

# The Oil Age in West Cork

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Oil and gas are finite natural resources formed in the geological past, which means that they are subject to depletion. This is a critical subject for the world, and indeed for the survival of *Homo sapiens*. It remains to be seen if he will be as wise as his name implies in addressing the issue to avoid extinction, the fate of many species in the geological past when they exhausted the resources of the niche in which they lived. Every region, including West Cork, needs to prepare for the unfolding situation.

## **An Historical Outline**

In earlier years, the people of West Cork relied on the energy coming from their muscles and those of their draught animals, supplemented by a little wood and turf from the hills with which to cook and heat their homes. It was not plain sailing as bad weather could damage a harvest, causing hunger. The potato was introduced into Europe from the Americas in the Middle Ages and became a particularly vital crop for the people of Ireland, supporting each community including West Cork. But in the middle of the 19th Century it was struck by *Phytophthora infestans*, a blight that caused a devastating famine. The country's population fell by death and emigration from its maximum of almost 8 million in 1845 to less than 5 million in 1900. Fortunately, it has barely grown since, despite some immigration pressures.

By chance, this famine only slightly preceded the discovery of commercial oilfields, especially in Pennsylvania and on the shores of the Caspian. Oil provided a radical new source of energy ushering in the so-called *Oil Age* that changed the world in remarkable ways. At first, it was used as a fuel for lamps adding an evening to the working day for many people, but then in the 1860s came the *Internal Combustion Engine* when a way was found to inject the fuel directly into the cylinder of an engine, making it much more efficient. The first automobile took to the road in 1882, and the first tractor ploughed a field in 1907. This is not as long ago as it might seem having been witnessed by the father of an old man living today. These developments led to the rapid expansion of manufacturing, transport and trade allowing the world population to grow seven-fold during the *First Half of the Oil Age*. Agriculture became very dependent on this new fuel having been recently described as a process that turns oil into food.

Ireland, then part of the United Kingdom, whose very name implies that it was made up of different factions, lacked sufficient coal deposits to support early industry, and largely remained a country of peasant farmers working land owned by privileged landlords. The famine increased a sense of resentment, especially as food continued to be exported, prompting the people to seek greater independence. These pressures culminated with the establishment of the so-called Free State in 1922, although the province of Ulster, which had been largely settled by immigrants from Scotland in earlier years, was excluded.

The world has enjoyed an epoch of economic growth over the past century, although suffering from two devastating world wars. Germany had previously been made up of small duchies and principalities but the *Industrial Revolution* led to unification and the quest for a trading empire to rival that of Britain.

The growth of trade was accompanied by the rapid development of the financial system, as banks came to lend more than they had on deposit confident that *Tomorrow's Growth* was collateral for *Today's Debt*. The United States emerged after the Second World War as the premier world power. The dollar became the principal currency for world trade which delivered a handsome reward. Previous empires had accepted some responsibility for the territories they controlled but the US concentrated on finance and commerce. Prosperity also came to Ireland, partly encouraged by the tax treatment of foreign companies, and culminated at the end of the last century with the boom of the so-called *Celtic Tiger*.

The *First Half* of the *Oil Age* was an epoch of general prosperity. Even remote villages in West Cork are choked with traffic, while the sky above is cut by vapour trails from airliners crossing the Atlantic, all such transport using oil for fuel. A culture of consumerism developed, with shops selling everything from high-heeled shoes and bow ties to corn flakes. Supermarkets and chain stores took the place of village markets. Although wealth was unevenly distributed, most people assumed that their circumstances would progressively improve in the years to come. While there were many scientific and technological achievements, the underlying driver of this chapter of history was oil-based energy. As even some economists now come to recognise, it is energy not money that drives economic growth.

## **The Status of Oil and Gas Depletion**

Oil and gas from surface seepages have been known since Biblical times, having been used to caulk boats, but the opening of the first oilfields in the 1860s led to the rapid growth of the oil industry with impressive scientific and technological progress over the past century. The origin of oil came to be understood. In fact, the people of West Cork are well placed to understand the circumstances by viewing Lough Hyne. It is a stagnant pool of water linked by a narrow passage to the sea allowing marine life to enter. In the summer, the surface waters heat up and circulation falls. Anoxic conditions develop at depth such that algae and other organic remains are not oxidized.

