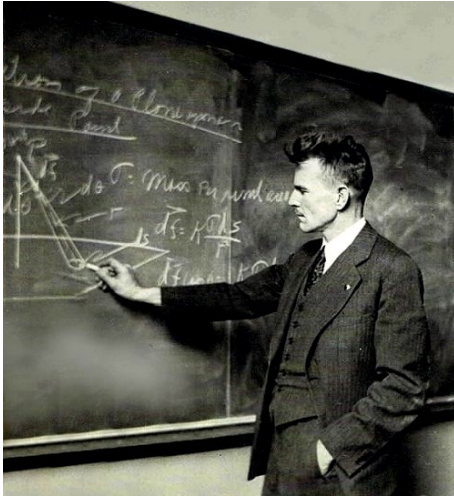


Piper Alpha and Independence



Marion King Hubbert (1903 – 1989)



Piper Alpha (6 July 1988)

“It would be a second Piper Alpha tragedy for Scotland if its historical effect on oil production has not been adequately acknowledged, thereby resulting in a major overestimate of Scotland’s future economic wealth by the Yes campaign. Following Piper Alpha, oil production was deliberately cut back in order to allow the installation of new safety measures. As a result UK peak oil was delayed by 10 years. Once due allowance is made for the Piper Alpha effect, UK oil (42 billion barrels produced to date) is seen to be a sharply dwindling resource. In brief, production began in 1975 (with great fanfare), peaked in 1999 (2.8 million barrels per day), currently is declining fast (no fanfare), and by 2025 will have almost completely petered out. Oil trajectories following such peaked (bell-shaped or Hubbert) curves are found to be excellent forecasters for scores of oil and gas fields from all around the world. There is no reason to suppose that a Hubbert-type projection is not the best available for making a candid and straightforward assessment of Scotland’s likely remaining oil wealth (including new finds). The Hubbert production forecast (after adjustment for Piper Alpha) is in close agreement with BP’s estimate of UK reserves of 4.3 billion barrels (BP Statistical Review of World Energy, 2014). Both are vastly below the White Paper’s claim of 24 billion.”

[Full version of letter submitted to The Scotsman, 31 Aug 2014]

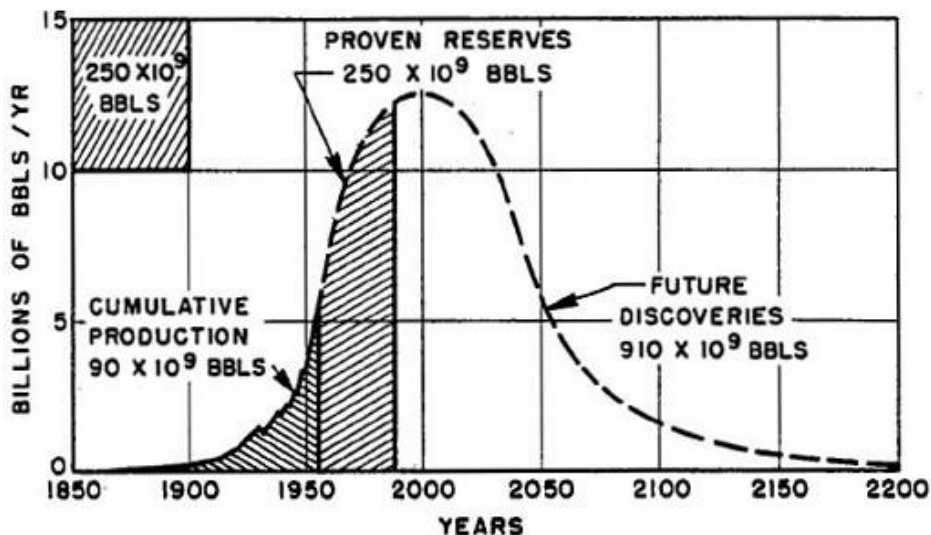


Fig 1. Hubbert’s curve.

Figure 1 is Hubbert's remarkable 1956 global prognosis in which he “*places the date of peak at about the year 2000*”. Inevitably his predictions were derided at the time, but in retrospect have proved to be exceptionally resilient. Hubbert worked at the Shell research lab in Houston, Texas as an oil-analyst. Hubbert's method has been found to also apply to individual oil and gas basins, and to separate countries as well as to the world as a whole. Turning to Scotland's future economic wealth - What does a Hubbert projection show?

