Unconventional Resources Potential in Continental Europe - Prospects and Developments

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Continental Europe has recently seen a true boom in exploration efforts for unconventional resources. New prospective acreage is being pursued vigorously not only by new small independents but also by majors. Studies attesting the quality of the reservoirs are being carried out in several countries and field operations are on the rise.

Activities targeting shale gas and coalbed methane (CBM) potential have started in Austria, Belgium, Bulgaria, France, Germany, Italy, Poland, Romania, Spain, Sweden and Switzerland. Shale oil operations are underway in France and a heavy oil project is in progress in Albania. An important tight sandstone gas (or basin-centered gas) project has been pursued for several years in Hungary. The occurrence of tar sands is known from southern Albania. In Estonia, oil shales have been mined for decades and they still provide for most of the electrical power production.

The main players in unconventional resource exploration in Europe are ExxonMobil and ConocoPhillips, followed by smaller operators Toreador, BNK Petroleum, Composite Energy, EurEnergy, Lane Energy, San Leon, Schueppbach. Other companies, like Marathon and Total, are applying for acreage to initiate exploration, or assess the resources (OMV).

In our study, we show the current licensing situation and the known operations related to unconventional resources in the European countries, and we discuss the potential future developments.

In Albania, a heavy oil rehabilitation project on the country’s largest field Patos-Marinza was initiated in 2002 by the Premier-led Anglo-Albanian joint venture. It was taken over by Bankers Petroleum in 2006. Both operators have carried out work including work-over of the old Albpetrol wells as well as the drilling of new vertical and horizontal wells. Cotraser (Canada) is applying for a reconnaissance (non-exclusive) permit covering the Selenice asphalt/bitumen accumulation in southern Albania.

In Austria, OMV conducted in 2008 a research project assessing shale series below the Vienna Basin. The project has proven the existence of a substantial resource potential within the marly series (Mergelsteinserie) covering an area of approximately 400 sq km. OMV estimates the resource potential of this, on average 1,000 m thick, series to be some 200-300 Tcf. It is to be noted that these series occur at depths of 4,500-6,500 m.

In Belgium, the Benelux JV (European Gas 50%, Transcor Astra Group 50%) has an application filed since late 2008 for the exploration permit Hainaut and production concession Anderlues et Peronnes in Wallonia, in the Northern Coal Basin (Nord Pas de Calais Basin). The exploration target in this area, which has been historically an important coal mining region, is CBM and CMM.

In Bulgaria, the US-based company CBM Energy holds since 2000 a CBM prospecting and exploration permit 21 DCB Dobrudzha in the Dobrudzha Coal Basin in north-eastern Bulgaria. So far, one well, Vranino 1, was completed in 2006 and two more wells are planned.

In France, licensing for acreage with unconventional resource potential has been very busy since 2006 (Fig. 1). European Gas is the most important player in CBM exploration having permits or applications in several basins: Northern Coal Basin (Desiree, Poissonniere, Sud Midi and Valenciennois blocks), Vosges Greuses Plateau (the Bleue Lorraine and Lorraine blocks), Languedoc-Provence Basin (Gaz de Gardanne block), Jura Foldbelt (Lons-le-Saunier block) and in the Saint Etienne Basin (Gaz de Saint-Etienne block). In the Bleue Lorraine permit, the company has drilled two successful CBM wells, stratigraphic test Folschviller 1 in 2006 and Folschviller 2 in 2008.
Companies searching for shale gas are East Paris Petroleum Development holding the Moselle permit (Paris Basin/Vosges Greseuses Plateau), Total with the Montelimar application, Cevennes Petroleum Development applying for the Cevennes block, and Schuepbach applying for the Ales and Brignoles blocks (all in the Languedoc-Provence Basin). Schuepbach also has the Lyon-Annecy application (Molasse Basin/Bresse-Valence Basin).

Targeting tight sandstone gas, Queensland Gas (Australia) has an application for the Provence exploration permit (Languedoc-Provence Basin).

Shale oil in the Paris Basin is the main objective of Toreador Energy (Leudon-en-Brie and Nogent-sur-Seine permits, Chateau-Thierry, Coulommiers, Nangis applications).

