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Document Version
Final published version

Citation (APA)
Schmidt, H. S. (2026). *The Dutch Subsurface: A Stakeholder Analysis*. https://doi.org/10.4233/uuid:d52fce61-b188-4015-b28a-8eda21efccc8

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The Dutch Subsurface:

A Stakeholder Analysis

2026



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The Dutch Subsurface:
A Stakeholder Analysis

This analysis was prepared by Helena Schmidt, TU Delft. The research and publication of this report were made possible through funding from the CrossScale Project (*DeepNL*; grant no.: 17781).

This report is intended for informational, educational, and analytical purposes only. It provides a high-level overview of organizations and actors involved in subsurface activities in the Netherlands, based on publicly available information. The inclusion or exclusion of any organization does not imply an endorsement, criticism, or judgment of its activities, policies, or relevance.

The information contained in this report has been compiled from sources judged to be reliable and accurate at the time of publication. However, the stakeholder landscape is dynamic; project statuses, organizational structures, and policy roles are subject to rapid change. This document reflects the stakeholder landscape as of May 7, 2026.

The author would like to thank the following people for their input in the process of identifying the relevant stakeholders and their respective responsibilities: the CrossScale project team (Gerdien de Vries, Aad Correljé, Anne Pluymakers, Hemmo Abels, Sebastian Geiger, Alexandros Daniilidis, Jesse Steinvoort, and Johannes Miocic), Niels van den Berg (NWO), Hester Huisman (TNO), Pim van Delft (Geothermie Nederland), Jan Dirk Jansen and Fabiën Dekker (TU Delft), and Nienke Busscher (University of Groningen).

This document may be referenced and cited with appropriate attribution.

Suggested Citation: Schmidt, H. (2026). The Dutch Subsurface: A Stakeholder Analysis. TU Delft.
https://doi.org/10.4233/uuid:d52fce61-b188-4015-b28a-8eda21efccc8

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1. Introduction

1.1. The Role of the Subsurface in the Netherlands

The Dutch subsurface has long been a cornerstone of national prosperity and infrastructure. Historically, it enabled industrial development through coal mining in Limburg and gas extraction in Groningen, providing decades of domestic energy supply and state revenue. More recently, it has become central to the energy transition and climate adaptation strategies, offering opportunities for geothermal energy, underground CO_2 storage (CCS), and hydrogen storage, which are now seen as critical tools for achieving national climate goals and energy security. Meanwhile, the subsurface continues to be used for other essential purposes, including water reserves for drinking, salt mining, gas storage, and the placement of critical infrastructure, such as tunnels and cables.

At the same time, these activities have raised complex governance challenges and social tensions. The induced earthquakes in Groningen caused by gas extraction have had severe and lasting societal effects, eroding public trust in institutions. The so-called gasquakes have also triggered a national reckoning with how subsurface activities are (or rather should be) governed. In Limburg, the legacy of mining has led to land subsidence, mine water, and lasting damage to buildings and infrastructure. Across the country, plans for geothermal and CCS projects increasingly intersect with questions of safety, spatial planning, equity, and environmental integrity. Subsurface use is also intertwined with agriculture, nature conservation, cultural heritage, and climate resilience, resulting in conflicting priorities and demands for participatory decision-making.

The Dutch subsurface is thus not just a technical domain: it is a social, political, and environmental space where actors with divergent interests and responsibilities must navigate difficult trade-offs. A clear understanding of these actors, their mandates, activities, and interrelationships is essential for enabling effective, legitimate, and socially and environmentally just governance.

1.2. Aims of the Analysis

This stakeholder analysis seeks to provide a systematic and comprehensive overview of the institutions, organizations, and initiatives involved in or affected by subsurface use and governance in the Netherlands. The central aims are:

1. **Stakeholder Identification:** To map the wide array of governmental, advisory, industrial, academic, civil society, and international actors connected to the Dutch subsurface.
2. **Role Clarification:** To clarify the diverse functions these stakeholders fulfill in subsurface governance, infrastructure, knowledge development, and advocacy, and identify thematic and geographic clusters.
3. **Website Index:** To give an overview of relevant websites and online databases, ranging from drilling permits to applicable laws and geothermal sites.

This analysis draws on public sources, institutional websites, and government documents.

1.3. Intended Audience

The report is designed for use by:

- Public officials, regulators, and project developers aiming to understand the broader institutional context in which they operate.
- Civil society groups, local communities, and journalists interested in the legal and power structures that shape subsurface outcomes.
- Academic institutions and knowledge consortia engaging in work on subsurface activities, risk governance, and socio-technical systems.

It is also intended as a broader resource for anyone interested in how the Netherlands is managing the complex intersection of subsurface use, spatial planning, and environmental and social responsibility.

1.4. Structure of the Report

The stakeholder landscape is presented in three thematic layers:

1. **National Stakeholders** *(Section 2)*
   These are actors with systemic influence on the governance, regulation, monitoring, and usage of the Dutch subsurface. They include governmental agencies, regulatory and advisory bodies, industry and commercial operators, financiers and insurers, academic and research institutions, NGOs and environmental organizations, as well as community organizations and citizen groups.

2. **Local Stakeholders** *(Groningen and Limburg; Section 3)*
   This section addresses stakeholders operating in the two historically and socially unique regions of Groningen and Limburg. It includes region-specific governmental bodies, citizen groups, compensation institutions, and historical legacies.

3. **International Stakeholders** *(Section 5)*
   This section highlights the international environment that influences Dutch subsurface governance, such as the European Union, global research networks, climate protection organizations, and cross-border advocacy coalitions.

Each stakeholder is briefly described by their organizational form, role, and activity domains. Both current and historically important stakeholders are included. To enhance analytical clarity, stakeholders are also grouped by the main roles they play in the subsurface (*Fig. 1*).

1.5. The Nine Stakeholder Activity Roles

The analysis identifies **nine primary activity roles**, based on the mandates, activities, and purposes of the listed stakeholders. Many actors play multiple roles; for example, a knowledge institution like TNO may generate both knowledge and policy advice, while a governmental body might regulate, fund, and communicate. These categories support a more structured understanding of how the Dutch subsurface system is governed, contested, and (re)shaped. *Fig. 1* presents all stakeholders organized by role.

1. **Policy & Regulation**
   Stakeholders that define laws, regulations, strategies, or administrative procedures governing subsurface activities and approve or reject projects based on technical, environmental, and legal criteria. This includes ministries, agencies, and government programs with formal rulemaking or permitting authority.
   Examples: Ministry of Economic Affairs and Climate (EZK), Ministry of I&W, SodM

2. **Advisory & Arbitration**
   Entities that issue formal, expert-based recommendations, review impact assessments, or resolve disputes or claims related to subsurface operations or damage. Includes commissions, technical committees, and judicial-like institutions.
   Examples: Mining Council, Commissie m.e.r., IMG

3. **Monitoring & Data Infrastructure**
   Actors responsible for collecting, managing, and archiving seismic, geological, hydrological, or infrastructural data. This includes both data producers and long-term infrastructure operators.
   Examples: KNMI, TNO-Geological Survey, Deltares

4. **Funding & Risk Management**
   Organizations that provide capital, public co-financing, insurance, or assume financial risk related to subsurface initiatives. This includes public funding agencies, state-owned financiers, insurers, and fiscal authorities.
   Examples: RVO, NWO, Ministry of Finance, insurance consortia

5. **Operation & Ownership**
   Actors that develop, operate, or hold ownership of subsurface infrastructure or assets such as geothermal or gas wells, salt mines, CCS terminals, or heat networks. This includes both public and private entities.
   Examples: NAM, municipal heat companies, project consortia like Porthos

6. **Sectoral Advocacy**
   Trade and industry associations that represent the interests of commercial sectors or industries and engage in lobbying and standard-setting.
   Examples: Element NL, Energie Nederland, Geothermie Nederland

7. **Civic & Environmental Advocacy**
   Groups that represent public or environmental interests in the subsurface domain. Includes NGOs, community organizations, and coalitions advocating for particular positions or rights and engaging in legal action, protests, or public campaigns.
   Examples: Milieudefensie, Waddenvereniging, Groninger Bodem Beweging

8. **Knowledge Generation**
   Stakeholders that conduct research and analysis to understand subsurface systems, risks, technologies, and societal impacts. This includes universities, research institutes, advisory bodies, and expert programs generating new data or insights.
   Examples: Universities, TNO, Deltares, DeepNL-funded researchers

9. **Knowledge Dissemination**
   Actors that share, translate, or coordinate access to existing knowledge for use in planning, operation, policy, or public engagement.
   Examples: RVO, GeoKennisNL, KEM, Dutch Mining Museum

2. National Stakeholders

2.1. Governmental Agencies

The Netherlands has a multi-layered governance structure for subsurface activities. National ministries set policy and issue mining licenses, while regional and local governments are responsible for spatial planning, environmental permits, and community interests. Key government stakeholders are summarized in the table

Agency	Role and Involvement	Activities
Ministry of Economic Affairs and Climate *(Ministerie van Economische Zaken en Klimaat; EZK)*	The central **government ministry is the formal competent authority under the Dutch Mining Act** and is legally responsible for issuing mining and subsurface licenses. During the current cabinet period, this mandate has been delegated to the State Secretary for Climate and Green Growth (KGG). EZK retains a coordinating role in broader economic and energy policy. The ministry's policy instruments and programs (vadministered by RVO) provide substantial funding support and risk mitigation for geothermal projects and carbon storage.	**Mining and energy policies, mining licensing:** *Policy & Regulation; Funding & Risk Management*
Ministry of Climate Policy and Green Growth *(Ministerie van Klimaat en Groene Groei; KGG)*	A newer dedicated **ministry** (as of the mid-2020s) **focusing on climate policy and sustainable growth.** As State Secretary within EZK, KGG is currently mandated to act on EZK's behalf in matters concerning subsurface permitting and regulation. It coordinates with other ministries on spatial planning and environmental matters.	**Energy policies, geothermal licensing:** *Policy & Regulation*
Standing Committee on Climate and Green Growth *(Vaste commissie Klimaat en Groene Groei)*	The Standing Committee on Climate and Green Growth in the Dutch House of Representatives is the **parliamentary committee** that scrutinizes and debates dossiers for which the Minister of Climate and Green Growth is primarily responsible. Its scope includes mining, the dismantling of the Groningen gas field, and geothermal energy, alongside wider climate and energy policy (e.g., industry decarbonization and the Climate Fund).	**Mining and energy policies:** *Policy & Regulation*

Agency	Role and Involvement	Activities
Ministry of Finance *(Ministerie van Financiën)*	This national **ministry** is the sole owner of Energie Beheer Nederland (EBN), giving it indirect but **material influence over nearly all oil, gas, CCS, and geothermal projects** where EBN is a statutory partner. The ministry co-decides on public investments, climate subsidies (e.g., SDE++), and state guarantees for high-risk projects, such as CCS infrastructure. It is also responsible for managing state revenues from mining (taxes, royalties, dividends) and budgetary frameworks for damage compensation and decommissioning (e.g., Groningen gas field liabilities).	**Shareholder oversight, subsidy approval, revenue governance:** *Policy & Regulation; Funding & Risk Management*
Ministry of the Interior and Kingdom Relations *(Ministerie van Binnenlandse Zaken en Koninkrijksrelaties; BZK)*	National **ministry overseeing spatial planning and regional development.** BZK coordinates with the Ministry for Economic Affairs and Climate and the Ministry for Climate and Green Growth to align mining/geothermal projects with spatial and urban planning requirements.	**Spatial planning:** *Policy & Regulation*
Ministry of Infrastructure and Water Management *(Ministerie van Infrastructuur en Waterstaat; I&W)*	The national **ministry is responsible for environmental protection, water resources, and infrastructure.** It advises and evaluates projects on environmental grounds, ensuring that subsurface policies and projects comply with environmental law and water management standards. For example, I&W ensures that projects such as gas or salt extraction do not compromise water safety or infrastructure.	**Environmental impact and water protection:** *Policy & Regulation; Advisory & Arbitration*

