

# **THE RIMINI PROTOCOL**

**an  
Oil Depletion Protocol**

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*Heading Off Economic Chaos and Political Conflict  
During the Second Half of the Age of Oil*

As proposed at the 2003 Pio Manzu Conference, and to be the central theme of the next Pio Manzu Conference, Rimini, Italy on October 28-30, 2005

## INTRODUCTION

Soaring oil prices have drawn attention to the issue of the relative supply and demand for crude oil, which is the World's premier fuel, having a central place in the modern economy.

Knowledge of petroleum geology has made great advances in recent years, such that the conditions under which this resource was formed in Nature are now well understood. In fact, it transpires that the bulk of the World's current production comes from deposits formed in two brief and exceptional epochs, 90 and 150 million years ago. This fact alone tells us that oil is a finite resource, which in turn means that it is subject to depletion.

People ask: *Are we running out of oil ?* The simple answer is: *Yes, we started doing that when we produced the first barrel.* But *Running Out* is not the main issue as the resource will not be finally exhausted for very many years. The much more relevant question is: *When will production reach a peak and begin to decline?*

### ***Depletion: Growth, Peak and Decline***

Much debate and study has focused on the calculation of the date of peak, but this too misses the main point. It is not an isolated or pronounced peak but merely the highest point on a long and gentle production curve. It matters little if the actual peak came last year, if it will be passed this year, or in a few years' time. The shock is the perception of the long, remorseless and terminal decline that follows, which can hardly fail but have a major impact on the future of Mankind.

Without quibbling over precise dates, it is now evident that the First Half of the Age of Oil draws to a close. It lasted 150 years since the first wells were drilled for oil in Pennsylvania and on the shores of the Caspian, and saw the rapid expansion of industry, transport, trade and agriculture, allowing the World's population to expand six-fold, exactly in parallel with oil. In addition, it made possible the growth of financial capital as banks lent more money than they had on deposit, confident that Tomorrow's Economic Expansion offered collateral for To-day's Debt. Many people came to think that it was money that made the world go round, when in reality it was a cheap and abundant supply of oil-based energy.

### ***Distribution and Categories of Oil***

The World's oil is unevenly distributed for well-understood geological reasons, and some countries are more depleted than others. In fact, five countries bordering the Persian Gulf own almost half of the *Regular Conventional Oil* that is left to produce.

This category of oil has provided most to-date and will dominate all supply far into the future. Accordingly, the onset of its decline will have the greatest impact on the World situation. The other categories, including the tar-sands and heavy oils of Canada and Venezuela, deepwater oil, polar oil, and liquids derived from natural gas, are important too, primarily because they can ameliorate the rate of overall decline after peak.

### ***Unreliable Information***

If reliable information on past production and reserves in known fields were freely available in the public domain, the issues of peak production and the onset of decline would be entirely self-evident. Estimating the size of an oilfield early in its life poses no particular scientific or technical challenge, such estimates being routinely made by the oil industry.

The reporting of reserves is another matter, being much influenced by political and commercial pressures. Simply stated, the oil companies reported commercial reserves under strict Stock Exchange rules that were designed to prevent fraudulent exaggeration but smiled on conservative reporting as laudable prudence. The companies, quite rightly, reported cautiously, preferring to smooth their assets and revise their reported reserves upwards over time, which gave a comforting, but very misleading, image of steady growth. It was widely, but wrongly, attributed to the remarkable technological progress that was achieved as well as to the scale of investment, when in reality it was primarily an artefact of reporting. The main impact of technology was to hold production higher for longer, which in fact accelerated depletion. The days of under-reporting are however now over, leading the major companies to merge and in some cases revise their reported reserves downwards.

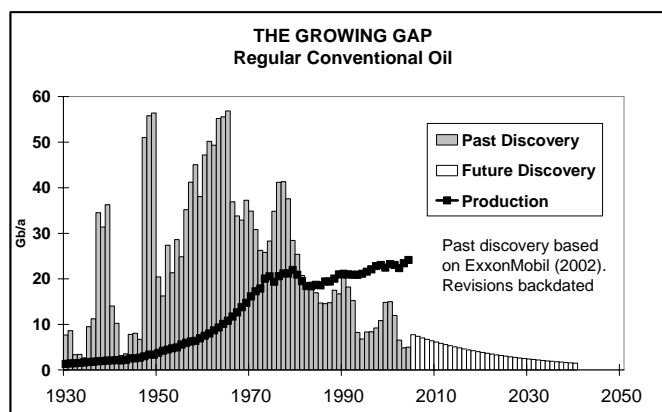
Several major producing countries nationalised their oil industries in the 1970s, and found themselves in the uncomfortable position of having to cut production to support price, when they faced competition from growing production brought in by the international companies from new areas. In those days, there were still large new provinces to bring in, especially offshore. The Organisation of Oil Exporting Countries (OPEC) introduced a quota system to manage the allocation of production amongst its members. Reserve estimates became effectively State secrets in these countries. In the 1980s, some of them announced massive overnight increases in reported reserves, although nothing particular had changed in the oilfields themselves. It transpires that they may have been reporting the total found, not the remaining reserves, which would explain why the reports have barely changed since, despite substantial production.

