts which had already taken place between Gasunie and Rotterdam local authorities about Maasvlakte and given the limited timescales available, a Maasvlakte site provided the best prospects for completing the designed decision procedure in time (in addition to the apparent cost-advantages of Maasvlakte).

At the time the special decision procedure was formulated by the national government--in late 1977--the "problem definition" used, included all possible LNG sites, land-based, off-shore and foreign. The "imperative" towards a Maasvlakte LNG site was, however, reflected n the attention the national government seems to have paid to consultation with the relevant local authorities (City of Rotterdam, Public Authority Rijnmond, and Province Zuid-Holland) in comparison to investigation of other potential alternative options. The decision procedure followed by the national government (based on advice from RPC) indicated the importance of continual assessment of the option of a foreign LNG terminal, but it is clearly suggested that the feasibility of a Dutch LNG terminal should be preferred (RPC 1977).

Whilst ICONA and other governmental bodies (ICMH, RPC) were requested in the period October/November 1977 by the national government to further investigate the various options for a LNG terminal, the special decision procedure seemed to emphasize the various arrangements involved in approval of a Dutch *land- based* terminal, in particular, at Maasvlakte. This emphasis was reflected in the institutional contacts between the national government and other major interested parties as it developed in the course of the decision-making process. The following section attempts to identify the role of the national government amidst

the network of interested parties and to discuss their inter-relationship.

5.4. INTERACTION BETWEEN INTERESTED PARTIES

Up to the end of 1977 four *main* interested parties had been involved in the preparation for LNG decision-making:

- -- national government/cabinet
- -- STUNET/ICONA
- -- Gasunie
- -- Local Authorities Rotterdam

When assessing the changing inter-relationships between these parties it is important to take account of the dynamics of the LNG events and to compare the different institutional arrangements at some of the crucial decision points, as formulated in Section 2.3.*

1975:

Gasunie initiated plans for a possible LNG terminal and had contacts in this context with the national government (Ministry for Economic Affairs--Energy Dept.), and the City of Rotterdam Harbour authorities (see Figure 5.3).

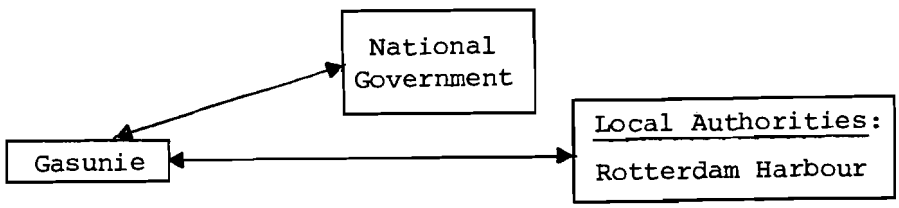


Figure 5.3.

Also in 1975 STUNET is set up (later made responsible to ICONA) with representatives of various government departments. Gasunie provided some technical in-put to STUNET. Gasunie also had observer-status in LNG Terminal Working Group. the basic institutional network remained unchanged in the period 1975 to June 1977. the contact between Gasunie and the Harbour Authorities of Rotterdam intensified and feasibility for a LNG terminal at Maasvlakte are started by the Harbour Authorities following the application for a construction permit by Gasunie in February

*Developments prior to 1975, such as the involvement of the Ministry for Social Affairs and the safety and nautical studies carried out by TNO and NMI bear relevance to the LNG issue, but they did not play a ***direct*** role in terms of initiating and approving decision on the siting of the LNG terminal. Similarly, the important contextual event of the adoption of a Dutch governmental gas importing policy in 1974, is not discussed in the context of this particular section.

1977.

June 1977

Gasunie signed a contract with Algeria for the importation of LNG, starting in 1984, a terminal had to be found by November, 1978. Following this contract, the Ministry of Economic Affairs had to decide upon approval of the agreement made by Gasunie, and the national government becomes more deeply involved. In preparation of its decision, the Ministry of Economic Affairs held preliminary discussions with the three local authorities responsible for an approval of a LNG site at the Maasvlakte: the City of Rotterdam, Rijnmond Public Authority, and the Province of Zuid-Holland. Contacts between the Gasunie and the local authorities similarly intensified (see Figure 5.4).

