

# Speech Theodor Kockelkoren- Learning from Silent Earthquakes: A Call for Open Risk Management and Accountability in Energy Systems (August 27th, 2024)

## A Silent Earthquake: The Story of Marieke and Johan

Ladies and gentlemen,

Let me first express my gratitude to my fellow regulator, Havtil, to Anne Myhrvold, who invited me to contribute today. The annual Safety Lunch has become an institution. Your presence here today testifies to that. Anne Myhrvold and her predecessors are to be commended for making this possible. It is, therefore, an honor to stand here and share my experience and learning.

Let me start by asking a question. Do you know what a silent earthquake is? My guess is not all of you, so let me share a story.

It is a story of Marieke de Vries. She lived in the quiet village of Loppersum, nestled in the province of Groningen. Her charming brick house, built by her grandfather, stood as a testament to her family's history. But beneath its quaint façade, deep fissures had formed, not just in the walls, but in Marieke's very soul.

The gas extraction had turned Marieke's beloved Groningen landscape into a source of dread. The first quake was mild, barely a shudder, but it was enough to crack the plaster in the living room. Marieke dismissed it as a fluke, a one-time event. But then the quakes came more frequently and increasingly more intense. The once-sturdy walls of her home began to show deep cracks and the roof threatened to cave in. The house that had sheltered her family for generations was becoming uninhabitable.

Marieke's husband, Johan, tried to stay optimistic. He reassured her that the government would help, that the damage would be repaired, and that they would be safe. But as months turned into years, those promises proved hollow. The process of claiming damages was slow and bureaucratic. Their house had been inspected and the expert had stated that it would need to be strengthened. But despite repeated promises their house continued to deteriorate but no action was taken. The endless delays were wrecking much more than their house.

The stress weighed heavily on Marieke. She couldn't sleep, haunted by the fear of another quake. The uncertainty gnawed at her, making her feel helpless and alone. The couple's savings dwindled as they tried to make temporary repairs themselves. The value of their home had decreased significantly. Johan's health began to decline, his heart weakened by the constant strain.

One particular night, after a day of dealing with yet another round of paperwork and evasive answers from the authorities, Johan suffered a heart attack. The ambulance arrived too late. Marieke was left to face her worst nightmare alone.

## The Groningen Gas Extraction: A Timeline of Neglect and Consequences

Let me stop the story here. Ladies and gentlemen, this is one story of too many that I heard when talking to people in Groningen. The names and the details of the story have been changed. The penetrating essence stands. It relates very much to safety and to risk management. Let me share with you some of our learning.

The first learning: Avoid risk management to be a closed shop. The second one: You have a duty of care for safety and therefore also a duty to ensure sufficient, and sufficiently strong knowledge regarding your activities. These sound very much as an open door, don't they? Let me tell you more about the events in Groningen and then ask yourself that very question again.

Decades ago, in the eighties when the Groningen gas field was producing to the max and the first earthquakes could be felt, the notion that earthquakes could be induced was dismissed.

In the nineties research was commissioned by the government and the regulator together with the operator, which concluded that earthquakes could be induced after all. The maximum theoretical earthquake was estimated at M3.3 and after earthquakes of this magnitude occurred, it was revised to M3.9. After a second earthquake of magnitude 3.6 in 2012 and an assessment made by the regulator which showed that the underlying analysis was faulty, this assumption was shattered.

### Failures in Risk Management: Lessons from Groningen

This was a pivotal moment, as earthquakes higher than M3.9 can cause houses to partially collapse. Remember the Rotliegend formation is at 3km depth (and natural earthquakes are typically at a depth between 10 and 30 km) and the top soil in Groningen is very soft compared to for example Italy. The induced seismicity in one blow became not only damaging but also potentially lethal. The regulator advised the gas production to be cut as fast and far as possible.

The government and the oil companies, joined up in a complex governance arrangement called the 'Gas building', initially dismissed the new insight as premature. 'Who the hell is the regulator, when they draw these type of conclusions?' could be read in internal 'Gas building' emails. The resulting decision making was done behind closed doors, the gas production initially went up and more research was commissioned.

### The Impact of Bureaucratic Delays and Lack of Transparency

Only the parliamentary enquiry was able to get a glimpse of the resulting decision making and concluded in its 2023 report "decision making lacked urgency and involved insufficient action to mitigate risks, even though the dangers were well documented". The report also concluded that "the interests of the people of Groningen have been structurally ignored with for them disastrous consequences". The report stated that the government and oil companies neglected their duty of care.

Let me pause the Groningen time line here: Ladies and gentlemen, how to avoid such disaster and damning conclusions?

The government and oil companies inside the 'Gas building' had no interest, no incentive to seriously bring in outside, contrarian views. The regulator had been kept outside the 'gas building'. And worse, when the regulator asked the government for additional means and people to analyze the complex risks, the government thought this unnecessary, since the knowledge could be found at other institutions. However, these institutions were very much involved in the risk analysis done by the operator. As a result the risk analysis was done with tunnel view by parties focused on maximizing financial value. As a result the nature and magnitude of the risk were not seen for decades.