Although the skills of a detective are called for to obtain reliable information, the general position can be determined within reasonable limits to permit and justify appropriate policy decisions and responses (See Appendix 1).

### *You have to find it before you can produce it*

It is axiomatic to state that oil has to be found before it can be produced, meaning that production mirrors discovery after a time-lag. When a new area was opened to exploration, the first step was for the industry to secure the rights from the government concerned. The next step was to investigate the geology, examining the rocks at the surface, scanning the depths with seismic surveys and drilling exploratory boreholes, known as *wildcats*. This work proceeded until a moment-of-truth was reached when the area either delivered its first discovery or was found to lack the essential geology, in which case it remained forever barren, no matter how much investment was applied. It was normal for the larger fields to come in first, being too large to miss.

For these reasons, the production in any country tends to reach a peak close to the Midpoint of Depletion, when half the total endowment has been produced. The subsequent decline may be modelling on the assumption that production will continue to fall at the current Depletion Rate, namely annual production as a percentage of what is left. There are of course exceptional situations that have to be assessed on their merits.

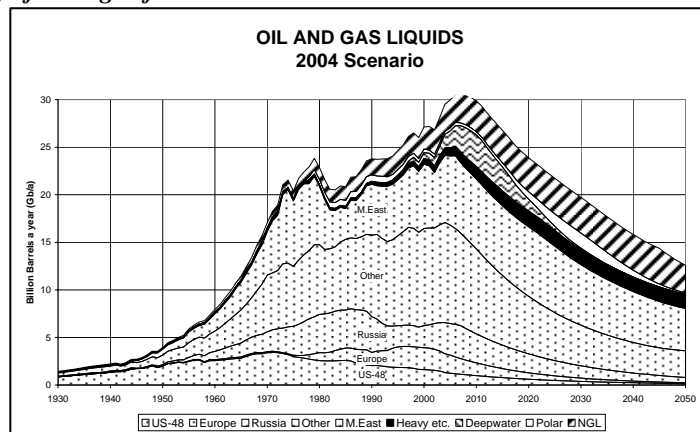


Displaying laudable frankness, a Director of the World's largest oil company has reported that the peak of world discovery, based on industry data with reserve revisions being properly backdated, was passed in the 1960s. (see Longwell H., 2002, *The future of the oil and gas industry: past approaches, new challenges*; World Energy 5/3). This information alone leaves little doubt that the corresponding peak of production is now imminent. The World started consuming more than it found in 1981, and the gap is widening, as illustrated in the above figure.

### *The Dawn of the Second Half of the Age of Oil*

Putting it all together, with the best information available and a realistic depletion model, based on appropriate Depletion Rates, gives the following general picture as a sound and prudent basis for planning, notwithstanding the remaining uncertainties of detail.

The evidence demonstrates that the Second Half of the Age of Oil is dawning. It will be characterised by the decline of oil,



and all that depends upon it. The decline itself is gradual at no more than 2-3% a year, such that production by 2020 will have fallen to approximately what it was in 1990. This, in itself, does not speak of any direct catastrophic collapse in supply, but the onset of decline does represent a turning point in history of unprecedented proportions.

### ***Financial Implications***

The First Half of the Age of Oil saw the growth of industrialisation and World trade, which was accompanied by the development of world trading currencies, provided first by the pound sterling and later the United States dollar. Control of such currencies became one of the principal benefits of empire as they delivered a hidden rental to the issuing country. Financial constructions cloud the issue. For example, the physical import of oil to the United States has been exactly matched by the expansion of domestic credit, which itself was little more than an expression of confidence in the current financial system. In a certain sense, the country obtained its supply of oil for free, paid for by debt based on the assumption of onward economic growth, whose validity is now put into question by declining energy supply.

The subject of Economics was devised to understand and manage finance and investment in this epoch of a growing economy. It was premised on the view that the Planet had near-limitless resources to be converted to Man's use by his skill and enterprise. A liberalised market was held to ensure that supply must always match demand, and that one resource would seamlessly replace another as the need arose. Indeed, the *Stone Age did not end for want of Stones*, as Man moved on in a natural progression to use bronze, iron and steel for better tools and weapons. Yet, oil declines during the Second Half of the Age of Oil due to resource constraints without sight of a better alternative, suggesting that some basic reappraisal of economic thinking is called for, given the fundamental role of oil as a fuel for most economic activity. Indeed, new schools of thought are emerging that better address the reality imposed by Nature.

