Earthquakes in Groningen: Organized Suppression of a Creeping Crisis

Alexander Verdoes and Arjen Boin

Abstract Natural earthquakes do not occur in the northern part of the Netherlands. Yet, small earthquakes have regularly struck the area since the 1980s. For a long time, it was denied that these earthquakes were caused by the extraction of gas in the area and that these earthquakes could cause any damage. When more, and more severe, earthquakes struck the province of Groningen, these claims became unsustainable. In 2012, a relatively strong earthquake hit the area and the earthquakes became a national policy issue that threatened the legitimacy of the state. The crisis lingered on until 2018 when the national government finally realized that prolonged extraction would cause a deep crisis and decided to terminate the extraction of gas well before the depletion of the field. We argue that this visible and enduring crisis was not recognized and sufficiently addressed because of a societal dependency on the extraction of gas. The

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A. Boin et al. (eds.), *Understanding the Creeping Crisis*,

https://doi.org/10.1007/978-3-030-70692-0_9

crisis was actively suppressed by the main actors, which ultimately undermined the legitimacy of the gas production and the state.

Keywords Creeping crisis • earthquakes • Dutch gas fields • crisis incubation • crisis response

9.1 INTRODUCTION: EARTHQUAKES IN HOLLAND?

Every Dutch schoolchild knows that earthquakes are rare in the Netherlands. In the northern part of the Netherlands, earthquakes never occurred—until recently. In December 1986, an earthquake struck the Drenthe province, near a gas extraction site. The following years witnessed small earthquakes near other small gas fields in Drenthe and in the province of North-Holland. But the number of earthquakes really accelerated in the Groningen province, where more and more gas has been extracted since 2000. At the time of writing, in late 2020, over 1700 small earthquakes have been registered in the northern provinces of the Netherlands.

The accumulated damage has been substantial (thousands of houses have been damaged), but the industry consortium exploiting the gas fields in the northern provinces simply denied any causal relations between their activities and the earthquakes. The Dutch authorities also denied that these earthquakes were caused by the extraction of gas or could cause any significant damage. As the number and intensity of the earthquakes increased, together with the rising harm caused by the earthquakes, this claim became harder and harder to sustain.

Over the years, the earthquakes developed from a local safety threat to a national policy concern. When an M3.6 earthquake¹ struck the village of Huizinge (in Groningen province) in 2012, citizens began to mobilize against gas production. In January 2018, a small earthquake (M3.4) struck the small town of Zeerijp (also in Groningen province). This event proved a tipping point: the public began to directly relate the earthquakes with the gas fields in the north. The national government finally realized

¹ The reference “M” refers to a Richter Scale magnitude ranking. The Richter scale (M) is a logarithmic scale. A one-step increase on this scale means that an earthquake is ten times stronger. It should be noted that the Richter scale may not be the most appropriate measure to determine the impact of earthquakes because of the interaction between shallow earthquakes, compaction related subsidence, weak soil, soft sediments, and constructions that were not designed to withstand earthquakes.

that prolonged extraction would lead to a deep crisis. The legitimacy of the state was at stake (Schmidt, Boersma, & Groenewegen, 2018).

In the 2018 quake's aftermath, the Minister of Economic Affairs, Eric Wiebes, decided to terminate the extraction of gas to ensure the safety of the region (Tweede Kamer, 2017–2018a). The minister also announced a new compensation and restoration scheme for the victims of the earthquakes. This was a major and very costly policy reversal. The Groningen gas fields had been a financial windfall for the Netherlands since the 1960s, generating between 5–10% of national revenues.

Below we explore why this creeping crisis, a concept defined in the introduction to this volume, could persist for such a long time. To answer this question, we make use of primary sources (parliamentary documents) and secondary sources (academic articles, policy papers and reports, and media reports). We begin the chapter with a brief reconstruction of how lucrative gas extractions in the northern Dutch provinces slowly developed into a legitimacy threat for the national government. We describe how the government and the exploitation consortium (known as the NAM, or Nederlandse Aardolie Maatschappij) responded to these earthquakes and how these responses were perceived by citizens. In the final section, we identify factors that explain why this creeping crisis was allowed to persist.

