**Petoro AS Improves Simulation Speed for Complex Reservoir Modeling**

ECLIPSE software and remotely hosted, high-performance compute clusters aid Norwegian Continental Shelf studies

---

**CHALLENGE**

Sustain production of Norwegian Continental Shelf (NCS) hydrocarbons by optimizing development of existing producing assets; overcome resource and computing limitations to more efficiently perform ECLIPSE* simulations.

**SOLUTION**

Provide high-performance, remote computing capability; integrate new IBM blade cluster with ASP environment and simulation data; install the following components:

- ECLIPSE reservoir simulation software
- Petrel* seismic-to-simulation software
- 64-core, IBM blade cluster.

**RESULTS**

Gained access to the most powerful CPUs available for ECLIPSE via SIS remote hosting; significantly decreased turnaround time for all simulation models; improved ECLIPSE license equity and use.

---

"The new, faster solution helps Petoro reservoir engineers in their work with complex reservoir models. Having this solution delivered remotely minimizes our IT footprint and makes the technology even more attractive."

Asbjørn Voll
Senior Advisor
Petoro AS, Norway

---

Optimize development and production of existing fields

Petoro AS was established by the Ministry of Petroleum and Energy (MPE) on behalf of the Norwegian government in 2001, with the unique goal to manage the direct government stake in oil and gas reserves and developments on the NCS. Petoro is one of the biggest production license holders in many major NCS assets, including Troll, Snorre, Heidrun, and Gullfaks. However, Petoro faces constraints from not being an operator on any of its licenses and not having an organization or company budget for software or IT infrastructure that corresponds to the size and number of assets.

NCS operator companies typically have access to a large, high-performance computing infrastructure that enables them to perform numerous dynamic simulations in their quest for ultimate development scenarios and production optimization. While Petoro collaborates with these operating companies on jointly-owned production licenses, it does not have as many engineers as its partners and is constrained in terms of in-house computing resources and software technology.

With a recent decline in NCS oil production, the Norwegian government asked Petoro to play a more active role in the large mature fields and contribute to a better strategy for license groups to optimize the development and production of these fields. The task of optimizing production on existing assets requires analysis using static and dynamic models, as well as performing more simulations in less time.

---

*SIS remote hosting provided access to powerful CPUs for faster ECLIPSE simulation modeling.*
Remotely-hosted, high-performance compute clusters

First solution
In 2008, Petoro had its first experience using the Schlumberger Information Solutions (SIS) remotely-hosted, high-performance, compute clusters for quick simulation of ECLIPSE models. Complex simulations were needed for Snorre field within a short timeframe, for which SIS mobilized a cluster, hosted remotely by HP, located in Swindon, UK. Access to the service was provisioned by SIS in record time—less than 1 month—and was used by Petoro reservoir engineers for the next 3 months to perform approximately 150 simulations, enabling them to finish the Snorre project on time. Subsequently, discussions took place between SIS and Petoro to arrive at a similar solution housed at Petoro’s Stavanger location, on a more cost-effective basis, with even more computing power.

A more powerful solution
In May 2010, SIS installed a new, 64-core, IBM blade cluster in its Tananger office that would be used remotely by Petoro from its downtown Stavanger office. Extensive testing was performed before the hosting agreement was finalized. SIS reservoir engineers tested the performance of five simulation models provided by Petoro on the most advanced hardware available. This was done to give Petoro a strong business case for adopting this solution.

During this timeframe, SIS leveraged experience from a first-ever installation of an ECLIPSE cluster in Scandinavia that had been created for another client and was being hosted from the same SIS office in Tananger. These valuable lessons helped SIS to accurately budget and quickly execute the Petoro project—fully meeting client expectations.

Improved simulation efficiency
SIS remote hosting provided access to the most powerful CPUs available for ECLIPSE simulation modeling. Petoro’s simulation turnaround time was greatly reduced, for example, from 70 to 24 hours for a giant oil and gas field offshore Norway. Utilization of equity licenses was also improved via faster hardware that allowed licenses to be released more quickly to other simulations waiting in the queue. Overall, Petoro was empowered to run more simulations per month using the same pool of core ECLIPSE licenses.

This solution has led to other Petoro initiatives of a similar nature, including a system that is already in use and receiving compliments by staff reservoir engineers, at both Petoro and Schlumberger.

Furthermore, a joint study of Heidrun field offshore Norway was launched in 2010, by Schlumberger Data & Consulting Services (DCS) and Petoro engineers. This project required many simulations of the reservoir model to improve its history match using 4D seismic data and, therefore, benefitted from a new, higher-performing simulation cluster that helped maintain the team’s timeline. A multiple realization approach—versus traditional history matching methods—enabled them to significantly improve the history matching to production data—providing additional production targets.

Also during 2010, SIS deployed three remotely-hosted simulation HPC clusters, for three other Norwegian clients, from one server room in the Schlumberger R3 building in Stavanger. In the future, SIS plans to build on its ECLIPSE cluster-hosting experience and expand the solution to provide more flexibility and more computing power needed by ever-growing operator companies in the NCS region.

Schlumberger Information Solutions
Schlumberger Information Solutions (SIS) is an operating unit of Schlumberger that provides software, information management, IT, and related services. SIS collaborates closely with oil and gas companies to solve today’s tough reservoir challenges with an open business approach and comprehensive solution deployment. Through our technologies and services, oil and gas companies empower their people to improve business performance by reducing exploration and development risk and optimizing operational efficiencies.

E-mail sisinfo@slb.com or contact your local Schlumberger representative to learn more.