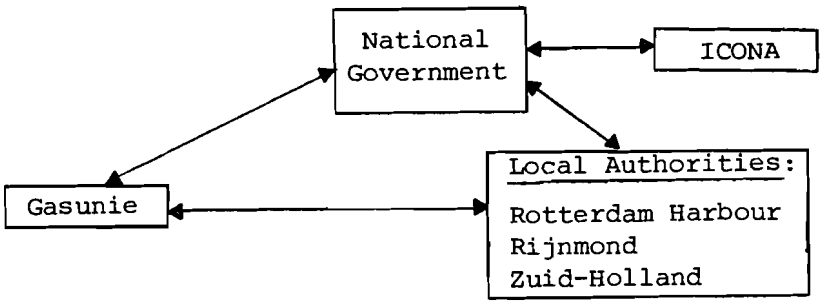


Figure 5.4.

October 1977

The Ministry of Economic Affairs approved the Gasunie-Sonatrach LNG contract; the national government (via RPC) started with the design of a local and national government procedure for the approval of a LNG terminal site. In the period October and November 1977, various formal and informal discussions took place involving the major parties. In this period the respective interests and policy positions with regard to LNG importation and siting started to "crystalize." Table 5.2 summarizes the various views at this point.

December 1977

Concerned about the perceived "delays" in the decision-making process by the local authorities responsible for the Maasvlakte site, Gasunie approached Delfzijl Harbour authorities (Delfzijl 1978, p.1). The purpose of the contact was to open discussions on the possibility for an alternative LNG site (other than Maasvlakte) for the Gasunie, in case the approval of a Maasvlakte LNG site would endanger the deadline for the decision (of 31 October 1978) to be made. From the respective positions on the acceptability of a LNG terminal at the Maasvlakte, it is clear that among the main parties, the view of Rijnmond Public Authority, constituted the strongest objections to Gasunie's initial plans of siting a terminal at Maasvlakte

Table 5.2

Government/ Min. Economic Affairs	Gasunie	Rotterdam Harbour	Rijnmond	Province	ICONA
Dutch LNG terminal required, Maasvlate site preferred	wanted LNG terminal at Maasvlakte	supported LNG terminal at Maasvlakte	worried about safety to local population	not yet formulated	LNG terminal at Maasvlakte or off-shore

1978

A new interested party was thus introduced in the decision process through dealings initiated by the Gasunie. Following initial feasibility studies, including a risk analysis by TNO--focusing upon the Eemshaven site--the Groningen local authorities established formal contact with the national government to argue in favor of a LNG site at Eemshaven (see Figure 5.5).

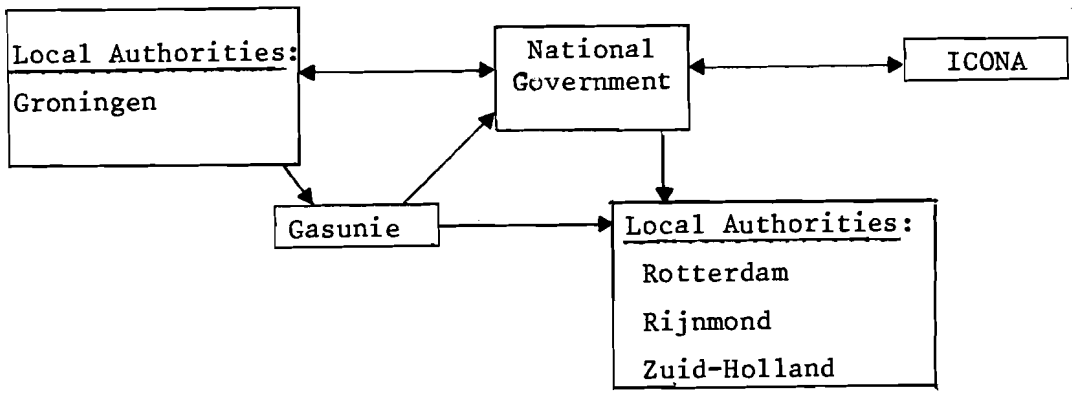


Figure 5.5.

The position taken by the local authorities of *Groningen* was clear from the start: because of the perceived socio-economic benefits of a LNG terminal, they strongly favored a LNG terminal at Eemshaven. In the first quarter of 1978 Groningen provincial governors established extensive contacts with the national government, to press for the inclusion of Eemshaven in the formal decision procedure for LNG, which had until that point only considered the Maasvlakte as viable site for a LNG terminal.