9.2 A CRISIS IN SLOW MOTION

The unfolding crisis of the Dutch gas fields can be described in four time periods: the initial incubation period (1959–1986), a phase in which a number of precursor events gradually increased attention (1986–2012), a major jump in attention and rise on governmental agendas (2012–2018), and a final phase that led to a full-fledged response: the announced closure of the gas fields (2018–2020).

9.2.1 *Incubation: Increasingly Dependent on a Financial Bonanza*

In 1959, the Slochteren gas field was discovered. Located in the province of Groningen, it turned out to be one of the largest gas fields of the world (Sintubin, 2018, p. 2001). The new source of income was an unexpected gift to a poor country still rebuilding its war-torn society.

In 1962, the first Dutch gas policy was published (OVV [Onderzoeksraad voor Veiligheid], 2015, p. 33). This policy was based on two pillars. The first pillar held firm to the belief that fossil fuels would soon be replaced by nuclear energy. Therefore, the aim was to start the extraction of gas as soon as possible and deplete the field quickly in order to maximize its value before the expected arrival of nuclear energy. The second pillar defined the state as a major player in the extraction, transportation, and selling of gas in cooperation with private parties (OVV, 2015, p. 33; Mulder & Perey, 2018, p. 12).

In 1963, Dutch State Mines (a state enterprise under the authority of the Ministry of Economic Affairs) and the NAM (a joint venture between Shell and ExxonMobil) signed an agreement to coordinate the extraction, transportation, and sales of gas (OVV, 2015, p. 33). The NAM was granted a lasting concession to extract the gas, while also becoming responsible for safety and liable for the consequences of extraction.² Later that year, the extraction of Groningen gas began. At the same time, an enormous operation began to enable the consumption of gas by industry and households. In addition to Dutch households, many households in Belgium, France, and Germany quickly became dependent on Groningen gas.³

After the 1973 oil crisis, gas prices rose. The resulting gas revenues contributed substantially to the national budget. In the 1980s, the share of gas revenues in the national budget peaked, amounting to about 18% of the state revenues (OVV, 2015, p. 21). During this time period, local residents did not have any noticeable objections. They were happy with the (indirect) economic benefits that befell the economically disadvantaged region. Furthermore, citizens were proud that they could contribute to the post-war reconstruction efforts and to the emerging welfare state (Bakema, Parra, & McCann, 2018, p. 8).

It was in this same period that the first negative side-effects were encountered. The NAM acknowledged in 1971 that gas extractions in Groningen would result in subsidence of the soil. This sinking, according to the NAM, would not be problematic. Across an area of 900 sq. km, the

² After the discovery of the Slochteren field, the NAM continued to explore gas fields, and it discovered several smaller gas fields in other parts of the Netherlands.

³ All the infrastructure was designed for Groningen gas, which is characterized as low calorific. High calorific gas from Russia, or Norway must be treated with nitrogen first, before it is compatible with the gas infrastructure (Mulder & Perey, 2018, p. 11; Sintubin, 2018, p. 2002).

soil would subside approximately one meter over time, but this process would be gradual. Because the process was so predictable and slow, the NAM claimed that damage could be prevented.⁴

The first small earthquakes—no more than light tremors at the time—were felt in 1976. The NAM denied that gas extraction could cause proper earthquakes (Scholtens, 2018, p. 27). The Royal Netherlands Meteorological Institute (KNMI), which is responsible for measuring seismic activity in the Netherlands, also denied the possibility of earthquakes (Kester, 2017, p. 18). The responsible ministers ascribed the observed tremors to vibrations in the atmosphere, which, they claimed, were probably caused by fighter jets breaking the sound barrier in the area (Tweede Kamer, 1988–1989).

