



**MSc project: Optimisation techniques for the estimate of the capacity of a gas network**

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## **1 Introduction**

A gas network has a number of entry and exit points. Shippers independently contract the right to use the network on these points. Only at the time of actual use, the combination of entries and exits is known.

One of the questions is, if all possible future transport use by the shippers can be met. Gasunie has a strategy to handle this problem. This strategy is to select a small (around 50) number of severe realizations (these are called shipping variants) such that if the transport capacity is sufficient for these shipping variants it is possible to satisfy all realizations. In the near future Gasunie would like to base the current strategy on a firm mathematical basis.

Research questions in this project are:

- Which physical quantities, metrics and techniques should be used to find those transport conditions that determine the size of the infrastructure?
- Which techniques are available to sufficiently reduce the obtained set to find an exhaustive subset of which the elements are mutually exclusive, given a required accuracy?

In order to answer these questions mathematical optimisation tools are needed to maximise the load and minimise the number of scenarios, given that all transport paths from entry to exit need to be covered.

## **2 Schedule**

The student starts with a literature study in order to obtain knowledge on the background of the problem, enhance the students skills on optimisation tools and theory, and become familiar with the current strategy. At the end of the literature study a report is available which contains the relevant literature, refined research questions, and a list of test problems to be solved during the research period.

During the research period, the student applies the optimisation tools and theory on the test problems and if necessary invents and analyses new theory and tools. A close collaboration with Gasunie is necessary during this period. At the end a Master thesis and defence have to be delivered.

## **3 Further Information**

The location of the Master thesis work can be at the TU Delft or in Groningen. In the future a PhD position on this work becomes available. For further information please contact: [c.vuik@tudelft.nl](mailto:c.vuik@tudelft.nl)