

The implications of the declining energy return on investment of oil production

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Abstract

Declining production from conventional oil resources has initiated a global transition to unconventional oil, such as tar sands. Unconventional oil is generally harder to extract than conventional oil and is expected to have a (much) lower energy return on (energy) investment (EROI). Recently, there has been a surge in publications estimating the EROI of a number of different sources of oil, and others relating EROI to long-term economic growth, profitability and oil prices. The following points seem clear from a review of the literature: (i) the EROI of global oil production is roughly 17 and declining, while that for the USA is 11 and declining; (ii) the EROI of ultra-deep-water oil and oil sands is below 10; (iii) the relation between the EROI and the price of oil is inverse and exponential; (iv) as EROI declines below 10, a point is reached when the relation between EROI and price becomes highly nonlinear; and (v) the minimum oil price needed to increase the oil supply in the near term is at levels consistent with levels that have induced past economic recessions. From these points, I conclude that, as the EROI of the average barrel of oil declines, long-term economic growth will become harder to achieve and come at an increasingly higher financial, energetic and environmental cost.

Keywords: [energy return on \(energy\) investment](#), [net energy](#), [economic growth](#), [oil](#)

Subjects: [energy](#), [engineering and technology](#), [engineering geology](#), [power and energy systems](#)

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