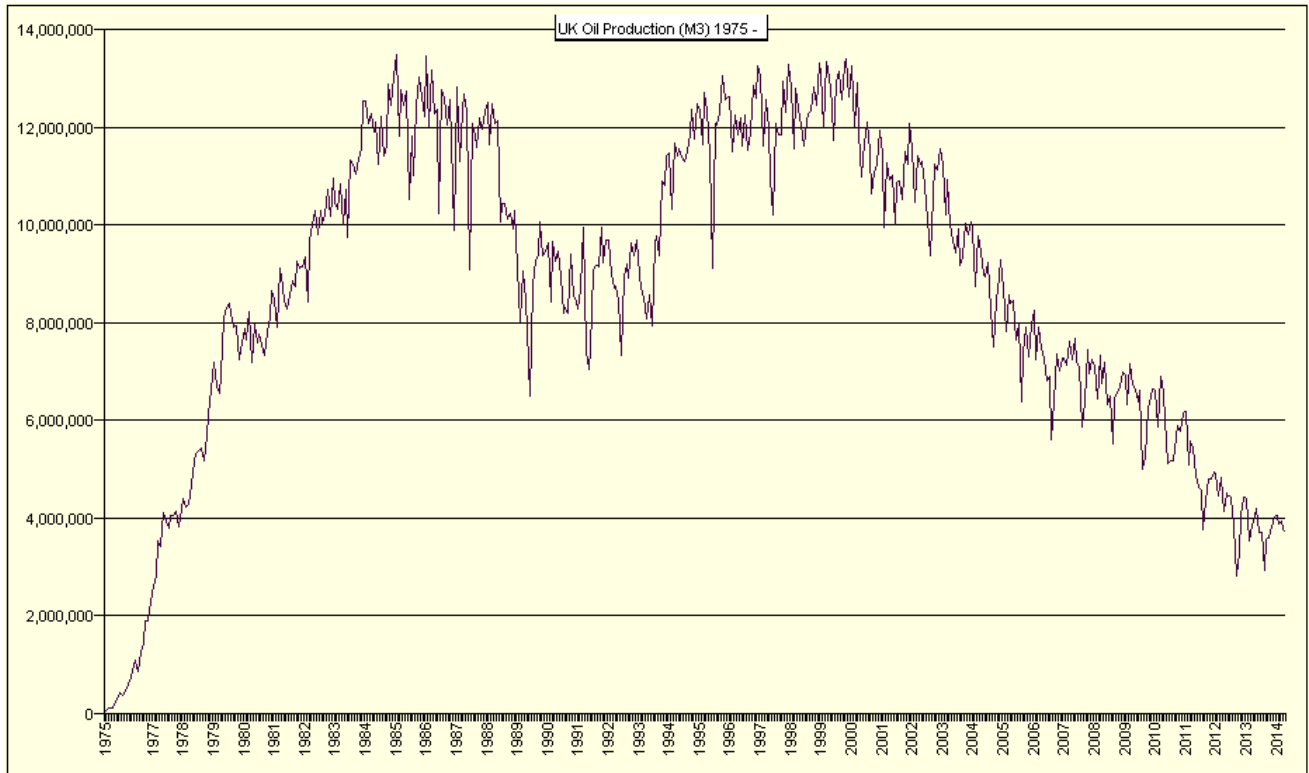


Fig. 2. UK oil production (DECC)

Figure 2 is the key diagram. It charts the pattern of past UK oil production from the very start of the North Sea era (1975) to the present day (2014). At first sight, with its two humps (like those of a Bactrian camel) and very spikey appearance, it does not look very Hubbert like. However cursory glances can be deceptive and the apparent mismatch is easily explained. First, the sharp drop in 1988 was predominantly caused by Piper Alpha. Secondly, the annual (saw-toothed) minima correspond to planned down-time regimes for yearly maintenance. Once allowance is made for the Piper Alpha and maintenance effects UK oil production is seen to conform to the standard Hubbert pattern (of a single bell-shaped curve). Monthly oil production reached 13.5×10^6 m³ (84.9 million barrels) in January 1985. However the highest annual production occurred, after the Piper Alpha disaster, in 1999 when offshore oil production topped 407×10^6 m³ (398 million barrels). Ever since the 1999 peak there has been a dramatic year-on-year decline in oil production. Proven plus probable reserves have been in decline for even longer (since 1994). What does all this hold for the future?

Clark and Thompson (Plant Ecology & Diversity, Volume 4, Issue 2-3, 2011) provide computer R-code for statistically fitting a Hubbert-like skew-normal curve to count data, such as barrels of oil (or numbers of flowers). Their skew-normal statistical fit reveals, as does a simple visual analysis, that the Hubbert trend is ever downwards, and that the Hubbert tail will have almost completely petered out by 2025. Over 42 billion barrels of oil (the area under the curve of Fig 2) have already

been produced from the UK continental shelf. The Hubbert projection indicates a further 5 - 7 billion barrels could be produced. This is well below that championed by the Yes campaign, in which oil continues flowing until 2050; and which would involve production climbing back to a high of comparable magnitude to the peaks of the 1980s and 1990s. But it is not dissimilar to BP's estimate which puts UK oil reserves at only 3 billion barrels, and UK gas at 0.2 trillion m³ (i.e. 1.3 billion boe). (See BP Statistical Review of World Energy, 2014).