9.2.2 *Precursor Events: Increasing Earthquakes and Rising Attention*

In December 1986, an M2.8 earthquake near a small gas field in Assen was strong enough to be registered by the KNMI's seismic sensors in Utrecht (approximately 150 km away) (Kester, 2017, p. 18). Other small earthquakes followed near smaller gas fields in the provinces of Drenthe and Noord-Holland. The NAM acknowledged that there were “vibrations,” but it denied any relation between the tremors and the extraction of gas. The NAM also stressed that it was impossible to establish the origins of the shocks, mainly because they were not monitored (OVV, 2015, p. 37).

A geographer and member of the provincial assembly of Drenthe, Mr. Van der Sluis, suspected a causal relationship between the extraction of gas and the earthquakes occurring nearby. He held the NAM responsible for the damages that were caused by the earthquakes. The NAM fiercely denied his claims and made personal attacks on Van der Sluis, suggesting he was an ignorant geography teacher (OVV, 2015, p. 37). The NAM asserted that it was the sole authority on this topic (Van der Voort & Vanclay, 2015, p. 6) while the KNMI declared that Van der Sluis's theory could not be true (Van der Voort & Vanclay, 2015, p. 6). Meanwhile, geologists in the US and France established that gas extractions could indeed cause earthquakes (OVV, 2015, pp. 59–60). The NAM and the

⁴In 1983, the NAM and the province of Groningen agreed that the NAM would be responsible for damage caused by the subsidence (OVV, 2015, pp. 34–35; Van der Voort & Vanclay, 2015, pp. 5–6).

KNMI denied that this was possible in the Netherlands because the geological conditions were very different. Both organizations saw no need to initiate further studies (OVV, 2015, p. 64).

The earthquakes triggered concerns among Dutch Members of Parliament (MPs) (Tweede Kamer, 1988–1989). They observed that earthquakes were suddenly occurring in an area where normally earthquakes do not occur. Ministers De Korte (Economic Affairs) and Kroes (Infrastructure) again pointed to air vibrations as the likely source. Nevertheless, De Korte ordered the KNMI to install seismometers to monitor the earthquakes. The first seismometers were installed in Assen in 1989 and in Finsterwolde in 1992 (Kester, 2017, p. 18; OVV, 2015, pp. 37–38).⁵

In 1990, the province of Groningen commissioned studies from the Massachusetts Institute for Technology (MIT) and Delft University. Both studies concluded that it was very unlikely that “induced earthquakes” could occur in Groningen. Even if they did occur, the impact of these tremors could not exceed M3 and would thus not cause any damage (OVV, 2015, p. 38). Despite these reassuring findings, more and more earthquakes were registered, which fueled concerns among MPs (Tweede Kamer, 1990–1991).

In response, the Minister of Economic Affairs initiated a multidisciplinary investigation in 1991. Two years later, the investigation committee published its findings. For the first time it was acknowledged that the extraction of gas could cause earthquakes. However, these earthquakes could not exceed a magnitude of M3.3 and were not considered cause for concern (OVV, 2015, p. 39). The NAM endorsed the findings but refused to compensate any damages to buildings (Van der Voort & Vanclay, 2015, p. 6).

More studies were initiated. Research conducted by the KNMI corroborated the findings of the 1993 study that established the link between earthquakes and gas extraction (OVV, 2015, p. 40). Meanwhile, the Groningen province started to receive damage reports from citizens. In 1995, the Groningen provincial government informed its residents that earthquakes could strike in extraction areas with a possibility of minor damage. Citizens were informed how they could claim compensation for damages (OVV, 2015, pp. 40–41).

⁵ Not much later, the first earthquakes were also registered in the Groningen area and it is very likely that earthquakes already struck Groningen before the earthquakes were monitored (Staatstoezicht op de Mijnen [SodM], 2013, pp. 10–11).