The government's response came in March 1978 when the Cabinet announced its preliminary policy position, which stated that in addition to the Maasvlakte sites A and B, the Eemshaven site was not "ruled out" (Tweede Kamer 14626, nr. 6, p.2). Following this preliminary policy

announcement, the local authorities concerned with the Maasvlakte *and* Eemshaven, were incorporated in the special decision procedure and were given until July 1st, 1978, to prepare their respective cases for consideration by the Cabinet.

In the period July to 25th August 1978, when the Cabinet took its final decision on the siting of the LNG terminal, the basic institutional network of interested parties did not change. However, contacts between the national government on the one hand and local authorities around Rotterdam and in Groningen intensified in this period after the local authorities had decided upon their policy positions, which were made known to the Cabinet by early July 1978.

In the period leading up to the final Cabinet decision on LNG siting, discussions took place at the formal level between Cabinet ministers (i.e., representatives of ministerial departments) and delegations from the local authorities responsible for Maasvlakte and Eemshaven sites, and with representatives of Gasunie. Additionally, the three main non-governmental parties (the two relevant local authorities and Gasunie) took the opportunity to establish contacts with the national government and Cabinet, using various formal and informal channels to influence the outcome of the decision process. The personal contacts between the provincial Governor of Groningen (Commissaris van de Koningin) and some key Cabinet ministers provide a significant illustrative example of the formal and informal contacts which were exploited by various parties, in the period of discussions by the national government leading up to the Cabinet decision.

After the Cabinet decision was announced, in preparation of the parliamentary debate on LNG, *parliamentary committees* became more directly involved in the decision process.*

A special parliamentary committee on LNG (Committee 14626) was set up in 1978 and had a series of meetings with representatives of the leading parties (national government, Gasunie, local authorities Groningen, City of Rotterdam, Public Authority Rijnmond, Province of Zuid-Holland) as well as with nautical experts (from NMI, KNRV, and other organizations) and representatives of environmental groups (included in Werkgroep Noordzee collaborative--see Section 4.6.3) (Tweede Kamer 14626, nr.12, p.1). The implications for the institutional set-up of interested parties is illustrated in Figure 5.6.

Prior to the Cabinet decision on LNG, several ("minor") interested parties, such as environmental groups (including those heard by parliamentary committees, included in the dotted box in Figure 5.6) were only part of the institutionalized decision structure, via public hearings held at the local level. Additionally, these parties communicated with the national and local government, the Cabinet and parliamentary representatives through correspondence and other consulted or unconsulted contacts, as a means of influencing the outcome of the LNG decision process.

*Parliament and parliamentary committees had been informed about various developments concerning LNG all through the decision-making period, but it was not until after the Cabinet's decision that Parliament was institutionalized in actual decision-making, and was given the opportunity to exercise its power.

In the context of this analysis the LNG decision-making process ended in the configuration of parties as represented in Figure 5.6, when Parliament effectively approved the Cabinet decision to site a Dutch LNG terminal at Eemshaven (31 October 1978).

