

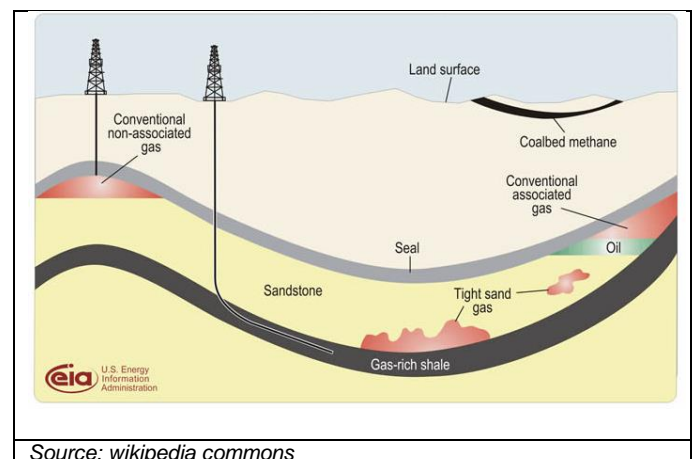
# Shale gas, difficulty in balancing risks and opportunities

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Should we or should we not drill for shale gas, a very difficult problem. If you have missed something, shale gas is natural gas that is extracted from shale, a rock. Here, large amounts of water, sand and chemicals are injected into the soil at high pressure<sup>1</sup>. There are countries in which drilling is already conducted and there are countries where permits have been granted recently. On the other hand, there are countries where the drilling is prohibited. Finally, there are countries where no decision has yet been taken and the Netherlands belong to these countries.

In order to drill for shale gas an investment decision is needed. In the capital-intensive sector those decisions are often taken after a net present value (NPV) calculation is made of the costs and benefits of the outcome of a project. This calculation is made relatively early in the preparation phase. Then a decision is made and the asset is designed and constructed. However, the NPV calculation does not take the value of delaying the investment into account. The problem is that during these preparations there are often large uncertainties on the benefits. An initial positive business case, in which the NPV method is applied, can ultimately be very negative after completion of the project with big disappointments as a result. We're going to look at the shale gas problem through the eyes of the real option theory and from there we derive lessons for the extraction of shale gas and asset management.



Source: wikipedia commons

With real option theory we can determine the value of an investment that takes the additional value of flexibility in decision making into account<sup>2</sup>. Flexibility has its price, but it can also have a (positive) value. When in the preparation and execution of capital projects phases are defined (eg like in Prince 2), then each phase is concluded with a decision point. That means a project can be cancelled half way and the project must therefore not be completed. This corresponds to a financial call option, the holder of the option has the right (but not the obligation) to purchase a share at a fixed price in the future. To emphasize this analogy, the investment opportunity is referred to as a 'real option'<sup>3 4</sup>. So big losses can be prevented when insights change or more information becomes available.

Everyone would agree that natural gas is no longer available sooner or later. However, there are different views about the solution to that problem. The Dutch Ministry of Economic Affairs wants to ensure that the Netherlands remains competitive in the long term and cheap energy in the form of shale gas is needed for this. However, the Environmental Movement and Greenpeace believe shale gas puts the development towards sustainable energy industry on hold. They also believe the risks to the

<sup>1</sup> <http://nl.wikipedia.org/wiki/Schaliegas>

<sup>2</sup> Real options: een reële optie? Vraaggesprek met Tjeu Blommaert en Stephan van den Broek. Tijdschrift Controlling, December 2010 (in Dutch)

<sup>3</sup> Strategische reële optietheorie in de praktijk: een voorbeeld uit de LCD industrie. Kuno J.M. Huisman en Peter M. Kort (in Dutch)

<sup>4</sup> [http://en.wikipedia.org/wiki/Real\\_options\\_valuation](http://en.wikipedia.org/wiki/Real_options_valuation)

environment and safety are too high, just like many people who live in areas where shale gas should be extracted<sup>5</sup>. Those risks are as yet uncertain.

Designers (not to mention the decision makers) should feel responsible for the consequences of their actions. To formally arrange this is already quite difficult in a political context. But that is not the biggest problem. If shale gas causes a problem to its environment, then the consequences could be enormous. There designers and decision makers may become liable, it however boils down to that the effects are ultimately passed onto others (health and environmental risks to those in the region and the financial impact on taxpayers). Which financial consequences are we talking about?

The Municipality of Boxtel is one of the municipalities where test drilling is under discussion, measuring almost 65 square kilometers. When we divide the GNP of the Netherlands (almost 770 billion euros) linearly over the surface of the Netherlands (41.000 square kilometers), Boxtel represents over 1 billion euros per year. When it all goes wrong and we lose 65 square kilometers, we pour a lot of money 'through the sewer' (or better: the gas pipe). Suppose that 10% of the area (6,5 km<sup>2</sup>) is lost and we estimate the gas revenues for Boxtel for 10 million euros per year, then the likelihood for failure has to be less than 1%. For a relatively experimental technique that likelihood might not be realistic. In addition, now and in the coming years we have still the Groningen natural gas available. The risk matrix of the Municipality of Boxtel<sup>6</sup> does not entirely satisfy the requirements for a risk matrix, but on such a matrix an incident with an effect of 1 billion per year would be 'unacceptable'. For Boxtel the annoying however, is the decision is taken in The Hague. Seen purely financial the Netherlands can afford a damage of 1 billion per year. Doing so?

Regarding the gas supply the Netherlands have no acute problem. We have plenty of Groningen gas in the coming years, even if the delivery is limited. This implies that we as the Netherlands have many years of time in which we can determine what the experiences in drilling in other countries are and whether there were negative effects. This can prevent irreversible problems. The Hague may use its power to decide this, and we as citizens have to swallow the rising gas price because there is less supply<sup>7</sup>. For the industry, it is annoying that there will be no expected revenue in the Netherlands, but then the industry could go somewhere else. That is simply a consequence of the market economy. Procrastination in this example seems a real option.

What can we learn for asset management? What we see in the case of shale gas is that we sometimes have the option to postpone potential negative effects associated with a measure. Then time can be bought in order to prevent irreversible problems. The value of the flexibility is the prevention of the potential trouble. In case of delay a possibility remains to take the measure in the future (to drill in this case) when it becomes clear that there are no negative consequences.

The question remains then how Hague can hold her back for the shale gas case? It's very simple. A solution could be by simply stating that the gas problem is solved for now.

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<sup>5</sup> Risks can be found here (in Dutch): <https://www.schaliegasvrij.nl/factsheet-schaliegas/>

<sup>6</sup> [https://www.boxtel.nl/fileadmin/DIGITAAL\\_LOKET/Wabo/Handhavingsbeleid2012-2014\\_risicomatrix.pdf](https://www.boxtel.nl/fileadmin/DIGITAAL_LOKET/Wabo/Handhavingsbeleid2012-2014_risicomatrix.pdf)

<sup>7</sup> This effect may be limited if more drilling is conducted in other countries