

Valuation of oil and gas reserves after SNA 2008/ESA 2010

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Outline

- Short history
- Changes as a result of SNA 2008 / ESA 2010
- Some reassessments of the method
- Results and sensitivity analysis of discount rates
- Conclusion

Short history

- Oil and gas reserves have been measured for some time
- Started with the government appropriation method
- Deemed too low, as it does not capture the full value of the reserves.
- As of 2008/2009 NPV method, based on ESA 1995. Main reasons were
 - i.) mfp and capital estimates for the mining and quarrying industry;
 - ii.) inclusion in environmental accounts and;
 - iii.) balance sheets for non financial assets.

Changes as a result of SNA 2008 / ESA 2010

- Revision of NA provided the basis for implementing changes in method of oil and gas reserves.
- Need to align requirements from SEEA-CF & SNA/ESA
- Four changes were implemented:
 1. Single year unit resource rent;
 2. Revaluations based on in situ price;
 3. Other items on the balance sheet based on the in situ price;
 4. All physical future extraction paths for gas taken from TNO (Dutch applied scientific research organisation).

Some reassessments of the method

- The adoption of SEEA-CF and SNA 2008/ ESA 2010 not only made changes, but also a reassessment of the method within SN was in order. Four items concerning the method were reassessed:
 1. The government (S.13) is the owner of the assets;
 2. Real discount rate is set at 4 percent;
 3. Dividing resource rent of oil and gas uses gross production as weights;
 4. UN framework (UNFC-2009) for the classification of reserves is adopted.

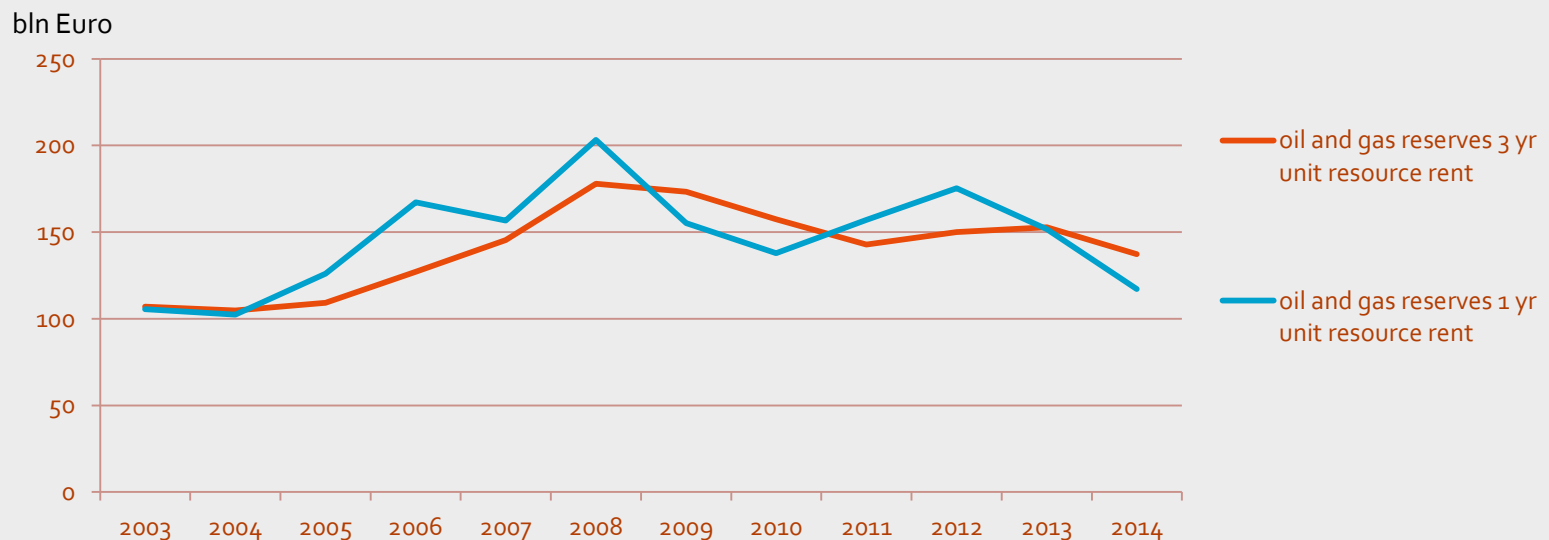
Results and sensitivity analysis

- Single year unit resource rent
 - More volatile than 3 year moving average;
 - Gives higher NPV for the period 2002-2014;
 - Correctly reflects changes in the resource rent;
 - Prevents the emergence of a negative net income when the value of physical extraction exceeds the resource rent.