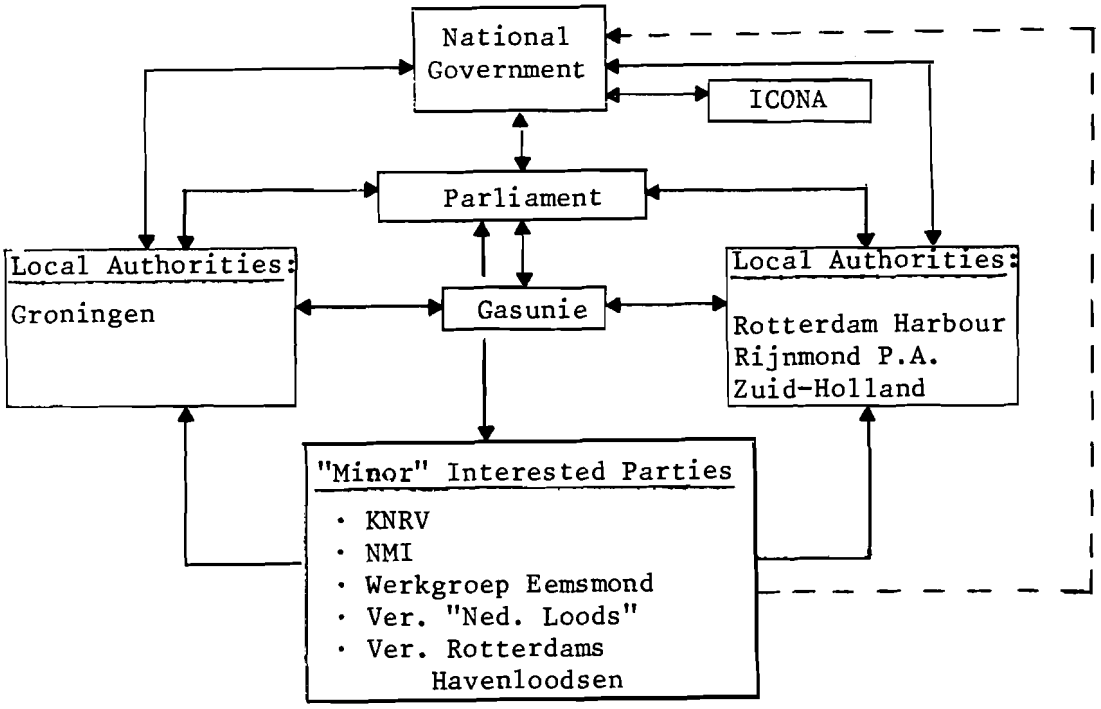


Figure 5.6.

CHAPTER 6:
PARTY INTERESTS: STRATEGIES AND CONFLICTS

6.1. INTRODUCTION

The previous sections have discussed how the interested parties involved in the LNG debate in the Netherlands took up different positions with respect to the question of LNG terminal siting and the place they were "assigned" in the decision structure. The respective party positions ultimately relate to the different responsibilities and perceived interests of the parties. This chapter attempts to assess the different strategies used by the major interested parties to support their respective positions and to identify what arguments and channels of communications were used to influence the final decision on LNG--keeping in mind the decision structures, as discussed in the previous chapter.

In addition to the formal and informal relationships between the various interested parties, they can be mapped according to their positions with respect to the LNG siting questions--both in terms of problem definition and in terms of dimensional preferences. An attempt is made to identify the areas of conflict between (groups of) interested parties and to map what alliances developed around common areas of interest. The different party interests crystallized distinctly in 1978, when the discussion on LNG siting narrowed down to a "political battle" between proponents of a LNG terminal at Maasvlakte and Eemshaven respectively; a major part of the following analysis therefore focuses upon the events of this final period of 10 months in 1978.

The period before 1978, however, also contained some key events, involving important alliances and conflicts between some of the interested parties.

6.2. ALLIANCES AND CONFLICTS

As discussed in Section 2.3., an important event took place in October 1977, when the Ministry for Economic Affairs approved the contract between Gasunie and Sonatrach for the importation of LNG (as signed 4 months previously). This ministerial approval set the scene for the subsequent decision process, among other things because it effectively endorsed the time restrictions of the LNG contract, which specified that a decision on the location of a LNG terminal had to be taken by 31st October 1978. This approval was the result of close contact between the (Department for Energy of the) Ministry for Economic Affairs and Gasunie. The Ministry for Economic Affairs (Energy Department) and Gasunie were in agreement on two important policy issues: (1) the need for LNG imports to secure Dutch energy supply, and (2) the need to find a LNG terminal within the specified period which initially suggested preference for Rotterdam Harbor area, as the site for the LNG terminal.

It was clear that both Gasunie and the energy department of the Ministry of Economic Affairs favored a Maasvlakte site, because, in addition to dimensional arguments in favor of Maasvlakte, this option seemed to provide the best prospects for ensuring that the deadline for the Sonatrach contract could be met. In 1977, however, no agreement was yet reached between the different ministerial departments as to the final position of the national government with respect to the preferred LNG site and several options and aspects were still being investigated. The lack of consensus at his stage also related to the different responsibilities of national ministries with respect to the policy discussion on LNG. Table 6.1 shows the respective areas of responsibility of various relevant ministries.