In 1997, an M3.4 earthquake struck the town of Roswinckel in Drenthe. This was the biggest earthquake thus far. More research was conducted, and the maximum potential magnitude was increased to M3.8. The new report predicted that the situation would not deteriorate (OVV, 2015, pp. 41–41; Van der Voort & Vanclay, 2015, p. 6).

In 2000, gas production from the smaller fields peaked. To compensate for the decreasing production from the smaller fields, extraction from the larger Groningen field increased (OVV, 2015, p. 22). At the same time, the earthquakes started to become a bigger problem in the Groningen province. In 2003, for instance, three earthquakes struck the village of Loppersum (OVV, 2015, p. 45). The maximum possible magnitude was increased again to M3.9 (OVV, 2015, pp. 46: 82).

In 2006, an M3.5 quake struck the Groningen villages of Westeremden and Middelstum. In the aftermath of this earthquake, an expert from the Dutch Organization for Applied Scientific Research (TNO) stated in the media that the earthquakes would not increase in magnitude. This assertion did not reassure local residents, however, who remained concerned about the increasing magnitude of the earthquakes, the possible damage that these earthquakes could cause, and the increasingly rapid extraction of gas (OVV, 2015, p. 47). Local citizens began to lose their confidence in the NAM. This was caused by the gradual increase of expected magnitude (from M3.0 in 1990 to M3.9 in 2003). Additionally, citizens were concerned that the earthquakes could cause damage to their houses, which the NAM had long denied (OVV, 2015, p. 48).

In 2007, the NAM presented a new extraction plan for the Slochteren field. Despite the earthquakes in the area, the planned period for extractions was extended from 2040 to 2068. The Minister of Economic Affairs accepted the plan. The possibility was noted that induced earthquakes could cause damage to houses, but it was also noted that damages could simply be compensated (OVV, 2015, pp. 47–48).

The relatively few people who had suffered damage to their houses were upset about the treatment they received from the NAM. They felt that the NAM did not take them seriously. The NAM continued to contest that earthquakes had caused the damages. In response, residents established an advocacy group, the Groninger Ground Movement (*Groninger Bodem Beweging* (GBB)) in 2009 (OVV, 2015, p. 49). The GBB would come to play an important role in putting the earthquakes on the political agenda. However, they were only capable of doing this after they were able to demonstrate that the earthquakes increased and

intensified, causing negative social effects. National newspapers thus far had shown very little interest in the risks related to gas extraction. All this changed in 2012, which delivered a so-called trigger event (Kester, 2017; Opperhuizen, Schouten, & Klijn, 2019, pp. 724–725).

9.2.3 *A Trigger Event: Arrival on the Political Agenda*

On 16 August 2012, an M3.6 earthquake struck the village of Huizinge. This was the most powerful and long-lasting earthquake to hit in the province of Groningen. Residents fled their residences and local buildings. Regional television had a live broadcast of the event. The earthquake caused considerable damage: residents filed about 2500 damage claims (Tweede Kamer, 2012–2013a, p. 1).

The State Supervision of Mines (Staatstoezicht op de Mijnen (SodM)) initiated a study after the Huizinge earthquake and confirmed that earthquakes had become more frequent and intense, and, importantly, that these developments were connected to the extraction of gas. The SodM also concluded that it was impossible to estimate the maximum magnitude of future earthquakes (SodM, 2013, pp. 10–11; 23). In January 2013, the KNMI confirmed the findings of the SodM study (OVV, 2015, p. 53). These reports garnered considerable media attention and put the issue of extraction-related earthquakes squarely on the national political agenda (Schmidt et al., 2018, p. 517). Later that month, the SodM advised the Minister of Economic Affairs to reduce the extraction as soon as possible to minimize the risks of more, and more severe, earthquakes (OVV, 2015, p. 53).