Agency	Role and Involvement	Activities
Netherlands Enterprise Agency *(Rijksdienst voor Ondernemend Nederland; RVO)*	A **national agency that supports innovation and business** on behalf of the ministries. RVO shares knowledge, provides subsidies, and facilitates projects in the subsurface domain. RVO hosts the Programme for the Sustainable Use of the Deep Subsurface (DGDO) aimed at ensuring safe and responsible onshore use of the deep subsurface for the energy transition and raw-material supply. RVO administers the SDE++ subsidy for renewable energy and risk-reduction instruments such as RNES Aardwarmte ("Risks cover for geothermal"), which is designed to insure a large share of the financial consequences of a misdrilling event (geological risk). RVO also maintains information portals (like business.gov.nl) to guide companies through licensing processes. RVO is the secretary of the Mining Council (see below) to ensure the agency's independence from ministries.	**Subsidy, information, and knowledge provision:** *Policy & Regulation; Funding & Risk Management; Knowledge Dissemination*
Provincial Governments *(12 Provinces)*	Regional authorities play a crucial role in permitting and integrating subsurface projects spatially. Provinces designate protected groundwater and drinking water areas, reserve space for projects in regional plans, and **advise the Ministers** of KGG/EZK on whether and under which conditions to grant exploration and production licenses in their region. Notably, provinces like Groningen have been heavily involved in gas extraction issues (e.g., advocating for safety in the Groningen gas field). Provinces participate in monitoring-related activities, primarily through groundwater-level and quality measurements and the provision of regional data portals. They may not operate their own seismic arrays, but they collaborate with national agencies and ensure that regional data (e.g., mine water rise in Limburg, or land subsidence in peat areas) is collected and addressed.	**Regional oversight of subsurface projects:** *Policy & Regulation; Monitoring & Data Infrastructure*

Agency	Role and Involvement	Activities
Municipal Governments	Municipalities **provide guidance on environmental and planning permits** (omgevingsvergunning) for mining activities that affect the local environment. They coordinate local zoning with the national ministries and provinces. Municipalities are required to prepare "Heat Transition Visions" for their areas to gradually replace gas-based heating with more sustainable sources, such as geothermal energy. Next to heat networks, municipalities have occasionally partnered in geothermal projects, often via local utilities or development companies. They also control the shallow subsurface (down to 500m) for uses such as open-loop geothermal heat/cold storage, and sometimes even operate communal systems for buildings. Municipalities also represent community interests – for example, the Municipality of Barendrecht famously opposed the planned onshore CO_2 storage, leading to the cancellation of that project.	**Local permitting and planning:** *Policy & Regulation; Operation & Ownership; Civic & Environmental Advocacy*
Water Boards *(Waterschappen)*	**Regional water management agencies** that enforce water and soil protection laws in the context of subsurface activities. Using the "water assessment" (watertoets), water boards review plans for drilling or mining to ensure groundwater and surface water are not adversely affected. They can establish conditions for managing drilling fluids, preventing contamination, and mitigating subsidence that could impact dikes or drainage.	**Groundwater protection and subsidence:** *Policy & Regulation; Monitoring & Data Infrastructure*
Intergovernmental Associations *(IPO, VNG)*	**IPO (Interprovinciaal Overleg)** represents all 12 provinces, while **VNG (Vereniging van Nederlandse Gemeenten)** represents municipalities. These bodies advocate provincial/municipal interests and communicate with the national government on mining and energy policy. They ensure that the voices of local/regional authorities are heard when national mining laws or climate policies are developed. IPO has a dedicated policy working group on sustainable subsurface (Beleidsgroep Duurzame Ondergrond).	**Policy coordination at the provincial/ municipal level:** *Policy & Regulation*

Agency	Role and Involvement	Activities
Union of Water Authorities *(Unie van Waterschappen)*	It is the **umbrella association of the Dutch water boards.** It represents water boards in national and international arenas and supports knowledge exchange and cooperation across the sector. Because water boards are responsible for regional water management and influence groundwater/ water-system considerations, they are relevant counterparts in subsurface planning where induced subsidence, salinization risks, and groundwater interactions matter.	**Policy coordination water boards:** *Policy & Regulation*
Environmental Services *(Omgevingsdiensten) and Omgevingsdienst NL*	Environmental Services (Omgevingsdiensten) are specialized regional agencies that support provinces and municipalities with environmental permitting, supervision, and enforcement, drawing on environmental expertise that includes soil and subsurface-related aspects. Nationally, Omgevingsdienst NL functions as the umbrella association for these services.	**Environmental supervision and implementation:** *Policy & Regulation; Monitoring & Data Infrastructure*
RES energy regions *(Regional Energy Strategies)*	In 30 "energy regions", provinces, municipalities, and water boards are jointly coordinating regional decisions on the energy transition. Crucially for the subsurface, RES regions work on identifying and distributing sustainable heat sources and consider (among other things) how much energy can be stored and whether networks can transport heat, energy carriers, or gases, connecting subsurface options (geothermal; hydrogen storage) to spatial planning and local legitimacy processes.	**Regional policy coordination:** *Policy & Regulation*
The National Local Heat Transition Program *(Het Nationaal Programma Lokale Warmtetransitie; NPLW)*	The NPLW is a **central knowledge and support hub** that assists **municipalities** in developing their local heat programs and implementing sustainable alternatives to gas networks, such as geothermal energy. It monitors progress, signals bottlenecks to national partners, and provides tools and practical examples to navigate the legal and technical complexities of initiating heat projects and establishing new heat networks. NPLW is a program directorate and falls under the Directorate-General for Housing and Construction of the Ministry of Housing and Spatial Planning (VRO).	**Knowledge dissemination and policy support:** *Policy & Regulation; Knowledge Dissemination*

Agency	Role and Involvement	Activities
GeoKennisNL *(planned to launch in 2026)*	The Dutch government has announced the establishment of a **national coordination platform for geoscientific data and knowledge.** GeoKennisNL aims to enhance the alignment of subsurface data infrastructure across universities, knowledge institutions, and government bodies, and to disseminate knowledge more effectively and make it more publicly accessible.	**Knowledge and data coordination:** *Knowledge Dissemination; Monitoring & Data Infrastructure*
Central Organization for Radioactive Waste *(Centrale Organisatie Voor Radioactief Afval; COVRA)*	The **national organization responsible for collecting, processing, and storing all radioactive waste** in the Netherlands. COVRA operates a storage and processing facility in Zeeland and works under license from the Authority for Nuclear Safety and Radiation Protection (ANVS; see *Section 2.2*). Although radioactive waste management is a distinct domain, it intersects with subsurface governance through future planning for geological disposal. COVRA collaborates with knowledge institutes to explore subsurface storage options and contributes to policy development on long-term radioactive waste solutions.	**Radioactive waste storage:** *Policy & Regulation; Knowledge Generation*

2.2. Regulatory and Advisory Bodies

Several specialized bodies regulate and advise on subsurface activities to ensure safety, environmental protection, and adherence to proper procedures. These include inspectorates, advisory councils, and commissions established by law:

Regulatory/Advisory Body	Role and Jurisdiction	Activities
State Supervision of Mines *(Staatstoezicht op de Mijnen; SodM)*	The independent national inspectorate responsible for overseeing safety and environmental protection in mining and subsurface energy operations. It advises the Ministry of Economic Affairs and Climate and, where relevant, other authorities such as the State Secretary for Groningen Restoration (Staatssecretaris Herstel Groningen). SodM issues both solicited and unsolicited recommendations on mining plans, licenses, policy, and regulation. While it holds no enforcement powers over policy decisions, SodM conducts inspections and investigations to monitor compliance and identify safety risks. It does not perform its own scientific research but commissions and oversees targeted studies, which it integrates into its assessments. SodM collaborates with knowledge institutions such as TNO, KNMI, CBS, and RIVM and maintains an independent research budget. Through these roles, SodM serves as a key advisor and watchdog in the governance of the Dutch subsurface.	**Monitoring of safety and environmental regulations:** *Advisory & Arbitration; Monitoring & Data Infrastructure*
Mining Council *(Mijnraad)*	The Mining Council is an independent advisory council established by the Mining Act. It advises the Ministry of Climate Policy and Green Growth on granting exploration and production licenses for hydrocarbons, minerals, and geothermal energy, as well as subsurface storage (deeper than 500 m; municipalities are responsible for shallow subsurface). The Mining Council reviews license applications and advises on whether granting is responsible, taking into account input from experts (TNO-AGE, SodM, EBN, RVO), provincial/municipal advice, and compliance with the law. It can request additional assessments for proposed projects.	**Advice on licensing:** *Advisory & Arbitration*

Regulatory/Advisory Body	Role and Jurisdiction	Activities
Energy Council *(Raad voor Energie)*	The Energy Council is a newly established **independent advisory body** (appointments announced February 2026) that advises the Dutch government and parliament **on the transition to a low-carbon, reliable, and affordable energy system**. Its responsibilities include providing advice on independence from third countries for raw materials and on the National Energy System Plan for 2050.	**Advice on energy policy:** *Advisory & Arbitration*
Commission for Environmental Assessment *(Commissie mer)*	The **independent body that advises on and reviews Environmental Impact Assessments (EIA)** for major projects. For mining projects, it evaluates the thoroughness of the environmental studies and provides recommendations to permitting authorities. This ensures that environmental impacts (soil, water, ecosystems) are properly considered before approval.	**Review of environmental impact reports:** *Advisory & Arbitration*
Technical Committee on Ground Movement *(Technische Commissie Bodembeweging; Tcbb)* *(historic)*	The Tcbb was an **independent committee that advised** and informed the Ministry of Economic Affairs and Climate **on ground movement caused by mining.** Its knowledge panel assessed issues such as subsidence and tremors. For example, Tcbb helped residents understand if soil subsidence in their area is related to mining and advised on compensation claims. It was discontinued in 2023 because its activities overlapped too much with those of TNO, the State Supervision of Mines (SodM), and the Commission for Mining Damage.	**Mining-induced subsidence/earthquakes**
Authority for Nuclear Safety and Radiation Protection *(Autoriteit Nucleaire Veiligheid en Stralingsbescherming; ANVS)*	While not a mining regulator per se, the ANVS **regulates and enforces the safe storage of radioactive materials, including NORM (Naturally Occurring Radioactive Material) rules for** subsurface operations. Drilling for oil, gas, or geothermal resources can release NORM in fluids or scales; ANVS ensures the proper handling and storage of radioactive residues.	**NORM in mining, potential waste storage:** *Policy & Regulation; Advisory & Arbitration*