The lack of (initial) consensus between ministries, in 1977, was illustrated by the minority view attached to the October 1977 ICONA policy advice (ICONA 1977) by the representative of the Minister for Health and Environmental Protection, indicating doubts about the desirability of LNG importation and objections on grounds of safety considerations to LNG siting at Maasvlakte. Despite these reservations, the advice given by ICONA, i.e., the *collective* view of the relevant ministries, indicated a preference for Maasvlakte as far as a ***land- based*** terminal was concerned. At this stage a decision in favor of a Maasvlakte site would thus have been in agreement with the interests of Gasunie and Rotterdam Harbour Authority and consistent with advice from ICONA.

In the second half of 1977, however, a potential area of conflict began to surface with respect to Gasunie's plans for siting a LNG terminal in the Rotterdam area. This involved the local authorities responsible for this area, who as early as the summer of 1977 (before the approval for the LNG contract was granted) had met with the ministries for economic affairs and social affairs respectively, to discuss the acceptability of

Table 6.1.

Ministry	Areas of Responsibility
Economic Affairs	Energy supply and regional industrial policy*
Transport and Public Works	Waterways, Shipping, North Sea activities
Health and Environmental Protection	Environmental impact and safety**
Social Affairs	Safety**
Housing and Planning	Land use planning feasibility

*In 1977 the main department within the Ministry for Economic Affairs dealing with LNG was the energy department.

**At the time of LNG decision-making there existed a potential conflict between the ministries for social affairs and public health/environment about the demarcation of responsibilities, in relation to safety.

Gasunie's plans to site the LNG terminal in the Rotterdam area. Through these meetings as well as via press and other statements by officials of Public Authority Rijnmond and some critical Rotterdam City Councillors, the less than enthusiastic positions of some factions of the local authorities (esp. Rijnmond Public Authority) began to surface. Gasunie and the (energy department of the) ministry for economic affairs became concerned about the possible delays caused by lengthy discussions at the local authorities level about LNG and potential time-consuming public debates on the subject.

Mostly as a result of the surfacing opposition and possible delays with respect to approval of Rotterdam LNG site, the Gasunie took the initiative to approach Delfzijl Harbor authorities to open discussions on the feasibility of Eemshaven for the siting of a LNG terminal. The positive response by the Groningen local authorities is well known and has been reported on earlier. Contacts between Gasunie and Groningen Province were facilitied by the fact that Gasunie's headquarters are located here, and the fact that the Royal Commissioner for Groningen is, through its statutory right, also the Chairman of the Supervisory Board of Gasunie. It is important to note that despite the close contacts between Gasunie and the province of Groningen, Gasunie, followed the strategy of proclaiming itself strongly in favor of a Rotterdam LNG terminal (see section 6.2.4) while keeping the option open to shift to Eemshaven at a later date, but strictly as a second choice.

In March 1978, the national government announced its preliminary policy position with respect to LNG siting, indicating that it definitely included in its final selection Maasvlakte sites A and B, whilst, "for the moment, the Delfzijl-Eemshaven location was not excluded" (Tweede Kamer 14626, nr. 6, p.2). The policy position clearly emphasized that the national government gave preference to a *Dutch, land- based* LNG terminal. The preliminary policy announcement signaled the start of the special decision procedure of consultation with the relevant local authorities. As the selection process had now largely been reduced to a choice between two alternative LNG sites, the conflicts and alliances between different interested parties were becoming increasingly pronounced.

As indicated in section 2.2, the policy process on LNG was concentrated in two interrelated questions: that of siting of a LNG terminal in the Netherlands and that of the exact location of such a terminal. As local authorities began to debate their respective positions on LNG siting in early 1978, general consensus on the first policy question had been reached by ICONA and the national government. The national government in particular had already made it clear that its official policy was in favor of LNG importation and preferred the use of a Dutch LNG terminal. This position, of course, formed the basis of the procedure whereby the local authorities were to restrict their discussions to the policy question of *acceptance* of a LNG terminal in their area. At the local level, the question of the need for LNG importation or for a Dutch terminal was largely kept out of the debate within local authorities; it was only raised by some environmental opposition groups and some parliamentary parties. The conflicting parties on the first policy question may thus be pictured as below (excluding local authorities). (See Table 6.2). (It must be noted

Table 6.2. Policy question 1: LNG importation in the Netherlands?