In reaction to these reports, Minister Kamp (Economic Affairs) reassured citizens that victims would be compensated and proposed measures to prevent and mitigate damages caused by future earthquakes (Tweede Kamer, 2012–2013a).⁶ However, Kamp did not reduce the gas production. Households and businesses in the Netherlands, Germany, Belgium, and France depended on the Groningen gas field. It was simply not possible to replace the Groningen gas with gas from other sources, at least not in the short term.⁷ In addition, reducing the gas production

⁶To prevent damages, the NAM would assess constructions and, if necessary, reinforce constructions (the so-called strengthening operation).

⁷There was insufficient capacity to treat high calorific gas with nitrogen to make the high calorific gas compatible with the gas infrastructure that was designed for the low calorific Groningen gas (see footnote 3).

would have negative consequences for the government budget. Instead, Kamp initiated 14 investigations so he could take an informed decision about the future of gas extraction in the Netherlands.

In a subsequent parliamentary debate (Tweede Kamer, 2012–2013b), a majority stressed that the safety of the residents should be prioritized above economic interests. A majority also agreed that compensation by itself was not an adequate response to the earthquakes. Instead, the production should be reduced to safe levels, or it should be stopped altogether. The minister refused to take a decision because he wanted to await the results of the additional investigations. Minister Kamp did admit that the Huizinge earthquake had generated a new sense of urgency among politicians and experts. He argued that reducing production would not substantially reduce the safety risks. According to the minister, a 20% reduction would decrease the probability of an M3.9 earthquake in the next 14 years from 7% to 5.6%. While the expected safety benefits were marginal, reduction of production would have severe consequences for businesses and households, in the Netherlands and abroad. Additionally, this would also substantially deplete the national budget amid an economic recession. After this debate, and with the announcement of 14 new studies, the earthquakes disappeared from the agenda (Schmidt et al., 2018, p. 519).

The provincial government of Groningen was not satisfied with the minister's response and initiated its own research committee: the so-called Meijer Committee (2013). In November 2013, the committee published its report, which put the earthquakes back on the political agenda (Schmidt et al., 2018, p. 519). The committee observed an imbalance in the costs and benefits from gas extraction; it also noted a growing resistance against the national government and the NAM. The province of Groningen received about 1% of the national income generated by gas production, but it suffered the bulk of the negative effects. Moreover, the report argued that NAM did not communicate with the victims while the authorities denied real estate value losses because of the earthquakes.

Residents were upset with the NAM's damage settlement procedure, too. They perceived the damage settlement procedure as nonresponsive, unwilling, and random (Postmes et al., 2018). Damages were repaired, but only after a long procedure (after each earthquake, people had to go through the demanding procedure again). The slow and uncertain damage settlement procedure and the strengthening operation made it difficult, if not impossible, for a substantial number of people to live a normal life (Postmes et al., 2018; Stroebe et al., 2019).

This widespread feeling of injustice was strengthened by the refusal of the NAM and the national government to cut gas production, as the SodM had advised. Shortly after the Meijer Committee released its report, it became known that a record amount of gas was being extracted from the Groningen field (OVV, 2015, p. 55). One could forgive the citizens of Groningen province for thinking that the Minister of Economic Affairs had initiated the 14 studies merely to delay a decision on the reduction of gas extraction (Bakema et al., 2018, p. 10).

The government tried to address the loss of trust by promising an investment of 1.2 billion EUR in the regional economy (OVV, 2015, p. 55). Additionally, a “dialogue table” was initiated, which aimed to build consensus between the gas industry, local actors, and citizens (Bakema et al., 2018, p. 11). The dialogue table quickly proved unsuccessful, however, as it reproduced existing power hierarchies and did not strengthen the representation of local actors in the decision-making process. It was disbanded at the end of 2015 (Bakema et al., 2018, p. 11).

Minister Kamp approved a new extraction plan in 2014. This led to another backlash. Even though the SodM advised the minister not to approve an earlier version of the plan in 2013, the plan was accepted. The only concession in the plan was a minor reduction in the extraction; no other substantive policy changes were made (OVV, 2015, p. 54; Schmidt et al., 2018, p. 522). Another problem with this new plan was that local stakeholders had not been involved in the decision-making process. Subsequently, the media and local policymakers framed the approval of this plan as a one-sided and unilateral decision (Schmidt et al., 2018, p. 522).