Regulatory/Advisory Body	Role and Jurisdiction	Activities
Commission for Mining Damage *(Commissie Mijnbouwschade)*	The Commission for Mining Damage is an **independent committee** established by the Ministry of Economic Affairs and Climate to advise citizens and small business owners **on damage claims** arising from mining activities and to assist them in filing such claims against mining companies.	**Mining-induced damage:** *Advisory & Arbitration; Monitoring & Data Infrastructure*
Geological Survey – TNO *(Geologische Dienst Nederland; GDN)*	TNO's Geological Survey of the Netherlands (Geologische Dienst Nederland, GDN) is not a regulator but a **scientific advisory body.** It conducts geoscience research and makes data, information, and knowledge available, enabling governments and companies to use the subsurface sustainably. TNO Advisory Group for Economic Affairs (TNO-AGE), an expert group of TNO-GDN, advises national ministries, including the Ministry of Climate Policy and Green Growth, and local authorities on the responsible and efficient use of the deep subsurface (>500m), including exploration and production of geothermal energy, and underground energy storage.	**Data, information, and knowledge provision:** *Advisory & Arbitration; Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination*

2.3. Industry and Commercial Operators

A wide range of industry players conduct or support subsurface operations in the Netherlands. This includes oil and gas companies, geothermal developers, salt/mineral mining companies, and new ventures for CO_2 storage. Many are private sector operators; some are (partially) state-owned enterprises. Historically, mining companies ranged from coal mine operators to today's energy companies:

Company / Entity	Description and Role	Activities
Consultancies and technical service providers	A substantial share of subsurface decision-making and project delivery is mediated by consultancies and technical service providers. They translate subsurface data into project designs and risk cases (e.g., reservoir modeling, site characterization, monitoring concepts, and permit-ready documentation), thereby shaping what becomes legible and actionable for operators and regulators. This group spans geoscience consultancies (e.g., **PanTerra**), geodata specialists (e.g., **Fugro**), large oilfield/service technology firms increasingly active in CCS and storage (e.g., **SLB; Baker Hughes**), and engineering/environmental consultancies involved in permitting, EIA, and heat/energy-system integration (e.g., **Arcadis; Sweco; Haskoning; TAUW; Witteveen+Bos; IF Technology**). Specialized contractors (e.g., **Huisman)** provide drilling rigs and well engineering services.	**Service providers:** *Operation & Ownership*
Energy storage providers	The Dutch subsurface is not only a site for extraction; it is also an infrastructure for balancing energy needs through underground storage. Natural gas is already stored in six salt caverns near Zuidwending by **EnergyStock** (Gasunie subsidiary) and in four **depleted gas fields** (Norg, Grijpskerk, Bergermeer, Alkmaar), alongside a **nitrogen storage cavern** near Heiligerlee, highlighting both experience and the relevance of subsurface risks such as ground movement and groundwater contamination. **Gasopslag Nederland** is the sector association representing Dutch gas storage operators. Current policy agendas frame hydrogen storage as the next step (e.g., Gasunie's **HyStock project**), requiring careful risk governance and clearer frameworks. Furthermore, Nobian is developing **compressed air energy storage** (CAES) in salt caverns near Zuidwending with Corre Energy.	**Gas, nitrogen, hydrogen, and CAES underground storage:** *Operation & Ownership; Sectoral Advocacy*

2.3.1. Oil and Gas Companies

Oil and natural gas extraction has been a cornerstone of Dutch subsurface activity for decades. The Netherlands is known for the giant Groningen gas field and many smaller onshore/offshore fields. Companies involved include joint ventures, multinationals, and independent firms. An industry association (Element NL) unites the operators.

Company / Entity	Description and Role	Activities
NAM *(Nederlandse Aardolie Maatschappij)*	The NAM is the Netherlands' **largest gas producer**, co-owned by the Dutch state, Shell, and ExxonMobil. Founded in 1947, NAM has been the operator of the Groningen gas field since its discovery in 1959 and of many smaller gas fields onshore and offshore (since 1975). NAM's core business is the exploration for and production of gas and oil in the Dutch territory. NAM is responsible for well drilling, field development, and production operations, and has borne accountability for issues such as the induced earthquakes in Groningen.	**Gas and oil extraction:** *Operation & Ownership*
Shell *(Royal Dutch Shell)* and **ExxonMobil**	These **multinational oil majors** are NAM's parent shareholders. **Shell**, originally a Dutch British company, and **ExxonMobil** (U.S.) have a joint stake in Dutch gas through NAM. Shell also directly operates some oil and gas projects and invests in new energy (including a stake in CO_2 storage and geothermal initiatives). In 2025, OMV Green Energy took over some of Shell's geothermal projects. ExxonMobil's Dutch involvement is primarily through NAM and formerly the GasTerra gas marketing venture. Both companies have historically played a central role in Dutch gas exploitation.	**Gas, CO_2 storage, geothermal:** *Operation & Ownership*
TotalEnergies	A **French multinational oil and gas company** active in the Dutch North Sea. TotalEnergies operates several offshore gas fields in the Netherlands' sector and has partnered in CCS projects. For example, TotalEnergies is part of the Aramis CO_2 transport/storage consortium.	**Offshore gas production, CCS:** *Operation & Ownership*
ONE-Dyas	ONE-Dyas is the **largest privately owned oil & gas exploration and production company** in the Netherlands (formed from a merger of Oranje-Nassau Energie and Dyas). ONE-Dyas is active in offshore field development (including some North Sea fields near the German/Dutch boundary) and onshore small fields.	**Oil and gas production:** *Operation & Ownership*

Company / Entity	Description and Role	Activities
Neptune Energy *(in 2024 acquired by Eni)*	An **international independent exploration and production company** that became one of the largest offshore gas producers in the Dutch North Sea. Neptune operated many platforms and fields. After the acquisition, **Eni** (Italian energy company) contributes technology and capital to sustain Dutch gas output from smaller fields as Groningen shuts down. It also has plans to store CO2 in empty gas fields.	**Offshore gas production:** *Operation & Ownership*
Vermilion Energy	Vermilion is a **Canadian operator** focusing on **onshore gas** from small fields. It entered the Netherlands in 2004 and is currently the country's second-largest onshore gas producer. Vermilion holds numerous licenses in Friesland and other regions.	**Onshore gas production:** *Operation & Ownership*
Wintershall Dea	A **German oil and gas company** active in the Netherlands (via its subsidiary Wintershall Noordzee). Wintershall operates offshore gas installations (e.g., in the southern North Sea) and has been involved in Dutch gas production for decades.	**Offshore gas production:** *Operation & Ownership*
Other Offshore Operators	*Examples:* **TAQA** (UAE), **Dana Petroleum** (UK), **Spirit Energy** (UK/Norway), **Petrogas E&P** (Oman), **Kistos plc** (UK) – these are companies that hold smaller assets or partial interests in Dutch fields. They are part of the **licensed producers united under Element NL**.	**Oil and gas production:** *Operation & Ownership*
Offshore Marine Contractors *(e.g., Heerema, Boskalis, Van Oord, Allseas)*	These are Dutch-based, world-leading marine engineering companies specialized in **heavy-lift operations, pipeline installation, offshore construction, and removal**. Allseas, for example, operates the *Pioneering Spirit*, the world's largest construction vessel, capable of installing or removing entire 60,000-tonne platforms in a "single lift". Heerema has over 30 years of experience in the safe removal and recycling of offshore facilities.	**Offshore installation:** *Operation & Ownership*

Company / Entity	Description and Role	Activities
Energie Beheer Nederland *(EBN)*	EBN is a unique entity: a **state-owned company** that takes a share in nearly all oil and gas projects on behalf of the Dutch government. EBN typically has a 40% non-operating interest in hydrocarbon production licenses, investing in exploration and pipelines as a public partner. EBN was established from the Dutch State Mines and ensures state involvement in industry operations and revenues. EBN also increasingly invests in geothermal and carbon storage (see below).	**State Oil and gas share:** *Funding & Risk Management; Operation & Ownership; Knowledge Generation*
Element NL	Element NL is **the Dutch industry association** (successor to NOGEPA) representing the oil and gas extraction sector. It unites the companies licensed to produce oil and gas in the Netherlands. The association engages with government and stakeholders to advocate for the sector's interests, develop standards, and promote safety and innovation. It liaises with regulators on issues like North Sea policies, climate targets, and decommissioning. It includes not only operators but also related infrastructure owners (e.g., pipeline operators NOGAT and NGT), reflecting a broader scope.	**Industry representation:** *Sectoral advocacy*

2.3.2. Geothermal Energy Developers and Operators

Geothermal heat extraction is an emerging sector in the Netherlands, primarily used for sustainable heating of buildings and greenhouses. The geothermal industry consists of specialized project developers, horticultural business consortia, and some energy companies, supported by an industry network:

Organization	Role and Involvement	Activities
Geothermie Nederland	Geothermie Nederland is the **association representing the Dutch geothermal energy industry**. It unites companies and organizations active in geothermal energy – including project developers, suppliers, consulting and engineering firms, heat network companies, and regional/ local governments. The association advocates geothermal development, facilitates knowledge exchange, and engages with policymakers on behalf of the sector. It also initiates public information (e.g., runs the Allesoveraardwarmte.nl portal).	**Industry coordination and representation:** *Sectoral advocacy; Knowledge Dissemination*
Geothermal Project Operators	Numerous private developers and operator consortia execute geothermal projects. These often involve partnerships of greenhouse growers (who use heat), municipal utilities, and energy firms. An example is Geothermie Delft, a consortium comprising Gaia Energy, EBN, and TU Delft, which drilled a geothermal well on campus. Many Dutch geothermal doublets are owned by consortia of horticulture companies seeking to replace gas heating (see below). Some energy companies (e.g., Shell, Eneco) have also invested in pilot projects or provided expertise.	**Geothermal heat extraction:** *Operation & Ownership*
Greenhouse horticulture clusters	Dutch greenhouse horticulture clusters are among the most prominent **collective users of geothermal heat** and frequently organize geothermal development via clustered wells and shared heat infrastructure. **Greenport West-Holland**, for example, hosts many operational geothermal projects and works to connect multiple geothermal clusters into larger heat networks, supplying heat to houses as well.	**Collective geothermal development:** *Operation & Ownership*

Organization	Role and Involvement	Activities
Energie Beheer Nederland *(EBN)*	EBN, the **state energy company, has expanded its mandate in recent years to include geothermal energy**. Since 2019, EBN has been able to take a financial stake in geothermal projects. As of July 2023, new geothermal projects must include EBN as a partner. EBN frames this as a non-operating partnership model (rather than day-to-day project operations), with a focus on co-investment and risk-sharing. Since 2025 (with the new Collective Heat Act), EBN needs to invest as a minority shareholder (up to ~40%) in heat network companies to help achieve majority public ownership. EBN brings technical expertise and funding, mirroring its role in the oil and gas industry. It contributes to the development of new industry standards and advises the Ministry of Climate Policy and Green Growth on geothermal energy. It also supports research projects and co-leads data acquisition programs, such as the national SCAN seismic survey, to map geothermal potential. EBN's goal is to accelerate the deployment of geothermal energy as part of the energy transition.	**State participation and research:** *Funding & Risk Management;* *Operation & Ownership;* *Knowledge Generation*
Heat Network Operators *(stadsverwarming)*	Companies that operate district heating networks invest in infrastructure to utilize geothermal energy for residential/commercial heating. For instance, **HVC, Vattenfall, and Eneco** have connected or plan to connect geothermal wells to their urban heating grids (e.g., in De Lier, Almere, The Hague, Lelystad). They are the link between geothermal wells and consumers. **Stichting Warmtenetwerk** is a platform that brings together various stakeholders, including governmental organizations, housing corporations, knowledge institutes, heat network operators, and suppliers in the heating chain.	**Heat distribution:** *Operation & Ownership*
Housing associations *(woningcorporaties)*	Housing associations are large-scale owners of residential building stock and therefore **key "demand-side" actors in the heat transition**, including district heating systems supplied by geothermal sources. Through procurement, tenant protection, affordability considerations, and participation in local heat planning, they can enable or constrain geothermal-based heat networks and shape legitimacy at the neighborhood level. Sector coordination via **Aedes**, the national association of housing associations, also supports knowledge exchange on heat networks and implications for tenants.	**Heat transition facilitation:** *Civic & Environmental Advocacy;* *Knowledge Dissemination;* *Sectoral Advocacy*