Desirable	Undesirable
ICONA	Environmental groups
Gasunie	(some) parliamentary opposition parties
Cabinet	
AER - Energy Council	

that as the question of LNG importation was being debated, some parties restricted the discussion to the need to import the contracted gas from Algeria in liquefied form; on the subject of the need for LNG importation in general, the Cabinet and parliament had in fact already agreed to this in 1974/75 within the context of the Dutch policy paper on energy (*Energienota*--Tweede Kamer 1974).)

As regards the second policy question of siting of the Dutch LNG terminal two alternative areas were being debated in 1978: Maasvlakte vs. Eemshaven. Among the major interested parties the divisional preferences could be noted as shown in Table 6.3. The implication of policy question 1 is that some interested parties were against both Eemshaven and Maasvlakte as a LNG terminal site (for details of party positions reference is made to Chapter 4).

Table 6.3. Policy Question 2: Site for LNG Terminal?

Maasvlakte	**Eemshaven**
Province of Zuid-Holland	Groningen local authorities (collectively)
Rijnmond Public Authority (only in favor of storage of LNG)	Trade union movement
City of Rotterdam	
ICONA	
Gasunie	

Not all of the above-mentioned interested parties involved themselves in equal degree in attempting to influence the outcome of the decision process, e.g. by applying pressure upon (some) ministerial departments and the cabinet, in order "to force" a decision in their favor. In some cases institutional links with the national government already existed such as the contacts between Gasunie and the Energy department of the Ministry of Economic Affairs, and the direct link between ICONA and the Cabinet, to whom the former was responsible. It is of significance here to emphasize the policy advice to the Cabinet given by ICONA in June 1978, in favor of a Maasvlakte site; ICONA was, after all the "closest" advisor to the Cabinet, the main policy advisory body which incorporated a co-ordinated view from all relevant ministerial departments.

As the discussion on LNG siting narrowed to a choice between a Maasvlakte site or a site at Eemshaven, two major (groups of) interested parties involved themselves ***actively*** in trying to influence the cabinet's policy decision on LNG to their advantage: the collective local authorities in the province of Groningen, and the City of Rotterdam. These (groups of) interested parties put forward specific arguments and used tactical approaches, in order to emphasize the advantage of the Eemshaven area and the Maasvlakte respectively.

6.2.1. Local Authorities Groningen

The local authorities of Groningen were very successful in mobilizing a common front of local interested parties in favor of a LNG terminal in Eemshaven. This included, in addition to the governors and council of the province of Groningen, the city councils of towns in the Eemshaven area (Uithuizermeeden and Delfzijl), the provincial Chamber of Commerce, and trade unions organizations. Additionally, the Royal Commissioner of Groningen played an important role in leading the proponents of an Eemshaven LNG terminal.

Major channels of communication between Groningen local authorities and the national decision-makers were threefold:

(1) to respective ministerial departments (letters and other contacts)

(2) to members of parliament (letters and other contacts)

(3) to party political allies.

With respect to the political party alliances it must be noted that the Royal Commissioner of Groningen belonged to the same political party (VVD) as the ministers responsible in the cabinet for economic affairs, public health/environment, and Traffic and Public Works--three key ministerial departments in the LNG debate. The fact that the Commissioner had been a cabinet minister in previous governments, illustrates the extent of close contact with national governmental circles.

It is significant that between June and October 1978 the Province of Groningen published no less than four official publications outlining its position on the LNG terminal at Maasvlakte, which were subsequently sent to ministers and members of parliament.

The major arguments put forward in favor of an Eemshaven LNG terminal can be summarized as follows (based on publications and statements by Groningen local authorities):

1. LNG terminal will provide social-economic stimulus for Province of Groningen, through employment benefits and the attraction for further industrial activities;
2. National regional economic policy has stressed importance of stimulating industrial activities in the province of Groningen (where unemployment rate is more than 50% higher than national average);
3. Eemshaven is cornerstone of regional industrial policy in Groningen and LNG project will provide opportunity for the national government to show it is serious about promoting industrial activities in this area;
4. LNG activity is essential for the future of Eemshaven, whereas at Maasvlakte it would represent no more than 3% of goods activities in Rotterdam harbor area;
5. Eemshaven LNG terminal will result in less interference with other shipping activities, compared to the Rotterdam area;

6. Lower risk to neighboring population, compared to Maasvlakte site.

As the above list illustrates, the brunt of the arguments put forward by the Groningen local authorities relate to the socio-economic advantages of a LNG terminal at Eemshaven. Partly these arguments had a political dimension, i.e., to convince the national government/Cabinet that it should show its *political* will to actively support a regional (industrial) policy in favor of the less developed (northern) areas of the country. Additionally, an attempt was made to discredit the arguments which were being put forward by the proponents of a LNG terminal at Maasvlakte (see below).