The bulk of world supply comes from two epochs of global warming around 90 and 150 million years ago when such stagnant lakes and seas formed where continents moved apart on the back of deep-seated convection currents in the Earth's crust. The compacted organic material, known as *kerogen*, lying on the floor of the lakes and seas was in turn buried below sands and clays washed in from adjoining lands. When buried to depth of about 3000 meters it was heated enough to be converted into oil. Gas was formed in a similar way but from more carbonaceous material as found in the deltas of tropical rivers, and also from the breakdown of oil that was overheated by deep burial. Once formed, the oil and gas migrated upwards to zones of lesser pressure, provided that there were fissures or permeable rocks through which to move. Some oil escaped at the surface, where it was degraded, with the tar sands of Canada being a well known example, but some was trapped in dome-like geological

structures provided that they contained a porous and permeable rock, such as sandstone, to act as a reservoir, and were also sealed by a layer of overlying clay or salt.

Much of the world's oil was found by geologists mapping remote areas with technology no more advanced than a hammer and hand lens, but later came geophysics whereby an explosive charge was released and recorders measured the time taken for echoes to return from deeply buried rock surfaces, which could then be mapped in detail allowing smaller and more subtle traps to be identified. Geochemistry too provided new detailed knowledge of the origin of oil, as outlined above.

Once a prospect was identified, it had to be tested by an exploration borehole, known as a *wildcat*. If successful, the new oilfield was developed by closely spaced producing wells and connected by pipeline, all of which involved massive investment. For obvious reasons, the more prospective, accessible and profitable areas were exploited first. As the onshore possibilities dwindled, the industry turned its attention offshore, even into deep water. While oceans cover much of the Planet's surface, relatively few areas beneath them have the right geological conditions to deliver.

A major discovery in 1908 in the foothills of the Zagros Mountains of Iran opened up the area around the Persian Gulf. It proved to be the most prolific oil province, holding almost 40% of the world's conventional oil. In earlier years, the industry was dominated by seven major international oil companies, but national State-owned companies later took dominant positions in most of the principal producing countries.

For Europe, the northern North Sea between the UK and Norway was found in the 1960s to contain a rich belt of effective oil source-rock, laid down around 150 million years ago. The peak of oil discovery in 1974 was followed by a corresponding peak of production in 1999 at 6 Mb/d (million barrels a day) which has since fallen to 2.5 Mb/d, being set to continue to decline at about 5% a year. One barrel contains 36 UK gallons. Ireland is not well endowed, lacking this prime oil source-rock, although a number of small finds, fed by less effective sources, have been made. The Corrib Field, off County Mayo, even contains gas derived from the breakdown of deeply buried coal deposits.

World discovery peaked in 1964 and delivered a corresponding peak of production of *Regular conventional oil* in 2005. This in turn prompted the industry to turn to ever more difficult sources, which have much

lower net energy yields. A debate rages as to the precise date of the peak production of all categories of oil, which is imminent, but misses the point when what matters is the vision of the long decline on the other side of it. The difficulties in assessing the position arise because there is no standard classification of the various categories which is a cause of much confusion in public databases. Information on so-called reserves is also unreliable in many countries, especially the OPEC members, due to political and economic pressures. Figure 1 describes the overall position, showing production in billion barrels per year, with gas given in terms of calorific oil equivalent.

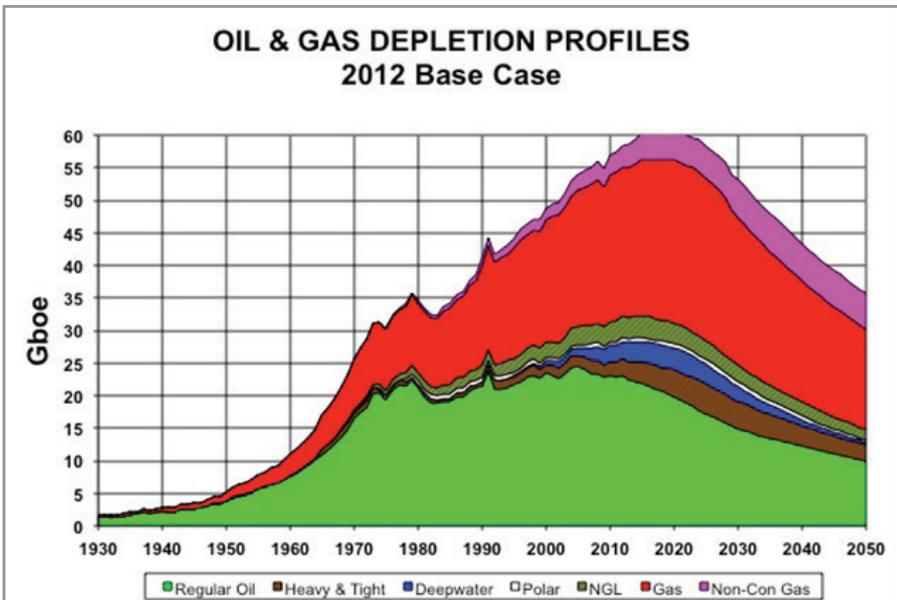


Figure 1: Oil & Gas Depletion production in billion barrels per year, with gas given in terms of calorific oil equivalent