Organization	Role and Involvement	Activities
Academic & Research Programs	*(See also Research & Knowledge Institutions section.)* These programs help the industry overcome technical challenges by researching new geothermal techniques and assessing seismic risks, thereby enabling more projects to be completed. Notably, **TU Delft** constructed a geothermal well on its campus to conduct research (infrastructure funded by EPOS-NL) and provide heat to campus buildings and urban areas, in partnership with Shell and EBN (Geothermie Delft). University and **TNO** researchers are deeply involved in improving geothermal success (optimal drilling, corrosion prevention, seismicity monitoring).	**Innovation and risk mitigation:** *Knowledge Generation: Knowledge Dissemination*
Local Government Initiatives	Many municipalities (e.g., **Haarlem, Zwolle, Rotterdam**) and provinces have established or supported geothermal initiatives as part of their regional heat transition. Some have municipal energy companies or public-private partnerships investing in pilot projects and exploring local heat sources. They facilitate permit issuance and sometimes co-finance projects.	**Facilitation and ownership:** *Policy & Regulation; Operation & Ownership; Funding & Risk Management*
Land- en Tuinbouw Organisatie Netherlands *(LTO Nederland)*	An **industry association representing farmers and horticulturists**. LTO supports members in adopting sustainable practices, including the use of geothermal heat in greenhouse horticulture. It shares knowledge with members and represents the agricultural sector in policy discussions on sustainable heat infrastructure.	**Industry representation:** *Sectoral advocacy; Knowledge Dissemination*
Glastuinbouw Nederland	The **national association representing greenhouse horticulture companies**. It plays a key role in the sector's energy transition, also by supporting geothermal projects within greenhouse clusters. The organization lobbies national, provincial, and regional governments, promoting knowledge development and supporting entrepreneurs through knowledge exchange.	**Industry representation:** *Sectoral advocacy; Knowledge Dissemination*
Nederlandse Vereniging voor Duurzame Energie *(NVDE)*	The NVDE is an **industry association**, representing over 1,600 **businesses involved in renewable electricity, heat, and gas**, as well as in sustainable mobility, the built environment, and industry. NVDE advocates for policies that support sustainable heat sources such as geothermal energy and actively promotes investment in low-carbon subsurface technologies.	**Industry representation:** *Sectoral advocacy*

Organization	Role and Involvement	Activities
Energie Nederland	The **trade association for all Dutch electricity, gas, and heat suppliers and traders**. It represents both fossil and renewable energy companies. It engages with ministries and regulators on permitting, financing, and integration of subsurface-based energy technologies into the national energy mix. It advocates for market frameworks that support large-scale geothermal energy, CCS infrastructure, and sustainable heat systems.	**Industry representation:** *Sectoral advocacy*
Brancheverenigging Bodemenergie	The industry association for shallow geothermal energy (0-500 m) represents companies and professionals active in low-temperature geothermal energy systems, primarily open- and closed-loop ground-source heat pumps. The association promotes knowledge sharing within the sector and engages in lobbying and policy advocacy to strengthen the role of shallow geothermal energy in the Dutch energy transition.	**Industry representation:** *Sectoral advocacy; Knowledge Dissemination*

2.3.3. CO_2 Storage and Carbon Capture Initiatives

As the Netherlands works to reduce CO_2 emissions, the subsurface is being explored for **carbon capture and storage (CCS)**. Major CCS projects involve public-private consortia to capture CO_2 from industry and store it in offshore depleted gas fields. Key stakeholders in CO_2 storage are:

Project / Entity	Description	Activities
Porthos Project	Porthos is the **flagship CCS project** in the Netherlands (among the first large-scale in the EU). It is **a consortium of state entities (EBN and Gasunie) and the Port of Rotterdam Authority**. Porthos will collect CO_2 from multiple industrial emitters in the Port of Rotterdam, compress it, and transport it via pipelines, then inject it into depleted gas fields under the North Sea (specifically, the P18-2 and P18-4 fields) for permanent storage. The project aims to store ~2.5 million tons of CO_2 per year for 15 years (total ~37 Mt). It has significant government backing (including an EU grant). It involves numerous stakeholders: the port (providing infrastructure), Gasunie (building pipelines), EBN (expertise in subsurface and offshore infrastructure), and emitting companies (Air Liquide, Air Products, Shell, and ExxonMobil). Operations are expected to commence around 2026, subject to regulation under mining and environmental laws.	**Offshore CO_2 storage:** *Operation & Ownership*
Aramis Project	Aramis is a **second major CCS initiative**, aimed at creating an incrementally built CO_2 transportation and storage network for decarbonizing industry in the Netherlands and neighboring countries. It is a **public-private partnership** between **TotalEnergies, Shell, EBN, and Gasunie**. Aramis plans to develop a large offshore pipeline to transport captured CO_2 from various industrial clusters (possibly including imported CO_2) for storage in depleted Dutch North Sea gas fields. With an envisioned capacity of up to 22 million tonnes of CO_2 per year, Aramis is larger and is scheduled for operation later in the 2030s. Unlike Porthos, Aramis will serve as a CO_2 hub for multiple regions.	**CO_2 transport and storage network:** *Operation & Ownership*

Project / Entity	Description	Activities
Delta Rhine Corridor CO_2	A planned **cross-border CO_2 transport corridor** linking industrial emitters in Germany and the Netherlands to offshore storage sites beneath the North Sea. It will connect to the Aramis offshore pipeline at Rotterdam and is designed for future expansion to additional offshore storage capacity. **Gasunie** is responsible for the Dutch infrastructure, with Open Grid Europe (**OGE**) developing the German section. The commissioning of the Maasvlakte–Venlo CO_2 pipeline is expected to occur between 2032 and 2033.	**CO_2 transport and storage network:** *Operation & Ownership*
Delta Schelde CO_2nnection	A **cross-border Gasunie initiative** (in partnership with Belgium's Fluxys) aimed at connecting CO_2 emitters in South-West Brabant (NL) and the Antwerp region (BE) to offshore CO_2 storage in depleted North Sea gas fields via the Aramis system and other future storage projects. It seeks to provide an integrated CO_2 transport and storage solution for the region. The permitting process is expected to commence in 2025, with construction scheduled to begin once the permits are obtained. The CO_2 pipeline is planned to be operational by 2031–2032.	**CO_2 transport and storage network:** *Operation & Ownership*
Barendrecht CCS Project *(historic)*	Barendrecht (2008–2010) was an **early proposed onshore CO_2 storage pilot** by Shell and the Dutch government to inject CO_2 into depleted gas fields under a populated area. Key stakeholders were the Ministry of Economic Affairs, Shell, and the local Barendrecht community (plus NGOs). Due to intense community resistance and local government opposition, supported by environmental NGOs, the project was canceled by 2010. It highlighted local risk perceptions and became a lesson that future CCS in the Netherlands would occur offshore.	**Onshore CO_2 storage** *(canceled)*
Rotterdam Capture and Storage Demonstration Project *(Rotterdam Opslag and Afvang Demonstratieproject; ROAD)* *(historic)*	The ROAD Project (2009–2017) **aimed to demonstrate the technical and economic feasibility of large-scale CO_2 abatement for fossil power generation**. After being captured, the CO_2 was to be stored in depleted gas fields in the North Sea. E.ON Benelux and Electrabel Nederland (now Uniper Benelux and Engie Nederland) were the project developers, with funding from the EU and the Dutch government. The project was canceled when the developers pulled out.	**Offshore CO_2 storage** *(canceled)*

Project / Entity	Description	Activities
Emitters and Technology Providers	Large industrial companies (e.g., refineries, hydrogen plants, steelworks) are stakeholders as CO_2 capture partners. They invest in capture units at factories, deliver CO_2 to the storage network, and provide engineering solutions (including drilling injection wells and building compressor stations). For example, **Air Liquide** and **Air Products** (industrial gases and hydrogen producers), as well as **Shell's** Pernis refinery, plan to supply CO_2 to Porthos. Technology firms like **Bonatti**, **TAQA**, and **Allseas** are providing compressors, wells, and pipeline installation for these projects. Their involvement is essential to the technical success of CCS projects.	**CO_2 capture and infrastructure:** *Operation & Ownership*

2.3.4. Mining, Mineral, and Water Companies

Aside from energy, the Dutch subsurface is used for mining other minerals – notably salt and, historically, coal – as well as extracting drinking water. The stakeholders here include water companies, chemical companies extracting salt, and the legacy of coal companies that shaped regions in the 20th century:

Company	Description and Role	Activities
Nobian *(formerly AkzoNobel Salt/ Nouryon)*	Nobian is the **Netherlands' main salt mining operator**, formerly the salt division of AkzoNobel (now an independent company). Nobian extracts rock salt (NaCl) via solution mining. It operates in Twente (e.g., Hengelo) and in Groningen (e.g., Heiligerlee and Zuidwending). Nobian pumps water underground to dissolve salt layers and brings up brine, which is evaporated to produce salt. It supplies salt for chemical industries (e.g., chlor-alkali), road de-icing, and consumer salt. Nobian is involved in several projects to develop gas and hydrogen storage in salt caverns (e.g., Zuidwending). The company is responsible for managing subsidence and cavern closure in the long term, subject to regulatory oversight (recently under strict supervision by SodM due to brine leaks and sinkhole risks).	**Salt solution mining (rock salt) and energy storage:** *Operation & Ownership*
Frisia Zout *(K+S Group)*	Frisia Zout is a **salt mining company based in Harlingen** (Friesland), owned by German salt giant K+S. Frisia mines salt from depths of 2.5–3 km beneath the Wadden Sea using the borehole brine process. The salt is used for road de-icing, in food industry products, for animal nutrition, and in water-softening tablets. Given its location adjacent to the ecologically sensitive Wadden Sea (a UNESCO World Heritage site), Frisia's operations are closely monitored by environmental groups and regulators. Frisia (formerly known as FRIMA) has been mining there since the 1990s and is the largest vacuum salt plant in K+S's portfolio.	**Salt solution mining (rock salt):** *Operation & Ownership*
Nedmag	Nedmag is a **company that mines magnesium chloride** in **Veendam** (province of Groningen). Nedmag's brine comes from a unique magnesium salt deposit ~1600 m deep. The product is used for specialty industrial purposes (refractories, de-icing, food, medical, and cosmetic industries). Nedmag's operations have also been subject to mining safety reviews following past leaks. A 2018 incident involving a diesel and brine leak from a cavern into overlying layers prompted investigations.	**Magnesium salt mining:** *Operation & Ownership*