### ***Economic and Political Impact***

The Economics of the First Half of the Age of Oil had a major influence on the political evolution of this chapter in history. Many countries adopted democratic forms of government primarily dedicated to fostering economic growth in a competitive global market. Prosperity came to some countries that found themselves in control of the system, while poverty remained the lot of others, being exacerbated by the growth of large urban populations. A perception of a new world of finite resources now presents itself, implying that one man's wealth must mean another's poverty.

This closing chapter in history was marked by two world wars, which, whatever the immediate causes, reflected the pressures and ambitions of economic hegemony. They were followed by the Cold War as the believers in free markets and central planning faced each other with threatening postures, each seeking to support its particular economic system and power. Lastly in its turn has come the so-called War of Terror as the United States seeks to support Israel and bring Middle East oil supplies under its control, facing many increasingly alienated peoples.

The 21<sup>st</sup> Century has dawned with these new tensions that, despite the many remarkable achievements, reflect a certain sense of excess and instability. The power of electronic communication has brought everyone into a global environment. Simple but happy people, previously living in relative isolation, have become subjected to relentless television imagery, making them feel resentful of the prosperous glitter of distant places. Cities everywhere have become choked with traffic, while vapour trails fill the sky from Rome to Rio. Population pressures have led to growing migration, which at first the wealthy nations welcomed as a means of holding down wages.

This brief chapter of history occurred at a time of high oil production, which in fact made the excesses possible. But now, no more than five years into the new Century, soaring oil demand, especially from the new industrial societies of India and China, begins to exceed productive capacity, leading to a radical increase in the price of oil, which has doubled in less than twelve months. It is important to stress that such high prices represent unintentional profiteering from shortage by oil companies and, especially, Middle East Governments, as the cost of production itself has not increased materially.

Under conventional economic reasoning, the high prices will themselves trigger new discovery and higher production rates, but in reality they may not do so. Even modest oilfields are profitable

under low prices, so high prices make viable only the smallest new discoveries, adding a negligible amount to World supply. High oil price may not encourage oil companies to produce at higher rates because it allows them to deliver satisfactory financial results while conserving their largely irreplaceable reserves. The Middle East governments, for their part, have little incentive to increase production, even if they had the resources to do so, as that would serve to lower World prices and hence their revenues.

It remains to be seen if further military intervention in the Middle East will occur and lead to sufficiently stable conditions for foreign oil companies to step in. An ironic silver lining attends continued instability insofar as more oil will be left in the ground for the future, when it will be desperately needed.

Although these few words hardly do justice to the many difficult circumstances facing the modern World, they do serve to emphasise the arrival of a turning point, which in turn imposes new responsibilities on Governments everywhere. The long-term decline of oil supply in the years ahead is not in doubt. The peak of production will not be evident as such until some years after it has occurred. It follows that Governments are well-advised to prepare rather than react, and begin to give serious attention to the management of the transition from the First to the Second Half of the Age of Oil, which threatens to be a time of great tension.

The most obvious objective is to cut consumption to match declining production. A Protocol to so achieve is laid out below in draft form.

## **THE DEPLETION PROTOCOL**

WHEREAS the passage of history has recorded an increasing pace of change, such that the demand for energy has grown rapidly in parallel with the world population over the past two hundred years since the Industrial Revolution;

WHEREAS the energy supply required by the population has come mainly from coal and petroleum, having been formed but rarely in the geological past, such resources being inevitably subject to depletion;

WHEREAS oil provides ninety percent of transport fuel, essential to trade, and plays a critical role in agriculture, needed to feed an expanding population;

WHEREAS oil is unevenly distributed on the Planet for well-understood geological reasons, with much being concentrated in five countries, bordering the Persian Gulf;

WHEREAS all the major productive provinces of the World have been identified with the help of advanced technology and growing geological knowledge, it being now evident that discovery reached a peak in the 1960s, despite technological progress, and a diligent search;

WHEREAS the past peak of discovery inevitably leads to a corresponding peak in production during the early years of the 21<sup>st</sup> Century, assuming no radical decline in demand;

WHEREAS the onset of the decline of this critical resource affects all aspects of modern life, such having grave political and geopolitical implications;

WHEREAS it is expedient to plan an orderly transition to the new World environment of reduced energy supply, making early provisions to avoid the waste of energy, stimulate the entry of substitute energies, and extend the life of the remaining oil;

WHEREAS it is desirable to meet the challenges so arising in a co-operative and equitable manner, such to address related climate change concerns, economic and financial stability and the threats of conflicts for access to critical resources.