## The Second Half of the Oil Age

It is evident from the foregoing that the *Second Half* of the *Oil Age* dawns. The decline in this critical source of energy will clearly have a colossal impact, and the transition threatens to be a time of great tension

as indeed already witnessed by demonstrations, riots and revolutions around the world. People facing soaring food prices and unemployment understandably become resentful and blame their governments, not realising that the circumstances are ultimately imposed by Nature.

Oil prices, which had averaged \$26 a barrel (quoted in terms of 2014 dollars) over the last century, reached almost \$150 in 2008 following the peak of *Regular conventional oil* production three years earlier. This in turn prompted a major economic recession cutting demand. The financial structure of the world was seriously affected with several prominent banks failing. But the fall in demand put pressure on oil prices which have fluctuated widely over the past few years. In the United States, whose conventional production peaked in 1970, the high prices prompted a turn to so-called *fracking* to produce *Tight Oil and Gas*. It involves drilling highly deviated wells to run parallel with oil- and gas-bearing rocks lacking sufficient natural porosity and permeability to be normal reservoirs. Fluids under high pressure are then injected to fracture the rocks adjoining the wellbore. The wells, having a low net energy yield, are expensive and short-lived, with \$80 a barrel being widely seen as the minimum oil price to make them viable. The more promising areas, termed *sweet spots*, were naturally tapped first, as soon as they could be identified. The resource in the ground is enormous and unquantifiable, but it is a very different source of energy from that which powered the *First Half* of the *Oil Age*. A recent fall in prices to around \$50 a barrel was triggered when Saudi Arabia decided to ignore its OPEC obligations to cut production to support price. Its motives are obscure with a possible factor being the recent death of King Abdullah, who once said that he wished to leave as much oil as possible in the ground for his grandsons. Venezuela and Nigeria, which are also OPEC countries, are suffering a heavy loss of revenue with serious social and political implications. It is too soon to forecast the future price range but the current low level is certainly anomalous and probably short-lived.

It cost Saudi Arabia less than \$30 a barrel to produce its oil, so when they sold it for over \$100 that was *unearned income* on a massive scale. Much of the surplus was no doubt placed with international banks who in turn lent it out charging interest and creating yet more money out of thin air. It is understandable why usury was condemned as a sin in earlier years by Christian religions. In fact, the low prices make a bad situation worse because they increase demand, accelerating depletion, and also

lead to the premature abandonment of aging fields that are no longer profitable, leaving less oil and gas for the future.

It is a large and complex subject that cannot be covered fully here, but there are some indications of positive reactions as people again come to think that they should rely more on whatever their particular region can support. The Transition Town Movement, which was formed in Cork and now has a world following, provides a strategy for localism, including local currencies. Recently, the government of Britain delegated greater financial control to the major cities. Scotland came close to seceding from the country in a recent referendum, and there are similar pressures in Spain and Italy. The European Union may see some of the current members, such as Greece, which is heavily in debt and facing a serious economic recession, withdraw. The people of the Eastern Ukraine, many having strong links with Russia, also wish to go their own way, following a serious economic downturn. The barren lands of North Africa and the Middle East are in turmoil. Immigration becomes a source of tension in these circumstances, and governments are increasingly being forced to restrict it or try to do so.

Ireland is relatively well placed with a population of only 4.6 million and plenty of green fields. It also has considerable scope for tapping renewable energy from hydropower, tides, winds, waves, solar panels, and anaerobic digestion, a process that converts urban and agricultural organic waste into methane that can be used to generate electricity. Indeed, the Shannon Hydroelectric Scheme, which was built in the 1920s to give the newly independent country its own source of power, sets an important precedent.

Ireland was one of the first countries in Europe to face the recent world economic recession, but the worst seems to be over. It would probably be well advised to reintroduce its own currency, to be managed responsibly by a national bank. While its major cities face challenges in adapting to the changing circumstances, the people of West Cork, who have a strong co-operative spirit, are relatively well placed. They can grow much of their own food and catch fish from the adjoining waters. They can even heat their homes with a highly efficient new wood-burning stove, the *EirEco*, which was designed and is marketed in West Cork.

