Innovation challenge

Responsible processing of mercury contaminated steel
From intensive cleaning to a smarter processing route

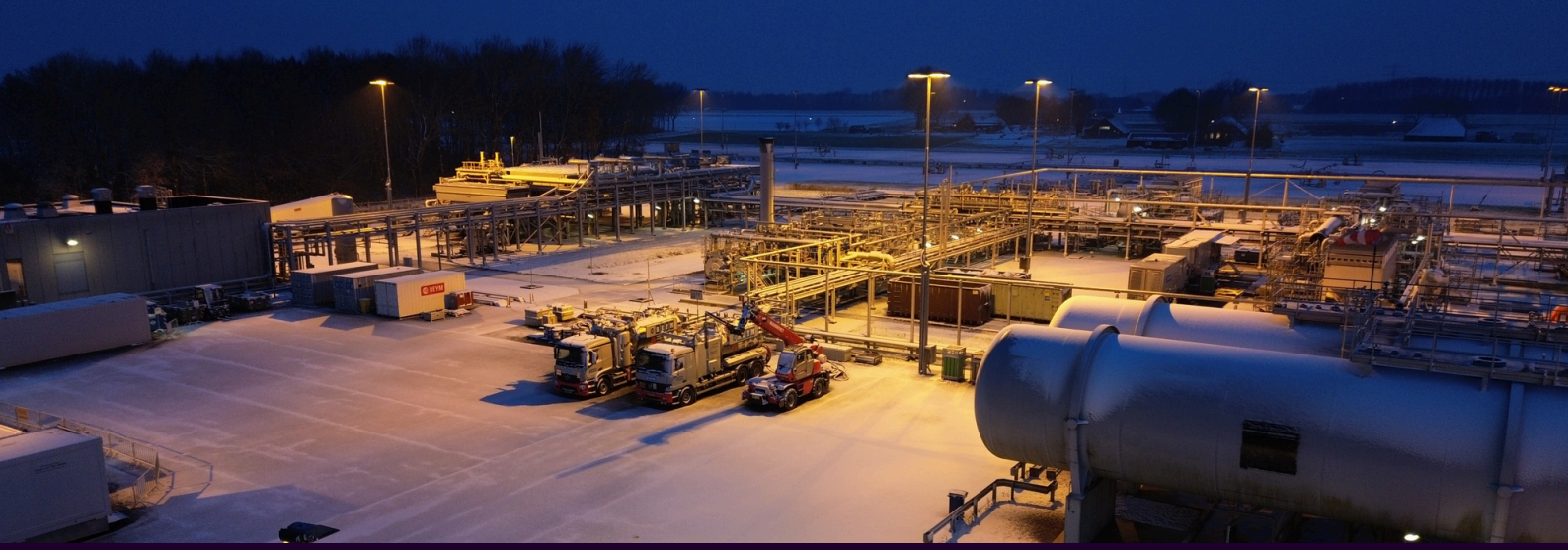
SITURN

SITURN is a collaboration between NAM, Arcadis and WellGear, established for the decommissioning of former onshore gas production systems in the Netherlands. It is one of the largest industrial clean-up operations ever undertaken in the Netherlands, comprising 800 production wells, 350 locations and 1,750 kilometres of pipeline.

The aim of SITURN is to dismantle and clean up these production systems carefully, efficiently and sustainably. The guiding principle is to reuse released materials responsibly wherever possible. Within SITURN, WellGear is responsible for the subsurface part of the operation: the safe and permanent closure of wells. Arcadis focuses on the above-ground part of the operation, including the cleaning, dismantling and removal of above-ground installations and pipelines in accordance with applicable safety and environmental requirements. This challenge is part of the above-ground scope and addresses a specific issue.