The position of residents was strengthened vis-à-vis the NAM and the government when in 2015 the Dutch Safety Board published its report on safety in Groningen. This body concluded that authorities had ignored the risks related to the gas extraction before the 2012 Huizinge earthquake (OVV, 2015).

Until 2015, the NAM was responsible for both the damage assessment and for the compensation of victims. Both the NAM and the Ministry of Economic Affairs no longer considered this situation appropriate. In 2015, the Ministry of Economic Affairs therefore founded the Centre for Safe Living (Bakema et al., 2018, p. 10). The new center was tasked with assessment, financial pay outs, and repair of damages. This was not an immediate solution for the problem, because it further complicated the already complex damage settlement procedure. This complexity

discouraged citizens to report damages (Kuipers & Tjepkema, 2017; Mulder & Perey, 2018; Stroebe et al., 2019). It was not until the 2018 Zeerijp earthquake that a new process was established (Bal, Smyrou, & Bulder, 2019, p. 3).

Citizens continued to mobilize against gas production via the GBB advocacy group and other local interest groups (Mulder & Perey, 2018, p. 9). They succeeded in generating substantial attention in the national media. A public broadcaster aired (during prime time) a documentary about the damage settlement procedure. Attention in the newspapers for the problem increased dramatically between 2013 and 2015 (Opperhuizen et al., 2019). Meanwhile, the NAM and the government limited their participation in the public debate. This caused a further backlash for the NAM because discussion of the earthquake risks was dominated by worst-case scenarios. In these scenarios, an M5 earthquake would strike the region. The scenarios fueled feelings of insecurity among residents (Sintubin, 2018, p. 2005; Vlek, 2019, p. 1073). In hindsight, we can see that this was the period during which the NAM slowly began to lose its “social license”—or legitimacy—to drill. It became increasingly difficult for political parties to support gas extraction in the northern provinces (Van den Beukel & Van Geuns, 2019, p. 21).

Around 2015, politicians started to change their positions, increasingly emphasizing safety and environmental concerns over economic considerations. Several political and judicial decisions were announced that favored local residents and put more demands on the NAM and the state (Van den Beukel & Van Geuns, 2019). First, Minister Kamp decided in 2015 that citizens in Groningen should not be exposed to more safety risks than other Dutch citizens were (Tweede Kamer, 2015–2016). To comply with this safety norm, more buildings had to be reinforced (Tweede Kamer, 2015–2016; Stroebe et al., 2019, p. 29). In the same year, the Council of State (the highest administrative court) ruled that gas production should be reduced to limit the risks for inhabitants. Following this verdict, the Dutch government capped the production of gas to a minimum (Raad van State, 2015). In 2016, a new mining law was adopted, which reversed the burden of proof in Groningen: the NAM had to prove that damages were not caused by the earthquakes (Van den Beukel & Van Geuns, 2019, p. 15). In 2017, two judicial verdicts hampered the extraction even further. An ordinary court ruled that the NAM is responsible for psychological damage caused by earthquakes. The Council of State decided that the Ministry of Economic Affairs should reconsider the extraction plan (Postmes et al., 2018, p. 28).

The drastic change of attention and response was facilitated by an important development: gas production was rapidly becoming economically unviable. By the end of 2017, the NAM had to pay about 1.2 billion EUR in compensations (Van den Beukel & Van Geuns, 2019, pp. 15–16); it had to pay about 1 billion EUR to compensate for the depreciation of the real estate in the region. Additionally, an enormous project to strengthen about 22,000 buildings in the area came with a price tag of about 10 billion EUR (Van den Beukel & Van Geuns, 2019, pp. 15–16). The costs of extracting gas thus increased substantially. The Groningen gas field was no longer the financial asset it had been for so long.