Company	Description and Role	Activities
Drinking water companies	Dutch drinking water companies (e.g., **Vitens, Dunea, Evides,** and **Brabant Water**) are central subsurface stakeholders because they rely heavily on protected groundwater extraction areas and are directly exposed to contamination and interference risks from drilling and subsurface operations. **Vewin** represents the collective interests of the drinking water companies in The Hague and Brussels, aiming to maintain favorable conditions for the continuous supply of high-quality drinking water.	**Drinking water extraction:** *Operation & Ownership;* *Civic & Environmental Advocacy;* *Sectoral Advocacy;*
Winterswijk quarry	Winterswijk represents a distinct (non-energy) mining context in the Dutch subsurface landscape: **an active limestone quarry** that is simultaneously framed as a geo-heritage and nature area, with guided excursions and local initiatives to strengthen public engagement with the site's geological significance. This case is relevant as a reminder that "mining legacies" and subsurface legitimacy issues are not limited to hydrocarbons, and can involve tensions and synergies between extraction, nature protection, and local identity.	**Limestone quarrying:** *Operation & Ownership*
Historic Coal Mining Companies *(closed)*	The prime coal-mining era (~1900–1974) in the Netherlands involved several stakeholders, including Staatsmijnen, a state-run coal-mining company founded in 1902 to ensure domestic control over coal resources. This company operated mines in Limburg, including Emma, Hendrik, Maurits, and Wilhelmina. **Oranje-Nassau Mijnen**, a private company (owned by the French De Wendel family), operated four coal mines around Heerlen. Active from 1899 to 1974, it was the largest private coal company. It is now active in gas production (*see Oil and Gas Companies*). **Laura & Vereeniging** operated the Laura and Julia mines in Eygelshoven/ Treebeek. **Domaniale Mijn** is the oldest mine in Kerkrade, originally founded in 1815 under a Dutch royal concession. These companies not only extracted coal but also built entire communities. They were major employers and heavily influenced socio-economic conditions. The closure of mines in the 1960s and 1970s, due to economic and energy shifts (including the rise of oil/gas and cheaper imports), marked a significant national turning point. It left a legacy of mining infrastructure, environmental issues (such as mine water), socio-economic damage, and an imprint on cultural heritage.	**Coal mining**

Company	Description and Role	Activities
ENCI (Eerste Nederlandse Cement Industrie: First Dutch Cement Industry) *(closed)*	ENCI (owned by HeidelbergCement) was a **company that mined limestone (chalk)** in the St. Pietersberg quarry near Maastricht from 1926 until 2018. While not subsurface "mining" in the sense of drilling, it was open-pit extraction of a geological resource (the Netherlands' largest limestone quarry) for cement production. ENCI provided a domestic source of cement but faced concerns about environmental and landscape impacts. Operations have ceased, and reclamation is ongoing; the site is being transformed into a nature park.	**Chalk/limestone quarrying**

2.4. Financiers and Insurers

Organization	Description and Role	Activities
Major Dutch Banks *(e.g., Triodos, Rabobank, ABN AMRO, ING, BNG Bank)*	These are the primary **domestic commercial lenders** and financial partners for the Dutch energy transition. They provide significant project financing, loans, and equity investments for capital-intensive subsurface projects, such as geothermal drilling and heat network development. Rabobank is a leader in financing geothermal projects, including major initiatives such as Geothermie Delft. The banks' willingness to invest is a key bottleneck or enabler for new projects.	**Geothermal and heat network financing:** *Funding & Risk Management*
Insurers & Risk Mitigation Schemes	This stakeholder group manages the unique financial risks of subsurface exploration. This includes private insurers who cover conventional risks (e.g., liability, equipment damage) and, more importantly, government-backed schemes. The Netherlands has a "Guarantee scheme for geothermal energy" (RNES Aardwarmte) designed to mitigate the specific geological risk—the risk that a well, once drilled, does not have the required flow rate or temperature to be profitable. Without this government-backed insurance scheme, many private developers and their financiers would be unwilling to take on the "upfront" geological risk.	**Geothermal exploration financing:** *Funding & Risk Management*

2.5. Research and Knowledge Institutions

Knowledge institutions in the Netherlands play a crucial supporting role in subsurface activities. They provide research, data, technical innovation, and independent analysis that influence both industry practices and government policy. Key research and knowledge stakeholders include:

Organization	Description and Role	Activities
TNO	As part of the national applied research institute TNO, the **Geological Survey (GDN)** maintains the central databases of subsurface data (seismic, well logs, and maps) and makes them available via NLOG. TNO researches the Dutch subsurface potential (for geothermal energy, CO_2 storage, etc.) and advises government bodies (the Ministry, SodM, and RVO). For instance, TNO experts assess reservoir models for license applications and study mechanisms of induced seismicity. TNO is leading projects, such as **SCAN** (a seismic campaign for geothermal energy), in collaboration with EBN, and exploring the feasibility of subsurface carbon and hydrogen storage. Additionally, TNO-funded institutes, such as the Dutch Institute for Applied Geoscience (**DIANA**) and **CATO** (part of the CCS research program), aggregate academic, government, and industry research efforts. These collaborative platforms mean that academic stakeholders often work closely with industry (for example, to improve reservoir simulation for CCS or to develop new drilling sensors). TNO is also involved in the multi-year research program **WarmingUP GOO**, which focuses on collective heating networks.	**Subsurface data and research coordination:** *Advisory & Arbitration; Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination*
Mining Effects Knowledge Programme *(Kennisprogramma Effecten Mijnbouw; KEM)*	In response to concerns raised by government authorities and residents, KEM is contracting research into the effects of mining in the Netherlands. It is building up **independent scientific knowledge about the (harmful) effects of mining activities**. KEM's panel, consisting of professors in the field, periodically advises the government on knowledge gaps and research priorities. A dedicated scientific advisory panel operating within the KEM focuses specifically on the social impacts of subsurface activities (SEM).	**Independent mining impact research:** *Knowledge Generation; Knowledge Dissemination*

Organization	Description and Role	Activities
Universities *(TU Delft, Utrecht University, Vrije Universiteit Amsterdam, University of Groningen, TU Twente, Eindhoven University, etc.)*	Dutch universities host geoscience and engineering departments that are involved in education, subsurface research, and development. **TU Delft**, historically originating as a mining school, is investigating techniques for safer, more efficient geothermal and CCS use. Scientists from **Utrecht University (UU)** have contributed to CO_2 storage research and the understanding of induced earthquakes. Researchers at the **University of Groningen (RUG)** study the impact of gas extraction, CCS, and induced seismicity, and advise on mitigation. The **University of Twente** and **Eindhoven University** have also been active in geothermal research and materials science for well integrity. Social science research on the perceptions and social implications of subsurface activities is underway at multiple Dutch universities, including TU Delft, RUG, and the research institute TNO (*see also universities under 3.2*). Academic consortia often collaborate through programs such as **DeepNL** (*see NWO*). BSc and MSc degrees in Earth Sciences, geoengineering, and related fields are offered by TU Delft, UU, **Vrije Universiteit Amsterdam (VU), University of Amsterdam (UvA)**, and **Wageningen University**.	**Academic subsurface research and teaching:** *Knowledge Generation; Knowledge Dissemination*
Royal Netherlands Meteorological Institute *(Koninklijk Nederlands Meteorologisch Instituut; KNMI)*	The KNMI is the **national weather institute** and also houses the **seismology department**. KNMI operates the seismic monitoring networks that detect earthquakes, including those from gas extraction, underground gas storage, geothermal heat extraction, salt solution mining, and post-mining water ingress. It maintains the Dutch public earthquake catalog (NLOG) and issues reports on induced seismicity. KNMI data and expertise inform safety measures (e.g., issuing warnings when a quake exceeds thresholds) and research on subsurface stress changes.	**National seismic monitoring authority:** *Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination*

Organization	Description and Role	Activities
Deltares	An **independent institute for water and subsurface research**, Deltares investigates soil mechanics, groundwater, and land subsidence. It has contributed to studies of ground motion caused by gas or salt extraction. For example, Deltares worked with TNO to map the damage risk of buildings in Groningen in the late 2000s. Deltares' expertise ensures that mining-induced subsidence is understood in the context of soil composition and water tables (both important in the low-lying Netherlands). Deltares is also involved in scientific monitoring of subsidence due to mining (gas, salt), modeling of hydrodynamics and morphology, and risk assessments to ensure that extraction activities (and climate effects) do not irreversibly harm the Wadden Sea.	**Soil and groundwater subsidence modeling:** *Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination*
Dutch Research Council *(Nederlandse Organisatie voor Wetenschappelijk Onderzoek; NWO)*	A **key funding and coordination actor for Dutch research** capacity relevant to the subsurface, particularly through national research programs/ projects (e.g., DeepNL) and large-scale research infrastructures. NWO also participates in drilling programs such as IODP/ICDP, which provide Dutch researchers access to large-scale international scientific drilling facilities. Within Domain Science, Earth and Environmental Sciences is represented in the NWO disciplinary consultation committees (i.e., Round Table Earth and Environmental Sciences; National Research Community for the Earth and Environmental Sciences), and NWO supports field-wide community-building through the annual NAC (Dutch Earth and Environmental Sciences Conference).	**Research funding and coordination:** *Knowledge Generation; Knowledge Dissemination*
Netherlands Materials Observatory *(Nederlands Materialen Observatorium)*	The Netherlands Materials Observatory (NMO) **gathers, manages, and provides data, information, and knowledge about critical raw materials** and supply chains, influencing awareness and policy of subsurface resource dependency. The NMO is hosted by the Geological Survey of the Netherlands (TNO) and works with government, companies, and research organizations, both domestically and internationally.	**Raw material monitoring:** *Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination*

Organization	Description and Role	Activities
TKI New Gas *(Topsector Energy)*	An innovation program within the Dutch Topsector Energy landscape, focusing on difficult-to-decarbonize sectors and applications such as hydrogen, green gas, CCS, geothermal energy, and North Sea system integration; topics that directly shape future subsurface use (i.e., storage, injection, geothermal development). The program guides and supports innovators by using the knowledge, networks, and resources at its disposal.	**Innovation acceleration:** *Funding & Risk Management: Knowledge Dissemination; Sectoral Advocacy*
EPOS-NL	The **Dutch solid-Earth research infrastructure** that integrates large-scale geophysical facilities and provides access to them and their data. Its stated geo-societal focus areas directly intersect with subsurface governance: exploration for (renewable) geo-energy resources, storage of fuels/CO_2/ wastewater, and hazards such as induced or natural earthquakes. It is funded by NWO.	**Geophysical research infrastructure:** *Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination.*
Royal Geological and Mining Society of the Netherlands *(Koninklijk Nederlands Geologisch Mijnbouwkundig Genootschap; KNGMG)*	The **national professional society for Dutch earth scientists**. KNGMG unites academics, professionals, and students working across geosciences and subsurface industries. It publishes the scientific journal Geologie en Mijnbouw / Netherlands Journal of Geosciences, organizes symposia, and promotes geological literacy in public and policy contexts.	**Geological professional network and publishing:** *Knowledge Generation; Knowledge Dissemination*

2.6. NGOs and Environmental Organizations

Non-governmental organizations (NGOs) and environmental advocacy groups play a significant role in debates and decisions around subsurface projects. They represent environmental protection goals, climate action, and community health and safety, often acting as watchdogs or campaigners. In the Netherlands, several NGOs have been particularly active:

Organization	Description and Role	Activities
Milieudefensie *(Friends of the Earth Netherlands)*	A **leading environmental NGO** that has campaigned on issues from climate change to local environmental health. Milieudefensie has fought against continued oil and gas drilling due to its climate impacts and was a plaintiff in the landmark climate case that led to a court ordering the Dutch government to reduce its emissions. It also specifically opposes new fossil fuel extraction (e.g., lawsuits to halt gas and oil exploration). Milieudefensie has stood alongside local groups to oppose gas drilling in the Wadden Sea and has advocated for the cessation of Groningen gas production. Notably, it has also taken on Shell in court over CO_2 emissions. Milieudefensie is often a voice for residents.	**Climate and anti-fossil fuel campaigning:** *Civic & Environmental Advocacy*
Greenpeace Netherlands	The **Dutch branch of Greenpeace** is very active in climate and energy campaigns. Greenpeace has staged direct actions against offshore drilling rigs in the North Sea and advocated for leaving remaining gas in the ground. They also focus on protecting the North and Wadden Seas from industrial activities. Greenpeace NL supported the Barendrecht community during the CO_2 storage protests and frequently partners with Milieudefensie on anti-fossil fuel campaigns.	**Anti-drilling direct action campaigns:** *Civic & Environmental Advocacy*

Organization	Description and Role	Activities
Natuur en Milieufederaties *(NMF)*	The Natuur en Milieufederaties is a **network of provincial environmental federations**, such as the Groninger Milieufederatie or Friese Milieufederatie, which engage at the provincial level. These federations have been critical in mining debates, such as voicing concerns over salt mining subsidence in Friesland or gas drilling near nature areas. They often participate in formal consultations (e.g., the environmental impact assessment process) and organize public responses to these consultations.	**Provincial environmental policy advocacy:** *Civic & Environmental Advocacy*
Waddenvereniging	A specialized **NGO focused on protecting the Wadden Sea**. The Wadden Sea is a fragile tidal ecosystem, part of which lies above gas fields. The Waddenvereniging opposes (new) mining projects in the Wadden area, leading national and international coalitions of conservation groups to condemn drilling or salt mining plans that threaten the area.	**Wadden Sea ecosystem protection:** *Civic & Environmental Advocacy*
Legal and Advocacy NGOs	**Urgenda** is a Dutch climate litigation NGO that successfully sued the Dutch government in the landmark Urgenda v. State case, which led the Supreme Court to mandate faster national CO_2 reductions under human rights law. Urgenda's work established a legal precedent obligating the state to reduce greenhouse gas emissions from fossil fuel use, influencing national climate and energy policy, including the future of gas extraction. **Advocates for the Future** is an advocacy group focused on strategic climate litigation. It has initiated legal action against new offshore gas developments and filed a formal demand for the Port of Rotterdam Authority to reduce fossil-related emissions. **Mobilisation for the Environment** (MOB) is a Dutch NGO that promotes environmental protection and democratic rule of law through strategic litigation, focusing on nitrogen reduction, biodiversity, and legal compliance with European environmental directives; it is currently contesting the Aramis CCS project in court on ecological grounds.	**Climate and fossil fuel litigation:** *Civic & Environmental Advocacy*

Organization	Description and Role	Activities
Staatsbosbeheer & Natuurmonumenten *(landowners)*	These are non-governmental or semi-governmental organizations that **own and manage extensive landholdings in the Netherlands**, primarily for nature conservation. **Staatsbosbeheer** (State Forest Management) is an independent government body that manages over 270,000 hectares of state-owned land. **Natuurmonumenten** (Dutch Society for Nature Conservation) is a private NGO that owns and protects over 100,000 hectares of land. These organizations often use their position to set strict environmental conditions or demand alternative routes to protect vulnerable ecosystems, significantly influencing a project's path and cost.	**Conservation gatekeepers:** *Civic & Environmental Advocacy*
Buurtwarmte	This **umbrella organization** supports municipalities, housing corporations, and start-up cooperatives in realizing heating networks through sharing experiences, knowledge, services, and subsidy requests. Via its sister organization Energie Samen, it represents the interests of cooperatives involved in local heating networks.	**Local heating network support:** *Knowledge Dissemination; Sectoral Advocacy*

2.7. Community Organizations and Citizen Groups

Local communities are at the heart of many debates surrounding subsurface activity, as they directly experience both the benefits (e.g., jobs, heat supply) and risks (e.g., environmental harm, induced earthquakes, subsidence/heave). Community organizations give residents a collective voice. Some key examples:

Organization	Description and Role	Activities
Local Citizen Initiatives	Many grassroots groups form in response to new drilling sites or mining plans. Examples include when exploratory shale gas drilling was proposed; residents in the **Noordoostpolder and Boxtel** mobilized under banners like "SchaliegasNEE!" (Shale Gas, no!), influencing the national moratorium on **shale gas**. In **Barendrecht**, the community (with the city council's support) held information meetings and demonstrations and formally objected to **CO_2 storage –** their unified opposition was pivotal to the cancellation. Citizens near **Twente** formed groups to oppose **new salt mining** due to concerns about subsidence and the potential for earthquakes. In **Friesland**, locals in the Harlingen area, united as Stichting Bescherming Historisch Harlingen (SBHH), maintain a continuous dialogue with the salt mining company Frisia regarding subsidence monitoring. These smaller NGOs or informally organized groups often partner with larger NGOs to access resources and gain publicity.	**Grassroots mining resistance campaigns:** *Civic & Environmental Advocacy*
Community Energy/ Heating Cooperatives	Some community groups engage in subsurface activities for sustainability. For example, local cooperatives have formed to initiate their own heat networks, involving citizens as shareholders. They investigate subsurface use for low-carbon energy, such as **Traais Energie Collectief** in Terheijden, which is exploring geothermal energy for a district heating network.	**Citizen-led geothermal heating projects:** *Operation & Ownership*

3. Local Stakeholders

The Netherlands' subsurface challenges are most visibly concentrated in the provinces of Groningen and Limburg, which each face distinct legacies of extraction. In Groningen, decades of large-scale natural gas production have led to induced earthquakes, causing widespread damage to homes and infrastructure, and triggering deep societal and political unrest. In Limburg, the closure of coal mines in the 1970s left behind physical risks like land subsidence and minewater rise, alongside long-term socio-economic decline in former mining communities. These histories have given rise to dedicated institutions, citizen movements, and compensation mechanisms that do not exist elsewhere in the country. For this reason, a separate section highlights the unique landscape of local stakeholders in these two regions:

3.1. Groningen

Organization	Description and Role	Activities
Governmental Bodies		
National Coordinator Groningen *(NCG)*	A **special governmental post** was established **to coordinate the response to earthquake damage** and the reinforcement of buildings in the Groningen gas field region, addressing the severe social and safety issues associated with Groningen gas production. The NCG collaborates with ministries, local governments, and residents to address the impacts of earthquakes induced by gas extraction.	**Earthquake recovery coordination:** *Policy & Regulation*
Regulatory and Advisory Bodies		
Groningen Safety Advisory Board *(Adviescollege Veiligheid Groningen; ACVG)*	An **independent governmental advisory body** tasked with **monitoring and evaluating the safety of buildings** in the Groningen gas extraction area. It advises the responsible ministries on safety risks and reinforcement needs of buildings.	**Building safety risk assessment:** *Advisory & Arbitration*
Institute for Mining Damage Groningen *(Instituut Mijnbouwschade Groningen; IMG)*	A **body set up to handle damage claims from mining-induced incidents**. The IMG (which includes the former Tijdelijke Commissie Mijnbouwschade) independently compensates for damage to buildings caused by ground movement resulting from gas extraction (notably in Groningen) or other subsurface activities. It has the mandate to ensure victims of induced earthquakes or subsidence are fairly compensated, separate from the operators.	**Groningen damage claims assessment and compensation:** *Advisory & Arbitration; Monitoring & Data Infrastructure*

Subsidence Commission *(Commissie Bodemdaling)*	The Subsidence Commission is a long-running body (established in the 1980s by the national government and NAM) that focuses on **preventing, limiting, repairing**, and, where relevant, damage costs associated with **subsidence caused by gas extraction**. It is a key actor in how long-term subsurface impacts are assessed, explained, and translated into mitigation/compensation needs. Since 2020, damage claims due to subsidence have been handled by the IMG.	**Managing subsidence damage:** *Advisory & Arbitration*

Research and Knowledge Institutions

Knowledge Platform *(Kennisplatform Leefbaar en Kansrijk Groningen)*	The Knowledge Platform focuses on **mapping the various aspects of the social impact of gas extraction** in the Groningen region. This knowledge is disseminated across multiple studies, knowledge institutions, and agencies. Additionally, the Knowledge Platform brings together knowledge seekers and providers, stimulating partnerships. Lessons can be learned from experiences with gas extraction in Groningen for managing mining projects in Groningen and the rest of the Netherlands. The platform is part of the Faculty of Behavioural and Social Sciences at the University of Groningen.	**Social impact knowledge coordination:** *Monitoring & Data Infrastructure; Knowledge Dissemination*
Gronings Perspectief	With Gronings Perspectief, the **University of Groningen** and the **Netherlands Institute for Health Services Research** (Nivel) are conducting research on the health, sense of safety, and prospects of residents in all ten municipalities of Groningen. This provides a wealth of knowledge about the impact of gas extraction and the general state of Groningen residents.	**Health and well-being impact monitoring:** *Knowledge Generation; Knowledge Dissemination*