Results and sensitivity analysis

- Single year unit resource rent vs. Three year moving average

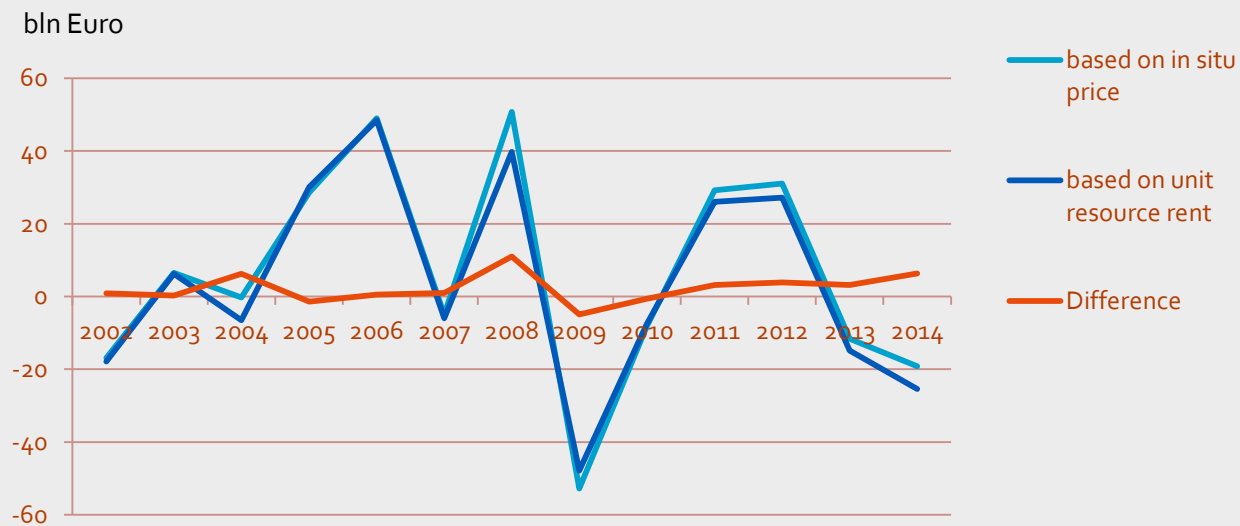


Results and sensitivity analysis

- Revaluations based on the in situ price
 - Used to be based on the unit resource rent
 - In situ price is the ratio between the physical and monetary stock
 - Now the monetary volume change follows the evolution of the physical quantity in the ground.

Results and sensitivity analysis

– Revaluations based on the in situ price



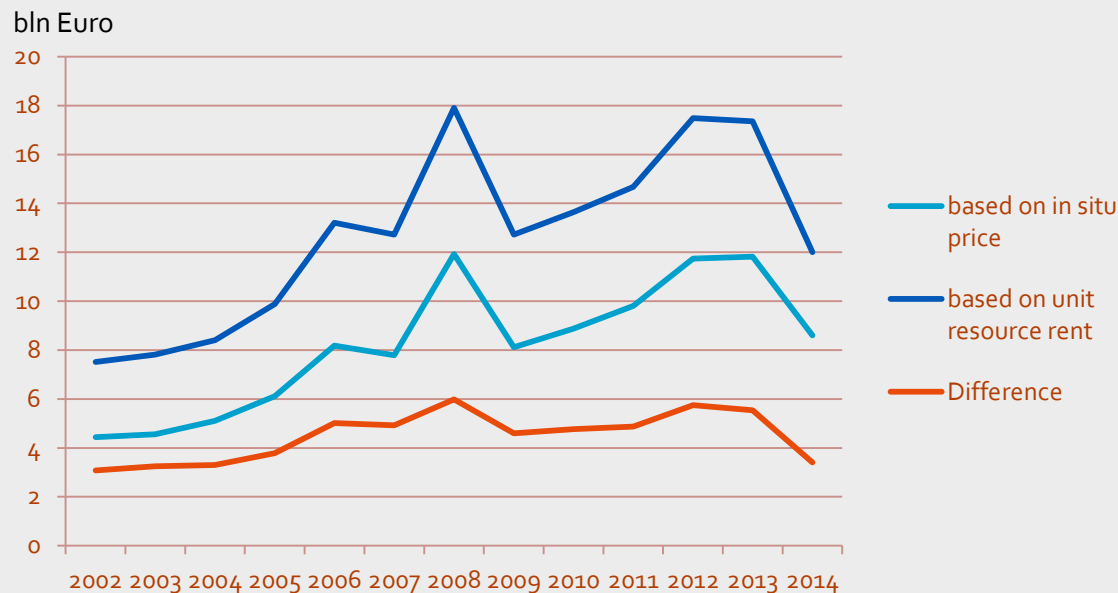
Results and sensitivity analysis

- Other items on the balance sheet based on the in situ price;
 - If the revaluations are based on the in situ price, so can the other items on the balance sheet.