### **NOW IT IS PROPOSED THAT**

1. A Convention of Nations shall be called to consider the issue with a view to agreeing an Accord with the following objectives:
  - a. to avoid profiteering from shortage, such that World oil prices may remain in reasonable relationship with production cost;
  - b. to allow poor countries to afford their imports;
  - c. to avoid destabilising financial flows arising from excessive oil prices;
  - d. to encourage consumers to avoid waste;
  - e. to stimulate the development of alternative energies.
2. Such an Accord shall have the following outline provisions:
  - a. No country shall produce oil at above its current Depletion Rate, such being defined as annual production as a percentage of the estimated amount left to produce;
  - b. Each importing country shall reduce its imports to match the current World Depletion Rate, deducting any indigenous production.
3. Detailed provisions shall cover the definition of the several categories of oil, exemptions and qualifications, and the scientific procedures for the estimation of Depletion Rate.
4. The signatory countries shall cooperate in providing information on their reserves, allowing full technical audit, such that the Depletion Rate may be accurately determined.
5. The signatory countries shall have the right to appeal their assessed Depletion Rate in the event of changed circumstances.

## THE CHALLENGE OF NEGOTIATION AND AGREEMENT

The foregoing is no more than an outline draft to try to stimulate interest. What is needed is an imaginative senior politician, or national leader, who would grasp the essentials of what is described. He would likely have a scientific or technical background, or at least an open, inquiring and logical mind. He is unlikely to have had a training in classical economics.

The first step for him would be to look into the matter more closely, and try to assemble proper data and knowledge of the resource base, as outlined in Appendix 1. Here, he will meet his first challenge because official institutions will likely deliver bland “business-as-usual” scenarios, not themselves being fully qualified to delve into the inner workings of the oil industry. If he approaches the oil companies direct he will be met by a façade of public relations. So, his best hope is to step behind the scenes and search out oil men who no longer have a vested interest in confusing the issue. The data provided in Appendix 1, including calculated Depletion Rates, may be taken as a starting point to be progressively revised and improved on the basis of proper technical audits of reserves and new transparency by countries supporting the initiative.

If he can overcome these first obstacles, he will find his eyes opening as he begins to understand the simple message the unpackaged facts deliver. He will find himself immensely encouraged and enthusiastic to follow the trail as more and more pieces in the puzzle fit together. That in turn will be followed by a certain sense of foreboding and depression, as he begins to appreciate the wider implications for the future of Mankind. He may at this point abandon the mission in despair, but if he has the stamina to continue, he will find his resolve strengthened by a new urgency to take action. He will remember his responsibilities as a politician to lead and help his people prepare. He may start holding public meetings to address his constituents on the subject. If so, he may be surprised at their positive reaction: far from drumming him out of town, he will find himself touching a nerve in the intuitive common sense of ordinary people. He will be reminded of the famous words of Winston Churchill who proclaimed *Put your trust in the people* as he tried to persuade his country to prepare to defend itself from the advancing threat of war.

If, by good fortune, he should represent a relatively small country, he might find it possible to bring his colleagues in government on board to host a Conference. The response from others at first sight might be lukewarm but as he marches ahead he will find that other nations and institutions will not wish to be left out and ignored. A positive development comes when communities, cities and provinces take steps to cut energy consumption paving the way for national responses.

A certain momentum will build until a proper meeting of World leaders is convened. A draft Protocol will be tabled and meet general approval subject to further clarification and negotiation.

The first thrust of such negotiation will be to start to try to determine Depletion Rates for the principal countries. Depletion Rate is annual production as a percentage of what is left, that being Reserves plus the Yet-to-Find. The numbers at first may be uncertain, or fall within a range, but as the calculations are made, it will soon become apparent that production does have a defined depletion profile with peak followed by decline. The data in Appendix 1 may serve as a starting point. Asking these simple questions will make the need for such a protocol entirely self-evident.

The detailed aspects of the practical implementation will need to be discussed. For example, it might be found expedient to exempt the Heavy Oils of Canada and Venezuela. Means of fair allocation to respect existing commercial rights will have to be ironed out. The wider impacts on the economy and environment will have to be addressed.

At the end of the day, the countries of the world will be invited to sign up. Not all will do so, but this need not deter those that do, for they will clearly see that they emerge better prepared than the non-signatories living in the past.

As the politician, who launched the endeavour, looks back over the months of hard work, setbacks, frustrations and rare successes, he will be able to console himself with the thought that it was a much needed job, well done. His grandchildren will come to be very proud of him, recognising how from a difficult and humble beginning he changed the course of history.