In January 2018, an M3.4 earthquake struck Zeerijp. The Minister of Economic Affairs decided, finally, that the extraction of gas would have to be terminated to ensure the safety of the region (Tweede Kamer, 2017–2018a).

The Zeerijp earthquake was a tipping point (see also Tweede Kamer, 2017–2018b). The damage settlement procedure also changed after the Zeerijp event. The Temporal Committee Mining Damage Groningen was established (since July 2020 the Institute for Mining Damage Groningen) and functions independently from the NAM (Bal et al., 2019). This new committee seems to be a success: residents have become more likely to report their damages, and compensations are paid relatively quickly (Jach, 2019).

Even though production was cut back, earthquakes have not stopped. In May 2019, another strong earthquake hit the area, causing damage in the city of Groningen (the capital of Groningen province) (Bal et al., 2019). Not much later, the minister announced that the production would be terminated even earlier than planned (Tweede Kamer, 2018–2019a). The production is scheduled to stop in 2022; the field should be closed in 2026.

9.3 CONCLUSION: A CRISIS THAT KEPT ON CREEPING

Over the years, the small earthquakes that periodically hit the citizens of the Groningen province attracted little public or political attention. The citizens who saw their houses damaged or depreciated could only turn to the company that had caused the damage. The NAM consortium long denied the problem and made the damage pay-out process a frustrating one. It took decades before this creeping crisis was finally recognized as a real crisis for those living through it. By then, the crisis had also become an institutional crisis as the trustworthiness of the national government suffered a severe blow (Schmidt et al., 2018).

The question, then, is: how is it possible that a persistent and clearly visible creeping crisis is not recognized as such? Our chapter identifies two closely related factors that together help to formulate an answer to that question, and enlighten our understanding of creeping crises more generally.

The first factor is *societal dependency*. Politicians had very little incentive to recognize, let alone address, the problem. Even a small reduction of earthquake risk would have serious consequences for the national budget. In addition, there was no short-term replacement for the gas on which Dutch, Belgian, German, and French households relied. According to Minister Wiebes, terminating the extraction of Groningen gas was never seriously considered before 2018 (Tweede Kamer, 2018–2019b). The social dependency ended only after a series of decisions that widened the responsibility of the government and the operation of the field became economically non-viable. In addition, alternatives for the Groningen gas had to be developed (the construction of a nitrogen factory in Zuidbroek and the expansion of a nitrogen factory in Wieringermeer) and foreign contracts had to expire, to lower dependency on gas and enable the government to end the extractions.

The second factor is *active suppression*. The main actors (NAM and the Ministry of Economic Affairs) had no interest in the safety of citizens. For a long time, their sole interest was to maximize profits. These organizations did not look for crises to manage—they tried to actively prevent a crisis from attracting attention.

It was long believed that compensations and strengthening buildings could mitigate what was a clear creeping crisis. Instead, these management strategies became part of the problem. It was not recognized that a few cracks in the wall could cause severe problems for residents. Meanwhile, the number of earthquakes and their intensity increased, which overburdened the already deficient compensation mechanisms and overdue repair and strengthening operation. This made it very difficult for victims to live a normal life. Because these problems were not addressed, and the government and the NAM did not limit the production of gas, local residents believed that they were not taken seriously by the state and the NAM. The earthquakes did not just damage buildings, but they also damaged the legitimacy of the gas extraction and trust in the (central) state.

The efforts to keep this creeping crisis out of the limelight planted the seeds for its rise on the public and political agenda. The actions taken by the authorities to mitigate the effects of the earthquakes gradually

undermined the legitimacy of gas production and the state. The state was ultimately forced to terminate the gas production almost 50 years before the gas field would have been emptied. In this rare case of a creeping crisis eventually acted upon, and ostensibly solved, these dynamics shine light on the potential pathways through which other creeping crises described in this book might be resolved.

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