

Executive Summary

Valuing Barrels of Oil Equivalent

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Many petroleum properties contain both oil and gas. Few companies produce one without the other. Because these minerals occur so frequently together, it has become standard practice to report combined volumes in terms of “barrels of oil equivalent,” a traditional measure that aggregates the two on the basis of relative thermal content. By this convention, each barrel of oil is usually counted as equivalent to 6 MCF (thousand cubic feet) of gas. This type of aggregation is routine among upstream petroleum companies as well as the financial analysts who follow them. The problem is that market values are not determined by thermal equivalence.

It is well known that BOE reporting may distort the valuation of upstream assets and operations. John Brown, former CEO of British Petroleum, railed against the practice, claiming that “We don’t help ourselves as an industry by talking about barrels of oil equivalent. No such thing exists.” Writing in 2004, Adelman and Watkins concluded that aggregation by thermal equivalence tended to overstate the cost of reserve additions by roughly 10%. The problem may be larger now, because oil and gas prices have continued to diverge even further from thermal equivalence. As a consequence, one BOE of “oily” reserves is worth many BOE of “gassy” reserves. Likewise, a dollar spent to find and develop one BOE of oily reserves is a better investment than a dollar spent to find and develop one BOE of gassy reserves.

We address, and attempt to correct, two specific types of misinformation that result when BOE accounting is employed to calculate or report the value of oil and gas reserves. The first has to do with the valuation of oil and gas reserves deduced from reported transactions, like corporate mergers and similar upstream acquisitions. The second pertains to the faulty corporate benchmarking that results when BOE accounting is used to rank the comparative performance and efficiency of companies. We propose an alternative approach that is simple and which produces alternative valuations and rankings that are relatively free from distortions created by the fiction of thermal equivalence. We demonstrate the proposed method using recent industry data that illustrate the extent to which calculations based on thermal equivalence distort reality.

The joint occurrence of oil and gas unavoidably complicates the valuation of upstream properties. The traditional solution, which combines joint products in terms of equivalent barrels, has the advantage of being objective and simple. This is an important consideration in the realm of financial reporting, where it is required that all parties play by a common set of rules. It does, however, impart a significant bias to estimates of value, cost, and profitability if “equivalence” is not defined in terms that are economically meaningful. Thermal equivalents are not economically meaningful. As we demonstrate, they represent a substantial and avoidable source of bias.