In Germany, ExxonMobil has started a program to prove the shale gas potential within the Mesozoic series in the area of Niedersachsen in northern Germany. Three wells were drilled during 2008 and stimulated to assess the output. If commercial, the project would open a new, Posidonia shale gas play, likely the first successful such project outside of the USA. Coalbed gas production in Germany comes from the traditional coal-mining region, the Ruhr area in north-western Germany, where operator RAG Iberbuhren is capturing the expelled sorbed gas.

In Hungary, the activities on the unconventional scene are, since 2005, dominated by attempts to unlock resource potential within a yet-to-be commercially proven play known as the “basin-centered gas accumulation” (BCGA). The concept involves the Miocene high pressure - high temperature sandstone series of the Endrod, Algyo and Szolnok formations in the Szeged Sub-basin, Pannonian Basin, in south-eastern Hungary (Fig. 2). The play was initially pursued by the Canada-based Falcon Oil & Gas that in late 2007 concluded the first phase of operations and submitted a testing/completion program for three out of six drilled wells. The resource potential is estimated at least at 20 Tcf at 4-6 km depth. This has encouraged ExxonMobil to acquire operatorship in Falcon’s project in April 2008, with domestic MOL joining the group.
Subsequently, the ExxonMobil/MOL group drilled wells Mindszent 3 in the Mindszent permit (in late 2008) and Hodmezovasarhely 1 in the Szegedi-Medence block (spring 2009), while the ExxonMobil/MOL/Falcon group drilled the Földeák 1 well in the joint Mako Trough Production License (spring 2009). All three wells have reached the projected total depths (4,100-4,400 m) and started testing. The industry awaits the results with much interest.

The presence of similar sedimentary series within the different tectonic units of the prolific Pannonian Basin, e.g. Bekes, Bihar, Somogy-Drava and Zala sub-basins, prompted a few other operators to examine the BCGA model. Since May 2009, the Hungarian Horizon/ExxonMobil group has been drilling the Gyula 1 well (Bihar Sub-basin in eastern Hungary), while Toreador drilled and initially tested the Balatoszallas Eszak 1 well in the Tompa block (Kiskunhallas Trough in southern Hungary). Also MOL is studying unconventional potential of its acreage; promising areas are seen in the “Derecske Basin” (Bihar Sub-basin in eastern Hungary), in the Zala Sub-basin in the west and in the Somogy-Drava Sub-basin in the southwest. Activities in the latter two regions could involve joint-operations with Ascent Resources and INA of Croatia, respectively.

In Italy, the Fiume Bruna CBM project is being pursued in the Northern Apennines (Tuscany) by Independent Energy Solutions (Italy) since 2006, when the company drilled the Fiume Bruna stratigraphic test confirming the existence of coal seams. In summer 2009, the company drilled the first CBM exploration well Fiume Bruna 1, which missed the target because of faulting. It will be sidetracked once the results of a new seismic survey are evaluated. Up to eight appraisal wells may follow to be put on long-term production tests to determine the gas production capacity and water flow rates from the coal.

In Poland, the main areas of interest for shale gas exploration are located in the northern and central-eastern parts of the country (Baltic Depression and Lublin Trough, respectively) (Fig. 3). In both cases, the target series are in the Silurian. The Lane Energy/ConocoPhillips group, BNK Petroleum, EurEnergy and San Leon are the key acreage holders in the northern sector, while ExxonMobil and EurEnergy operate in eastern Poland; Marathon has also applied for acreage in this area. The areas in eastern and southern Poland - Lublin Trough and Upper Silesian Coal Basin, respectively - contain CBM targets related to the presence of Carboniferous coal. Composite Energy, EurEnergy and a few small domestic operators, like CH4, MethanelPolTex, hold acreage there.
In Switzerland, a small US-based operator Schuepbach acquired two concessions to attest the possibility of producing gas from the Mesozoic series present in the Molasse Basin. In August 2009, the company entered into an agreement with Ascent Resources to analyze the potential of another block.

It is worth noting that while the production from shale gas and CBM reservoirs in the US represents an important portion of the overall gas output (3 Tcf per year; 15%), the commerciality of similar projects in Europe has yet to be proven.

Although unlocking oil and gas from unconventional reservoirs has proven to be a costly undertaking, it is believed to be viable. Europe is a prime target for the development of unconventional resources for various reasons: it is a politically stable region, it has petroleum legislation in place, large population and market, existing infrastructure, increasing oil and gas demand, and stable gas prices and market fundamentals.