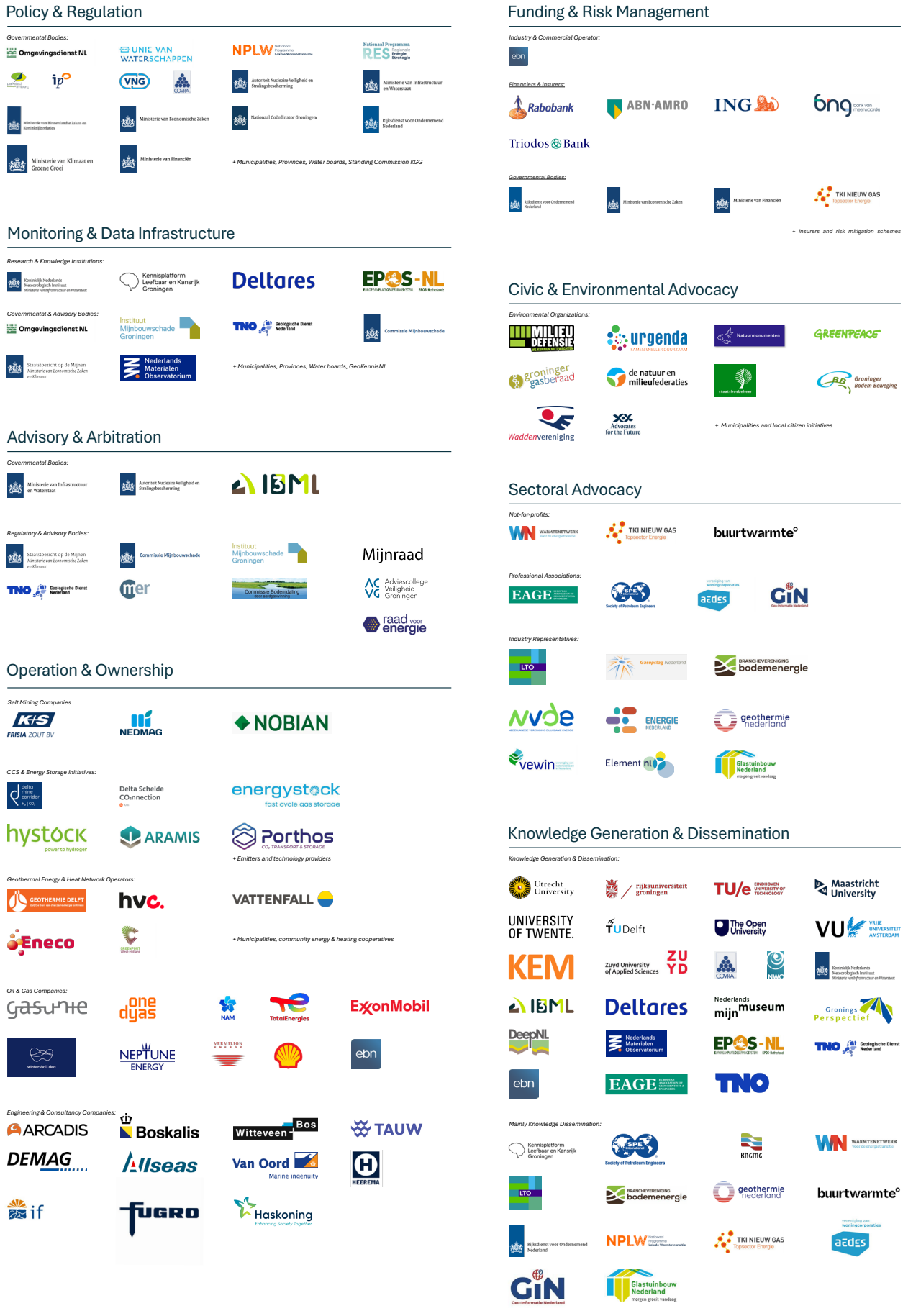
Groninger Bodem Beweging *(GBB)*	Perhaps the most prominent grassroots movement related to mining in NL, the GBB is an **association of residents in Groningen**, founded in 2009 when gas-induced earthquakes began to proliferate. Its mission is to advocate for the interests of people who have been directly or indirectly affected by gas extraction in the Groningen field. With thousands of members, GBB has campaigned tirelessly for recognition of earthquake damage, fair compensation, and safety – putting pressure on NAM (the gas company) and the government. GBB has organized protests, provided input to parliamentary inquiries, and played a crucial role in drawing public attention to Groningen's plight, ultimately contributing to the political decision to shut down the field. It continues to ensure that damage is handled and that reinforcement is carried out justly.	**Earthquake victim advocacy and lobbying:** *Civic & Environmental Advocacy*
Groninger Gasberaad	This is a **collective platform of various societal organizations in Groningen** (including Natuur & Milieufederatie, cultural heritage associations, business groups, and housing corporations). The Gasberaad aims to ensure residents' involvement in plans for damage repair, building strengthening, and future perspectives in the gasquake-affected region. It serves as a dialogue partner for government programs addressing mining-related damage. The Gasberaad exemplifies a multi-stakeholder coalition at the regional level.	**Stakeholder consultation and coordination:** *Civic & Environmental Advocacy*

3.2. Limburg

Organization	Description and Role	Activities
Governmental Bodies		
Institute for the Environment, Human and Mining *(Instituut voor Milieu, Mens en Mijnbouw; I3ML)*	It is the **new body** (opening January 2026 in Heerlen) **dedicated to processing and compensating claims of damage caused by past coal mining in Limburg**. I3ML was established through a partnership of the national government, the Province of Limburg, and the mining municipalities. The Open Universiteit and others are contributing to I3ML's knowledge center, so that it not only compensates for damage but also studies patterns.	**Limburg mining damage compensation:** *Advisory & Arbitration; Knowledge Generation*
Stichting Calamiteitenfonds Mijn(water)schade Limburg *(historic)*	A **regional foundation** established to **handle urgent mining-related damage cases**, such as subsidence from historic coal mining and rising mine water in Limburg. Active for about a decade, it funded critical structural interventions (e.g., home stabilization) and has helped transition Limburg to a broader state-backed compensation scheme (see I3ML).	**Emergency compensation fund**
Parkstad Limburg	A **regional alliance of seven municipalities in the former Eastern Mining District** (around Heerlen/Kerkrade) that focuses on spatial planning, economic redevelopment, and achieving energy neutrality by 2040. Primary interest is the sustainable reuse of post-mining resources. It launched the Parkstad Limburg Energy Transition (PALET) program, which involves reusing mine resources: the Mijnwater project utilizes geothermal mine water for heating/cooling.	**Post-mining redevelopment coordination:** *Policy & Regulation*
Individual Mining Municipalities *(e.g., Heerlen, Kerkrade, Sittard-Geleen)*	They are directly **responsible for managing ongoing subsurface risks** (subsidence, sinkholes, rising mine water) resulting from historic coal mining. The interests are public safety, damage compensation, and the stability of spatial planning. Heerlen spearheaded the "tien mijngemeenten" (ten mining towns) coalition to lobby for a national mechanism to compensate for mine damage. Kerkrade actively works on mitigating hazards by locating and sealing old mine shafts.	**Mine damage mitigation and advocacy:** *Policy & Regulation; Monitoring & Data Infrastructure*

Organization	Description and Role	Activities
Governmental Bodies		
Municipal initiative for damage compensation	In 2025, **all seven mayors of Parkstad** (a former mining area) collectively **sent letters to the successor companies** (notably the families behind former mine operators) inviting them to discuss compensation or investment in the region. While the companies' responses were tepid (denying responsibility or highlighting other philanthropy), the effort itself – backed by local historians, ex-miners like Jo Wiertz, and community volunteers – is a form of grassroots advocacy for justice. It underlines that many in Limburg still feel "abandoned" by those who benefited from the mines and are seeking recognition and support for the communities left with poverty and decline.	**Accountability mobilization:** *Civic & Environmental Advocacy*
Research and Knowledge Institutions		
Universities	The **Open University**, headquartered in Heerlen, has taken a leading research and advisory role on mining damage and policy with a unique endowed chair in Mining & Liability Law. **Maastricht University** contributes to research on the socio-economic impacts of mining, among other initiatives, through the heritage center Tracé Limburgs Samenlevingsarchief (formerly Sociaal-Historisch Centrum voor Limburg), which documents the history of the mining region. **Zuyd University of Applied Sciences** offers programs in engineering and the built environment, and its students/faculty have worked on optimizing minewater district heating operations.	**Mining impact and redevelopment research:** *Knowledge Generation; Knowledge Dissemination*
Dutch Mining Museum *(Nederlands Mijnmuseum)*	Originally a mining heritage center, the museum has evolved into a regional hub for knowledge and awareness of ongoing mine-related impacts. It is also involved in research on the effects of mining in the region.	**Mining heritage and risk education:** *Knowledge Generation; Knowledge Dissemination*

4. Figure 1. Stakeholder Ecosystem of the Dutch Subsurface



5. International and Cross-Border Stakeholders

While subsurface activities occur within the Netherlands (or its part of the North Sea), international organizations and foreign entities also have a stake or influence. These include:

Organization	Description and Role	Activities
Governmental Bodies		
European Union *(EU)*	The EU heavily shapes the context in which Dutch subsurface projects operate. EU **directives and regulations** provide standards – for example, the **EU CCS Directive** sets the framework for CO_2 storage permitting, and the **Extractive Waste Directive** and **Water Framework Directive** affect mining operations. The EU's climate targets (e.g., the Fit for 55 package) push the Netherlands to utilize the subsurface for CO_2 storage and geothermal as part of the energy transition. The EU also provides **funding**: the Porthos project was awarded €102 million and is labeled a Project of Common Interest, underlining the EU's role in enabling CCS. Moreover, the EU Emissions Trading System (ETS) will likely integrate accounting for stored CO_2.	**Regulatory and funding framework:** *Policy & Regulation; Funding & Risk Management*
Neighboring Countries' Governments	There is some cross-border stakeholder collaboration. For example, the **German government** is cooperating with the Netherlands on a new gas field just across the maritime border (near Borkum/Schiermonnikoog). **Belgium** is interested in the CO_2 storage capacity that the Dutch offshore could offer (Aramis is also designed to serve emitters in Antwerp, etc.). Furthermore, Germany and the Netherlands are collaborating on the Delta Rhine Corridor – a cross-country network for the transport and storage of CO2. The policies and needs of these countries can impact Dutch project choices, and vice versa.	**Cross-border coordination:** *Policy & Regulation; Funding & Risk Management*

Organization	Description and Role	Activities
Professional Associations		
European Association of Geoscientists and Engineers *(EAGE)*	An **international professional association for geoscience engineers, professionals, researchers, and students** involved in geophysical exploration, mining, or subsurface energy. EAGE regularly hosts conferences and workshops, fostering knowledge and experience exchange across academia, government, and industry. It plays a crucial role in promoting the global development and application of geoscience and related engineering disciplines. EAGE has a local chapter in the Netherlands.	**Subsurface science coordination:** *Sectoral Advocacy; Knowledge Dissemination*
European Geosciences Union *(EGU)*	A major **European scientific society for Earth, planetary, and space research**. It enables geoscience knowledge exchange through Europe's largest geoscience conference (the annual EGU General Assembly), a large portfolio of open-access journals, and diverse outreach and education activities.	**Geoscience knowledge exchange:** *Knowledge Dissemination*
Society of Petroleum Engineers *(SPE)*	A **global organization supporting professionals in the upstream oil and gas sector**. It fosters technical exchange and professional development among its members. It has a section specifically for the Netherlands. While rooted in hydrocarbons, SPE Netherlands is increasingly discussing geothermal and CO_2 storage topics, supporting the transition of subsurface skills into new energy domains.	**Petroleum and geothermal skill transfer:** *Sectoral Advocacy; Knowledge Dissemination*
Research and Knowledge Institutions		
European Plate Observing System *(EPOS)*	A multidisciplinary, distributed **research infrastructure** that facilitates the integrated use of data, data products, and facilities from the European solid Earth science community. EPOS brings together Earth scientists, national research infrastructures, ICT (Information & Communication Technology) experts, decision makers, and the public to develop new concepts and tools for accurate, durable, and sustainable answers to societal questions concerning geo-hazards and those geodynamic phenomena (including geo-resources) relevant to the environment and human welfare.	**EU research data infrastructure:** *Monitoring & Data Infrastructure; Knowledge Dissemination*

Organization	Description and Role	Activities
ECCSEL ERIC	The **European research infrastructure** provides open access to a distributed portfolio of facilities across seven countries for research on carbon capture, transport, storage, and utilization, as well as geothermal energy and subsurface energy storage. ECCSEL is relevant as a structured gateway to experimental capacity and expertise and works with industry and academic stakeholders.	**EU research facility infrastructure:** *Monitoring & Data Infrastructure; Knowledge Generation; Knowledge Dissemination*
EuroGeoSurveys	The not-for-profit association **representing Europe's geological surveys**. It positions itself as a bridge between geoscience and policy, providing European institutions, regulators, industry, and the public with open-access, harmonized geological data and data infrastructure relevant to sustainable cross-border subsurface governance.	**Geological service for the EU:** *Monitoring & Data Infrastructure; Knowledge Dissemination*
International Research Collaborations	Dutch institutions are involved in **EU projects** and international bodies, such as EU Horizon projects on geothermal energy (e.g., DESTRESS, GEOENVI, FindHeat), which include Dutch partners. Additionally, the Netherlands participates in the **IEA Geothermal TCP** and in networks such as **CO2GeoNet**, focusing on CO_2 storage research in Europe. Through these, foreign academic organizations also become stakeholders in Dutch subsurface innovation, and Dutch researchers influence international best practices.	**Transnational subsurface research networks:** *Knowledge Generation; Knowledge Dissemination*
NGOs and Environmental Organizations		
OSPAR Commission	The OSPAR Commission (an international convention for the protection of the North-East Atlantic) amended its treaty in 2007 to explicitly allow **offshore CO_2 storage**. The Netherlands is a contracting party. OSPAR sets **environmental guidelines** for any injection into the geologic formations of the North Sea. This means OSPAR (and related international maritime law) is a stakeholder that ensures practices such as CO_2 storage or the disposal of mining waste meet agreed-upon environmental safety standards.	**Marine environmental standards:** *Policy & Regulation; Advisory & Arbitration*