6.2.2. City of Rotterdam

The City of Rotterdam was the main interested party involved in putting pressure upon the national government to select Maasvlakte as the LNG terminal site, especially during the final months leading up to the cabinet decision in August 1978. The position of the proponents of a Maasvlakte terminal was made considerably more difficult by the fact that it was unable to present a common line of arguments, shared also by the other two main local authorities, Public Authority Rijnmond and the Province of Zuid-Holland.

Whilst the province of Zuid-Holland seems to have kept itself out of further discussion after July 1978, following submission of its official position vis-a-vis LNG to the Cabinet, Public Authority Rijnmond was unable to engage in a pro-Maasvlakte "campaign" since it had pronounced itself against importation of LNG at Maasvlakte (distinct from LNG storage). As the pressure upon the national government intensified from the Groningen local authorities in favor of the Eemshaven site, the City of Rotterdam was thus the only interested party which was in a position to wholeheartedly put its weight behind a Maasvlakte site for LNG. Spurred by the interest of the Rotterdam Harbor authorities, the mayor and aldermen of Rotterdam became the main interested party which continued to argue in favor of the Maasvlakte site. The arguments put forward by the City of Rotterdam in a document on LNG published three weeks prior to the final cabinet meeting decision on the siting of LNG can be summarized as follows:

1. LNG can bring increased employment to Rotterdam area at a time of decreased economic activity (especially with respect to oil operations) which endangers Rotterdam harbor as energy distribution centre of Europe;
2. Rotterdam harbor is safest place to import LNG; risk of collisions is smaller than at Eemshaven;
3. Rotterdam harbor can accommodate all sizes of LNG tankers foreseen, has large number of moders navigational aids, is used to handle large ships and has no restrictions resulting from limited depth of shipping waters;

4. Cost of LNG terminal at Rotterdam is 700 million guilders lower than Eemshaven site (assuming 12 x $10^9 m^3$ LNG/year imports) whilst required infrastructure is already available at Maasvlakte;
5. Major users of natural gas are in the western part of the Netherlands around Rotterdam;
6. There is no prospect for large-scale industrial development around any newly-developed sea harbor and the bad industrial infrastructure in Groningen limit chances for LNG related industrial activities in that region.

Several of the positive aspects of a LNG terminal at Maasvlakte had also been stressed by ICONA and Gasunie. The critical comments by the Dutch ship-owners' association with respect to the nautical feasibility of an Eemshaven LNG site (see Section 4.6.7), also contributed to the pressures in favor of a LNG terminal at Maasvlakte.

6.2.3. Further conflicts

The conflicts between proponents of Eemshaven and Rotterdam respectively did not limit themselves to the various parties mentioned above, but also extended to governmental circles. It is known that an internal conflict existed within the Ministry of Economic Affairs. On the one hand there was the department responsible for energy policy, which continued to be in favor of a Maasvlakte site, whilst the department for regional economic policy had chosen to side with the local authorities of Groningen, arguing in favor of the Eemshaven site.

As regards further disagreement involving ministerial departments the major dissenting view--to the coordinated advice in favor of Maasvlakte--had come from the ministry for public health and the environment, who at the time of the first two ICONA report (October 1977 and February 1978) had been critical about the acceptability of a LNG terminal at Maasvlakte from the point of view of risk and safety. It was not announced by ICONA to what extent the Eemshaven site was deemed more acceptable in this respect.

6.2.4. Gasunie

The position of Gasunie is characterized by the fact that by and large it did not involve itself in the process of shifting attention to the Eemshaven site. Gasunie continued to stress the economic, and energy policy advantages of a Maasvlakte site. Gasunie, however, seemed to have turned away from the direct policy discussion as regards *Eemshaven versus Maasvlakte* as the debate continued in 1978. Gasunie considered the siting decision to be one which could only be taken at the level of national government. It is important in this respect to note that Gasunie had made it clear that any decision in favor of the more expensive Eemshaven site, should not involve higher costs for Gasunie, but should be carried by the government.