The story for gas, over the last two decades, is comparable to that for oil (Figure 3). Gas production peaked in 2000 and it too has since undergone an unremitting decline. Production of both oil and gas has fallen so low that the UK is now a net importer of oil and gas.

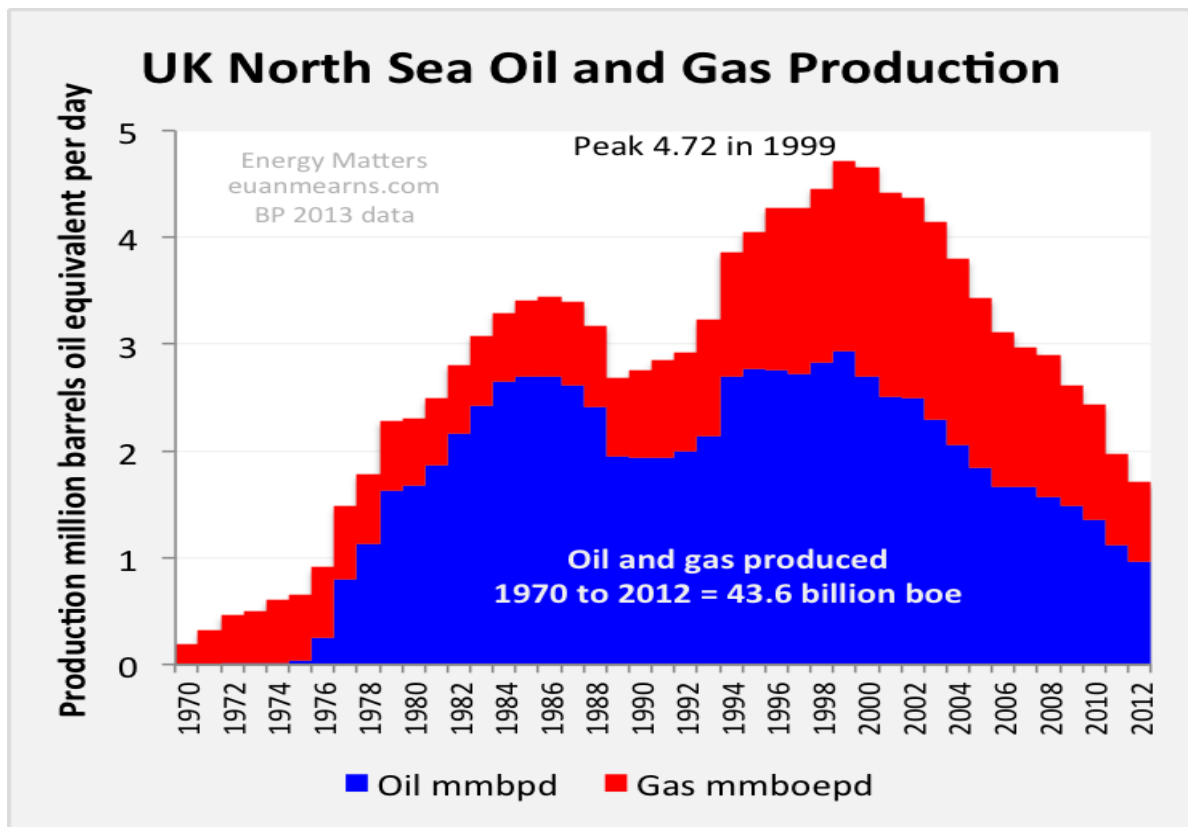


Fig. 3. The history of UK oil and gas production (data from BP statistical review of world energy).

Optimists will argue that there are some projects that will arrest the decline. These claims range from the quite extraordinary “*The biggest oil-field in the world lies to the west of Lewis*” (See ‘The Real State of Scotland’s Oil and Gas Reserves’ by Bellacaledonia), to the more nuanced Statoil Mariner project equivalents, or the un-mothballing of projects abandoned because of rising operating costs (e.g. Bressay & Rosebank to name but two). Donald Rumsfeld’s memorable words “*There are no knowns. There are things we know that we know. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. There are things we do not know we don't know.*” spring to mind. The Hubbert approach cuts through the thorny problem of unknowns. It does this by treating the recent past as our most direct and most candid guide to the future. In essence it uses past rates of oil discovery, and the previous tempo at which reserves have been brought into production, to make a clear-cut and explicit projection of future oil production, and hence of the tax-wealth that will be available to a new Scottish Nation. Sadly as Figure 3 dramatically shows, once the Piper Alpha effect on oil and gas production is acknowledged, UK oil and gas resources are seen to be fast running out.