Organization	Description and Role	Activities
Multilateral climate initiatives	Bodies like the **UNFCCC/IPCC** indirectly influence Dutch subsurface policy by emphasizing the reduction of emissions. The **International Energy Agency (IEA)** provides best-practice guidance (the IEA's geothermal technology collaboration programs include Dutch experts). While these organizations do not operate projects, they provide the knowledge and agreements that govern stakeholder actions.	**Climate policy pressure and guidance:** *Civic & Environmental Advocacy*
International NGOs and Networks	Organizations like the **WWF**, Greenpeace (global), and **BirdLife International** (via Vogelbescherming) have weighed in, particularly on issues such as Wadden Sea protection. In 2021, a group of international conservation NGOs (including WWF and BirdLife) publicly condemned plans for new gas drilling near a protected Wadden area. Their involvement underscores that some Dutch subsurface decisions have international visibility. In addition, there are cross-border coalitions (e.g., the **Wadden Sea** is protected through trilateral cooperation among the Netherlands, Germany, and Denmark under UNESCO; these international bodies have also weighed in on Dutch decisions). The **Global CCS Institute** and **Climate Action Network Europe** also monitor Dutch CCS progress and the phase-out of fossil fuels, contributing to international pressure and support.	**Cross-border advocacy:** *Civic & Environmental Advocacy*

6. Conclusion

The stakeholder landscape for subsurface and mining activities in the Netherlands is both extensive and layered. **It encompasses national ministries and regulatory bodies, commercial operators and industry associations, financiers and insurers, knowledge institutions and environmental NGOs, as well as regional authorities, local citizens' organizations, and international institutions.** These stakeholders operate across multiple scales and sectors, bringing with them diverse responsibilities, expertise, and perspectives. Subsurface governance and use in the Netherlands are thus not simply amatter of technical planning, but a profoundly institutional, political, and societal undertaking.

At the national level, government institutions form the backbone of the subsurface governance regime. The Ministry of Economic Affairs and Climate, in collaboration with the Ministry of Climate and Green Growth, is primarily responsible for establishing the legal framework under the Dutch Mining Act. Other ministries, such as Infrastructure and Water Management, Finance, and the Interior, contribute to permitting, environmental protection, public compensation, and spatial planning. These national responsibilities are complemented by the role of provinces and municipalities, which influence mining decisions through environmental licenses, zoning rules, and water protection regulations. **This multi-level governance structure has become especially salient in cases where local concerns, such as those in Groningen or Limburg, demand stronger place-based responses**, as reflected in the creation of the National Coordinator Groningen.

Regulatory bodies ensure that resource development remains within legal, technical, and environmental limits. The State Supervision of Mines (SodM) monitors compliance across renewable, fossil fuel, and salt operations. The Mining Council reviews license applications based on expert and local/regional input, while the Commission for Environmental Assessment (Commissie mer) provides an independent evaluation of the potential impacts of proposed projects. Damage-related institutions such as the Institute for Mining Damage Groningen (IMG) and, formerly, the Technical Committee on Ground Movement (Tcbb) respond(ed) to residents' claims and concerns, particularly in regions facing the legacy of extraction. These bodies, supported by technical advisors such as TNO's Geological Survey, provide essential checks and balances to maintain public trust.

In the industrial sphere, companies like NAM, Vermilion, and ONE-Dyas remain central to gas production, while Nobian and Frisia Zout continue the country's long-standing tradition of salt mining. The former actors are united under the industry association Element NL and are supported by Energie Beheer Nederland (EBN), the state-owned partner in oil, gas, and geothermal projects. In the geothermal sector, **EBN's mandatory project participation, combined with government subsidies and risk guarantees, exemplifies how private initiative and public oversight are intertwined.** This is further reflected in CCS projects such as Porthos and Aramis, which bring together state entities, multinationals, and the EU, highlighting the complex networks that underpin contemporary subsurface projects.

The Dutch research community plays a vital dual role: advancing scientific understanding and serving as a critical voice on the risks and promises of subsurface activities. Institutions like TNO, KNMI, and various universities contribute to both technical innovation and the social assessment of impacts. Programs such as DeepNL and KEM have been launched to deepen understanding of seismicity, heat extraction, and underground CO_2 storage, while also building capacity and public knowledge. The Geological Survey's data infrastructure, KNMI's seismic monitoring, and research on induced effects in Groningen are indispensable, ensuring that governance and (future) operation are grounded in sound science.

Civil society has long been a powerful actor in shaping Dutch subsurface use and policy. Milieudefensie, Waddenvereniging, and other environmental NGOs have frequently challenged new mining proposals, using legal channels, direct action, and public advocacy to assert social and ecological concerns. Locally, grassroots movements such as the Groninger Bodem Beweging and the ten mining municipalities in Limburg have successfully mobilized public and political support for compensation, safety improvements, and regional investment. Meanwhile, community cooperatives are exploring geothermal heating and localized energy solutions, shifting the landscape of subsurface use from centralized extraction to shared public-private ownership.

Internationally, Dutch subsurface activities are increasingly shaped by European and global frameworks and players. EU directives impose requirements for safety, environmental performance, and CO_2 accounting. European subsidies have enabled CCS projects, such as Porthos, while cross-border initiatives, including CO_2 pipelines to Antwerp and coordinated salt cavern use for energy storage, highlight how the Netherlands' subsurface is embedded in cross-border systems. International NGOs and treaty organizations (e.g., WWF, OSPAR) have intervened in high-profile environmental controversies, reinforcing the idea that subsurface decisions made in the Netherlands often carry international implications.

A key contribution of this analysis is the identification of nine distinct activity roles that stakeholders fulfill (*see Introduction*): *Policy & Regulation, Advisory & Arbitration, Monitoring & Data Infrastructure, Funding & Risk Management, Operation & Ownership, Sectoral Advocacy, Civic & Environmental Advocacy, Knowledge Generation, and Knowledge Dissemination*. **These roles are not siloed; most stakeholders operate across multiple domains.** For example, the Ministry of Economic Affairs and Climate not only sets policy but also manages subsidy frameworks. EBN participates in ownership while also coordinating data acquisition and collection. TNO generates knowledge, provides licensing advice, and maintains critical data systems. **Mapping stakeholders by activity type reveals areas of role concentration**, such as the dominance of public actors in monitoring, **and potential governance gaps**, particularly in structural participatory engagement or automatic accountability mechanisms.

This analysis reinforces the view that the Dutch subsurface is not just a physical resource to be managed but a contested and dynamic domain in which institutional frameworks, public legitimacy, and social learning are key. Balancing the need for energy transition, economic prosperity, and environmental responsibility will require not just innovation and investment, but trust, transparency, and inclusive governance. The range of stakeholders described here, along with their roles, provides a foundation for future work to improve coordination, address power imbalances, and ensure that the subsurface serves the public interest.

7. Website Index

7.1. General Information

Alles over Aardwarmte
Focus: Public education platform on geothermal energy.
Features: Project map, FAQs, news updates, participation guidance, and communication toolkit.
https://www.allesoveraardwarmte.nl/

EBN
Focus: Overview of subsurface energy activities and the state's role.
Features: Information on heat networks, geothermal energy, CCS, gas, geological data, and a knowledge base.
https://www.ebn.nl/

7.2. Geodata and Map Portals

Bodemdalingskaart (Dutch Ground Motion Service)
Focus: Satellite-based ground motion (subsidence) data across the Netherlands.
Features: Interactive maps with ground movement at address-level detail.
https://bodemdalingskaart.nl/

BROloket (Subsurface Key Register Portal)
Focus: Public access to subsurface datasets and models under Dutch law.
Features: Interactive viewer and download portal for borehole data, groundwater models, and geological structures.
https://www.broloket.nl/ondergrondgegevens

DINOloket (Geological Survey Data Portal)
Focus: Central portal for geoscientific data from the Geological Survey of the Netherlands (TNO).
Features: Access to geological drilling surveys, groundwater surveys, probing surveys, geoelectric surveys, waterbed surveys, and well and pump tests; data sourced from BRO and DINO archives.
https://www.dinoloket.nl/

GEODE Atlas
Focus: Play-based exploration data for hydrocarbons, CO_2 aquifer storage, and hydrogen storage potential.
Features: Offshore and onshore geological evaluations (e.g., Zechstein, Rotliegend), with downloadable exploration data.
https://www.geodeatlas.nl/

Geothermal Project Map (Geothermie.nl)
Focus: Overview of operational and planned geothermal energy projects.
Features: Status-based map with project-specific descriptions.
https://geothermie.nl/geothermie/locaties-op-kaart/

Grondwatertools.nl
Focus: Hydrogeological structure and groundwater information (part of TNO-GDN).
Features: Maps of groundwater levels and composition, as well as hydrogeological models.
https://www.grondwatertools.nl/

KNMI – Seismology & Earthquakes
Focus: Real-time monitoring of natural and induced earthquakes.
Features: Interactive map, public earthquake catalog, downloadable data, and a citizen reporting tool.
https://www.knmi.nl/nederland-nu/seismologie/aardbevingen

NLOG Mapviewer (Netherlands Oil and Gas Portal)
Focus: Subsurface activities, including gas, oil, and geothermal operations.
Features: Interactive maps of drilling, seismic surveys, and active permits; knowledge database.
https://www.nlog.nl/nlog-mapviewer

ThermoGIS
Focus: Visualization of geothermal energy potential in the Netherlands.
Features: Interactive map viewer with location-specific geothermal calculations and scenario tools.
https://www.thermogis.nl/en

7.3. Legislation, Supervision, and Permitting

Mijnbouwvergunningen
Focus: Public access to mining permit procedures and participation.
Features: Overview of pending applications, public consultation periods, and objection instructions.
https://mijnbouwvergunningen.nl/

SodM (State Supervision of Mines)
Focus: Independent regulator of mining and subsurface safety.
Features: Sector reports, safety warnings, inspection results, and incident reporting.
https://www.sodm.nl/

NLOG – Legal Framework Page
Focus: Legal basis for subsurface activities in the Netherlands.
Features: Overview of mining legislation (Mining Act, Environmental Management Act, etc.) with links to official documents.
https://www.nlog.nl/wet-en-regelgeving

Mining Regulations (in English)
Focus: Advice portal for foreign entrepreneurs operating in the Netherlands.
Features: English-language summaries of applicable laws and required permits for exploration and extraction.
https://business.gov.nl/regulations/explore-extract-store-minerals-geothermal-heat/

RVO (Netherlands Enterprise Agency)
Focus: Support for geothermal and CCS business development.
Features: Subsidy schemes (e.g., SDE++), legal basis, and further resources.
https://www.rvo.nl/



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