

Quality assurance issues of the Yet to Find (YTF) resource-potential in mature petroleum provinces

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The Norwegian Petroleum Directorate (NPD) is a government institution responsible for maintaining a complete inventory of petroleum resources in Norway. This is done in accordance with established resource classification routines, regular reporting from the oil companies and NPD's geological mapping. NPD compile and publish annually figures on field reserves, contingent resources and YTF resources.

The main tool for assessment of YTF resources is stochastic play modelling. A play is defined as a geographically and stratigraphically delimited area where a group of prospects share specific set of geological factors such as reservoir rock, trap, and mature source rock and migrations paths. The most important data input to the play model is the estimate of size and number of petroleum prospects in each play.

After 40 years of exploration and production, parts of the Norwegian continental shelf can be described as mature petroleum provinces that are extensively explored and mapped. Despite this, there are remaining potential - even in well known areas - and new discoveries are still being made every year. However, the discoveries made are generally smaller and smaller. Norway pursues an active license policy with annual bid rounds in so called "Awards in Predefined Areas" (APA) that attract many oil companies and we see hard competition for acreage.

A huge effort is made by the oil companies to map and assess prospects. Certified prospect assessments are a prerequisite for obtaining new licenses from the authorities. For the licensees the market value of their acreage depends on the presence of viable prospects.

In addition to its own prospect mapping, NPD receives information from prospect mapping done by the oil companies through their license applications, in exploration committee meetings and by regular company reporting. The prospect data are entered into a GIS-database and is used by NPD as input to the play modelling which is the basis for the assessment of YTF volumes.

Over the last years, NPD has observed that for some areas NPD's database holds a population of prospects which in numbers, volumes and probability of discovery match poorly with the subsequent number of discoveries and declining discovery sizes obtained through exploration drilling. NPD updates the YTF estimates of the NCS on a bi-annually basis by use of a stochastic play assessment method. To fully capitalize on the statistical data from mature areas, and as a calibration of the standard play assessments, a Bayesian Discovery Process Modeling method centered on objective, probabilistic models of the petroleum discovery process has been used for three mature plays. This discovery-process model is built from assumptions that describe the manner in which hydrocarbon accumulations are discovered. Its principal premise is that discovery data are size biased: large deposits are more likely to be discovered early in the evolution of a play than are small fields. Assessments of the undiscovered resources can be made by understanding the nature of the bias and adding the capability to express the known geological play characteristics as prior distributions. Used together with standard prospect based play modeling, this integrated approach has allowed us to obtain a more reliable assessment of the YTF

resources in the mature plays, and represent a tool for quality control of the prospect endowment that are reported to government by the oil companies.

The results from different quality assurance methods that have been applied to validate the prospect information will be reviewed and discussed.