The strategy followed by the Gasunie, during the course of the decision process in late 1977 and in 1978 involved a great deal of confidence about the expected position taken by the ministry for economic affairs and ultimately the cabinet. The general consensus was that the

discussion on LNG siting was taking place against the background of Dutch energy policy, which would almost certainly ensure that the import of Algerian (and other foreign) LNG would be endorsed by the Cabinet. Backed by the imperative of security of Dutch energy supply, as outlined in the governmental policy, Gasunie was confident that the Dutch cabinet would operate within a "boundary condition," whereby the importation of the contracted LNG would go ahead. Within such a context the Cabinet would not see it in its interest to stall the arrangements leading to delivery of LNG by Algeria in 1983, and beyond. Consequently Gasunie was able to continue its strong support in favor of Rotterdam, thereby relying on either one of the following two actions by the Cabinet:

(1) selection of Maasvlakte, after local objections to LNG had been effectively overcome; or

(2) selection of Eemshaven, if a LNG site at Maasvlakte seemed impossible to achieve within the required timescales as a result of (political) opposition.

As long as the Cabinet would take the position that a positive decision on either Maasvlakte or Eemshaven had to be taken, the Gasunie had little interest in involving itself in finding a politically acceptable site for a LNG terminal, leaving this task entirely to preparatory activities of ministerial departments and Cabinet ministers. This explains why the Gasunie involved itself only to a very limited degree in the discussion on LNG in the months leading up to the final decision.

6.3. PARLIAMENTARY DEBATE

The role of parliament increased in the period following the Cabinet's decision to site the LNG terminal at Eemshaven, and leading up to the parliamentary debate (25, 26 and 31 October 1978). Despite the attempts by proponents of both Maasvlakte and Eemshaven to involve members of parliament in such a way as to see their respective interests represented, Parliament debated LNG in a wider context, without creating significant alliances with major interested parties as regards the ***exact location*** of a LNG terminal. It may be significant in this respect that a full parliamentary debate took place only once, at the very end of the decision-making process. Despite the fact that parliamentary committees had been given the opportunity to question Cabinet ministers during the preceding year(s), the parliamentary debate on LNG involved a discussion on a broad set of issues including the need for natural gas imports, the conditions under which the Sonatrach LNG contract was signed, as well as more specific issues relating to siting

The parliamentary debate on LNG focused upon the following ***major*** aspects (Tweede Kamer 1978a):

- the need for importing ***liquefied natural gas***;
- the lack of attention to the option of importing (Algerian) gas via pipeline to the Netherlands;

- -- the role of the factor *time* in the decision-making process and the late involvement of Parliament;
- -- the safety aspects; the acceptability of risk involved in LNG;
- -- the "questionable" positive effect which may be expected in terms of employments and additional economic activities from the location of a LNG terminal at Eemshaven;
- -- the extent to which a decision on the siting of a Dutch LNG terminal could be postponed.

Several motions were debated calling for the national government to reconsider its decision and/or to postpone a final decision on LNG siting, to enable further investigation of alternative options. These motions did receive some support mainly from those who either (i) preferred alternatives involving natural gas via pipeline rather than LNG, or (ii) objected to the Cabinet's selection of Eemshaven. A majority of Parliament, however, voted against these motions, and thereby effectively endorsed the Cabinet's decision to site a LNG terminal at Eemshaven.

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APPENDIX A

The following Dutch organizations and individuals were consulted by the author during the course of the research:

Delfzijl Harbour Authority
Groningen Provincial Authorities
dr.ir. J.L.A. Jansen
Ministry of Economic Affairs
Ministry of Education and Science (Science Policy Directorate)
Ministry of Health and Environmental Protection
Ministry of Home Affairs
Ministry of Housing and Physical Planning
Ministry of Social Affairs
Ministry of Transport and Public Works (ICONA)
Natuur en Milieu Foundation
N.V. Nederlandse Gasunie
Noordzee Working Group
drs. A.P.J. Planken
mr. A.A. van Rhijn
Rijnmond Public Authority
Rotterdam Harbour Authority
TNO Netherlands Organization for Applied Scientific Research
Zuid-Holland Provincial Authorities