

Exploring for unlocked subsurface potential by integration of historic and modern data: the case of a forgotten Flysch reservoir within the Vienna Basin (Austria) discovered almost a century ago

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The Vienna Basin represents an excellent subsurface laboratory how to integrate modern and historic data to support conventional hydrocarbon development and to de-risk alternative energy applications. In an area of existing (sub)surface infrastructure an example is given how to increase the value of brown fields by integration of historic and modern data. Optimized use of infrastructure and the increase of recovery factors result in an environmentally sensitive redevelopment approach by keeping mature hydrocarbon fields active and accessible for future energy solutions.

The Flysch is composed of several 1000 meters of sand and shale interbeds with a more than 300 m thick section of proven hydrocarbons. Compartments are, however, isolated, and small. The discovery dates back to 1929. More than 50 MMbbl of oil were produced since then. Nevertheless, recent work indicates bypassed oil which can be extracted by comparatively simple, onshore wells less than 1500 m TVDss deep. A well drilled in 2018, produced almost pure oil for more than a year and confirmed that regardless of the well location close to prolific wells, economic oil production is still achievable.

The reservoir was neglected due to:

- Its complexity as a dual porosity reservoir with an extremely low matrix permeability. The nearby Matzen Field is a less complex reservoir and could more easily attract investments.
- The peak development time of the reservoir was in the first half of the century: Technology to produce such a reservoir was not yet developed.

As it is barely economic to collect data in the latest stage of brown fields optimized usage of existing data by integration of modern and historic data sets is crucial. More than 700 wells were drilled into the reservoir and data situation per well ranges from simple self-potential logs or hand-written reports to modern core-calibrated logs. Recently, the historic data sets were re-interpreted and integrated with locally present high-quality data to refine existing models. Available 3D seismic was likewise used for well placement, as notes from historic reports.

The reservoir remains challenging, but good reasons exist that economic value is high. An economic review in 2021 resulted in the initiation of a phased redevelopment plan.

It remains challenging to:

- 1) Overcome drilling risk caused by adjacent depleted and over-pressured compartments.
- 2) Minimize formation damage.
- 3) Plan wells in a structurally complex area with poor seismic images.
- 4) Locate areas with open fractures and how to orient the wells.

Economic enablers are:

- 1) Moderate drilling costs.
- 2) Latest reservoir insights such as pressure data from active wells.

3) Close-by outcrop data of the same formation.

The integration of modern and historic data supports the success of wells in an area with infrastructure being present. Whilst the application of modern technologies can increase productivity, artificial intelligence or campaign drilling can compensate the overall reservoir risk.