### Social and Health Consequences: The Invisible Damage

The tragedy continued: In 2012 it had become clear that vulnerable houses needed to be strengthened. However, first a methodology to identify vulnerable houses had to be created. A safety norm had to be set. Initial assessments suggested that with the then existing gas production, as much as half of all the houses in the region had to be strengthened (more than 80 thousand houses). As a result, eventually gas production was gradually decreased.

At the same time, however, the operator and government completely underestimated the effort to strengthen houses. The operation never really came about. Yet, many people alarmed by earthquakes,

had learned their house was potentially unsafe. People were left alone, in the dark, in their unsafe houses – that's how they saw it.

Thus, the uncertainty of earthquakes was compounded by the uncertainty when houses would be fixed and strengthened. The communication was very much lacking. Stress was building up in many households, leading to significant impact on health and happiness.

In 2016 a program was started to try to measure the social and health impact. The first results in 2017 showed large groups of people suffered impaired health and even worse, the researchers expected 16 early deaths on average each year. It has also become apparent that more invisible damage is done: the children in impacted households suffer especially in mental health and in school performance. The tragedy of these consequences was their invisibility: suicides, heart attacks can seldom be directly related to the extraction of Groningen gas, physical and mental suffering is more often than not behind the doors of the damaged houses rather than in the open.

### The Role of the Regulator: Pushing for Transparency and Safety

These results did not really sink in. Government tried to improve the repair and strengthening of houses, but did it without fully appreciating the situation. There remained an undue focus on financial value. There was as a strong fear government would spend unnecessary money and top brass in the 'Gas building' thought people in Groningen were trying to take advantage of the situation. As a result the trust between national government and local government and citizens evaporated completely. Instead of speeding up fixing and strengthening houses, progress actually stalled.

The risk management done by operator and government was focused on the technical risks. Lots of research was being done to improve the understanding of the gasfield and its risks. One early mistake of not conducting sufficient research was, however, repeated: the social and health impact was neglected in the risks analysis. Decisions were technocratic. Plans were developed without regard to people. The continued focus on financial value led to further mistakes: Risk analysis outcomes at macro scale suggesting almost all houses were safe, was seen as sufficient evidence not to evaluate individual houses – even if the individual assessment of houses showed many were still unsafe.

### Moving Forward: Ensuring Open and Impartial Risk Management in Future Energy Systems

Government and operator continued making decisions behind closed doors –yes, there was now more public scrutiny, but the essential steps of risk management were not conducted in an open and transparent manner. So, risk was defined too narrow and the risk analysis and characterization were therefore incomplete at best, if not faulty.

The technical knowledge, initially weak, developed as a result of an intense research effort to be of moderate strength. This, however, led to a false sense of security: government and operator overestimated the strength of their knowledge, partially due to the fact that this enabled decisions to continue gas production. The regulator pushed back strongly. I would like to thank the Norwegian risk scientist prof. Terje Aven for his excellent work which helped us, the regulator, base our critical and contrarian analysis on sound scientific footing.

Indeed, the critical advice of the regulator to government and subsequently the damning report of the parliamentary enquiry helped move the needle. This year the gas production has been stopped completely – despite pressure fanned up by the Russian invasion of Ukraine to keep producing. The reports of the regulator also helped to focus the strengthening program on citizens and speed. The need for this focus was underlined by the parliamentary enquiry. Now roughly 5 thousand houses have been strengthened and another 10 thousand still need to be done. Research shows that after houses have been strengthened the health of the inhabitants is improved.

Following the parliamentary enquiry's recommendations a special law, the Groningen law, is being enacted in which the government pledges support to also improve the social and economic fabric of Groningen. It will probably take more than a generation before the biggest wounds will have been healed. The scars will remain, probably for generations.

Here ends for now the Groningen timeline. So, could this have been different? I think the answer is yes, provided from the onset of the extraction activities an open risk management cycle would have been followed. With an open risk management cycle I mean a process that is open for all stakeholders to participate in, their contributions acknowledged; a process that is transparent in a way that information is made accessible and understandable; and a process which is conducted in an impartial way, independent of private interests.

The Netherlands is at the beginning, as many other countries, of a complex rebuilding of the energy system, which has to be completed in record time. The deep underground will have to play a critical role, for example for the large scale energy storage necessary to bridge the gap between the very much seasonal energy demand. We, the regulator, are committed to learn from the Groningen tragedy. When planning and designing the new energy system, we will push for an open risk management cycle. We will push for early and sufficient investment in knowledge development, both fundamental and applied. We will be very critical when overconfidence regarding the strength of knowledge is the basis for decisions that may have disastrous consequences. We hope we can reap the benefits of this approach. I hope and wish you all can also benefit from our mistakes and learnings. It will benefit our societies. It can also serve as a monument to the suffering of the people in Groningen after too many silent earthquakes.