Results and sensitivity analysis

- Other items on the balance sheet based on the in situ price; e.g. extractions:



Results and sensitivity analysis

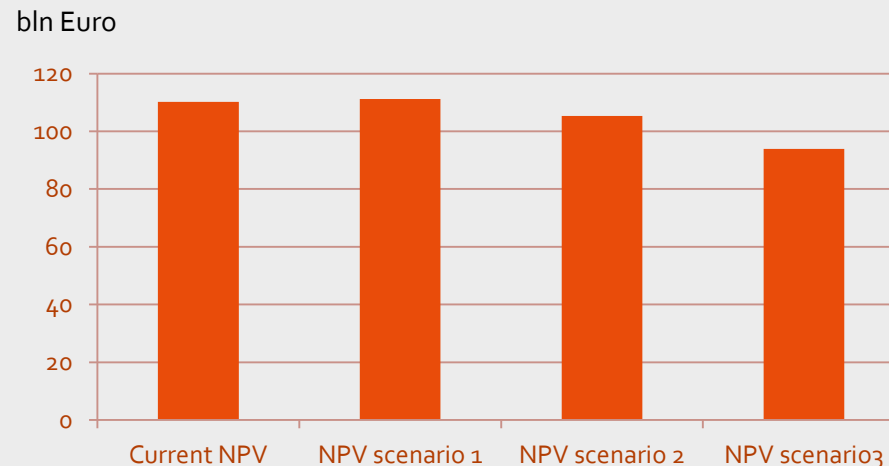
- All physical extraction paths taken from TNO.
 - Provides reliable and detailed information on the extraction of oil and natural gas.
 - If the path does not add up to exhaustion of the reserves, we add our own linearly declining path for the remainder.
 - A debate on the maximum threshold extraction level has started because of increase in the risk of earthquakes in Groningen.

Results and sensitivity analysis



Results and sensitivity analysis

- All physical extraction paths taken from TNO
- NPV of natural gas varies according to extraction ceiling for the Groningen accumulation set by ministry of Economic Affairs:

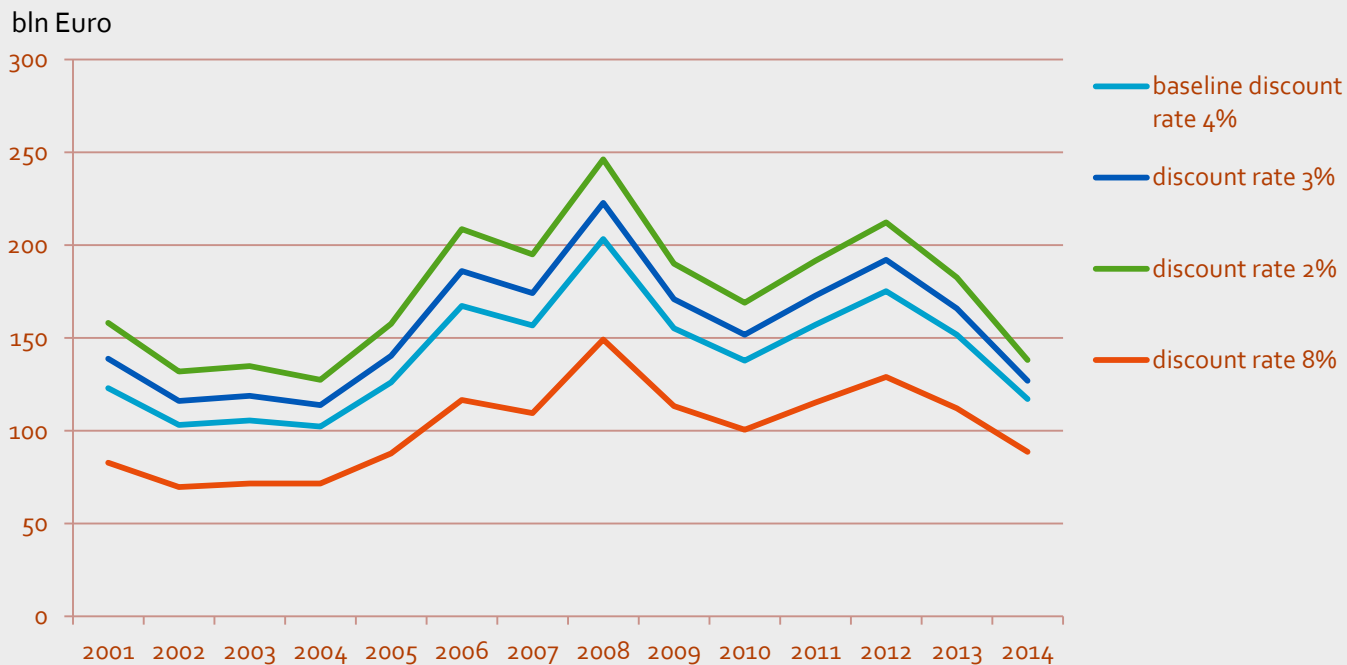


Results and sensitivity analysis

- Discount rate set at 4 percent
 - Other rates are possible and should preferably include the importance of future generations.
 - The bandwidth is between 2 and 8 percent.

Results and sensitivity analysis

– NPV at different discount rates



Concluding remarks

- Monetary and physical balance sheets are now aligned and consistent with both environmental accounts (SEEA-CF) and national accounts (SNA/ESA).
- Future research includes:
 - Include decommissioning costs of produced capital
 - Further research and change of the discount rate at next NA benchmark revision

Questions

- Questions?
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