During natural gas production, other substances from the deep subsurface are produced along with the gas, including mercury. Because these substances were separated from the natural gas for decades using gas treatment systems, the steel from these installations has become contaminated with mercury. After production has stopped, the treatment installations are thoroughly cleaned. However, for installation components containing mercury-contaminated steel, an additional approach is required. As a result, finding a new destination for reuse or processing by smelters is more complex than for regular steel scrap. NAM and Arcadis currently have a technically workable route for handling this steel through intensive cleaning. This route is feasible, but costly, and leads to additional secondary streams and transport movements.

Melting down mercury-contaminated steel is not straightforward. It is only possible if the facility has suitable flue gas treatment systems that can responsibly capture the mercury released during processing. In practice, this means that the logical circular route - returning steel to the smelter - is largely unavailable unless the material is first intensively pre-treated, resulting in high costs and long lead times. Processing outside the Netherlands may theoretically offer opportunities, but in practice it raises classification and permitting issues around export.



This brings a broader question to the table: are there responsible outlets for the reuse of steel containing more than 1 mg of mercury per kilogram of steel? A route in which the steel is simply reused elsewhere in its current form is not sufficient. For SITURN, it is essential that the material does not indirectly end up at a destination where there is insufficient visibility over its final application and long-term processing. The basic principle is that any solution must remain responsible and explainable throughout the entire lifecycle.

SITURN is therefore looking for a smarter processing route: an approach that is controllable, more scalable within the overall decommissioning programme, and offers prospects for circular use while preserving as much material value as possible. The focus is on realistic solutions that contribute to fewer secondary streams, less pressure on execution, greater preservation of material value and, ultimately, lower costs.

The challenge

How can mercury-contaminated steel from above-ground gas treatment installations be treated and reused in a circular, responsible and scalable way, while preserving as much material value as possible?

Call for solutions

SITURN is looking for solutions that contribute to a robust treatment and processing route for mercury-contaminated steel, with lower costs, shorter lead times, less wastewater and fewer transport movements, while preserving as much material value as possible. This challenge is part of a large-scale decommissioning operation in the Netherlands. At the same time, there is international interest in how the Netherlands is approaching this task. For promising solutions, this means there is not only potential within this challenge, but also broader opportunities for scaling. SITURN therefore warmly invites startups, scale-ups, innovative SMEs and specialised technology and processing companies to take part in this challenge. After the first selection round, the most promising candidates will be invited to meet the parties within SITURN and further explain their proposal. Register now via the application form.

Disclaimer

This challenge is a non-binding invitation to submit solutions and does not qualify as a procurement procedure. Participation does not create any entitlement to award, compensation or further collaboration. SITURN reserves the right to amend, suspend or terminate the challenge.

All intellectual property rights relating to submitted proposals remain with the submitting party, unless agreed otherwise in a separate agreement.

Assessment criteria

A strong solution for the SITURN innovation challenge should meet as many of the following criteria as possible.

1. Responsible and practically feasible. The solution is safe, manageable, controllable and practically applicable within the context of industrial decommissioning and the processing of mercury-contaminated steel. The approach fits the reality of planning, logistics, workability and collaboration across the chain.

2. Preservation of material value. The solution demonstrates how the value of the steel can be preserved as much as possible, for example through reuse, recovery or another high-value application.

3. Reduced pressure on the clean-up operation. The solution makes a substantial contribution to reducing costs, lead times, waste streams, transport movements and other secondary streams compared with the current approach.

4. Scalable. The solution should not only work for a single location or object, but should offer potential for broader application within the decommissioning programme.

5. Technological maturity and pilot pathway. The solution is at least at TRL 5 or can demonstrably reach this level in the short term. Submitting parties are expected to be able to carry out a lab pilot within 1 year and a field pilot within 2 years. Solutions without a concrete validation and implementation pathway are not eligible.

6. Chain responsibility. The solution makes it clear and controllable what happens to the material in the subsequent steps of the chain. Even in the case of processing or application outside the Netherlands, it must be clear how responsible use, reuse and eventual end-of-life handling are safeguarded.

7. Legally and permit-wise feasible. The submitting party must be able to substantiate how the proposed route fits within relevant laws and regulations for processing, transport and any cross-border steps.