Exploration Challenges Ahead

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ABSTRACT

Exploration for hydrocarbons in the past exploration has been in the shadow of the Peak Oil Concept. It predicts the decline of hydrocarbon resources. In the meantime, there will an increasing demand for energy resources, resulting into increasing prices for oil and gas. This is quite logical as hydrocarbon and mineral resources are finite and irrenewable.

This situation resulted in the Malthusian and Neo-Malthusian Concept. Malthus (1800) already predicted that population growth is exponential and will outstrip the world natural resources: especially food. The Club of Rome (1974): also foresees doom's day, as natural resources deplete rapidly while environment deteriorates in the year 2000. The US National Research Comm. on Status and Research Opportunities in the Solid Earth Sciences (1993) stated: "It is only a matter of time until global shortages of petroleum resources developed".

The reality, however, history shows that Peak Oil has been deferred several times. The Green Revolution has thwarted food shortages. Oil and gas prices have going up and down and consequently also exploration for oil and gas. Geologists believes that finding oil is in the mind of men, and hydrocarbon resources are more than plentiful, and hidden accumulations are waiting for geoscientist to find it.

As a matter of fact, present day exploration woes are the oversupply of production; low petroleum prices; production an exploration costs; environmental concern on the effect of the extractive technology on environmental damage. Total outright ban on hydrocarbons use as source of energy is looming as the mainstream scientific community believes that the cause of world climate change is due to emission of CO2 as the culprit as the result of burning fossil fuels. Several European countries have already vision that in a few decades' combustion engines will be banned. It remains to be seen whether the so called alternative green energy sources will be able to meet the demand for ever increasing energy need of the world, as even electric cars requires a source of energy for the electricity, which is especially true for the more populous countries such as Asia.

This oil glut is believed to be caused mainly by the development of shale oil and gas oil in the United States, due to the advent of "fracking" technology. Anyway geologists have to review that there are hydrocarbon resources availability constraints; 1. Geologic Condition which controls the availability hydrocarbon accumulation; 2. Economic Condition: involves market price, supply and demand. 3. State of the art of Technology involving the extractive as well exploration technology: and lately also Environmental Concern (real or imagined).

Due to these constraints reserves and resources have been categorized such as the distinction between Reserves and Resources (Reserves: Quantity which is proven to be exploited profitable under current technology and economic condition Resources: Quantity which may become

profitable under certain/future technology and economic condition), Indentified Resources, Potential Resources, Marginal Resources, Conventional Vs Unconventional Resources and so on.

Recent development indicates that it is more reasonable to consider reserves and resources as a continuous series. What matters is the quality of the resource, as changing economic condition and progress of state of the art of technology can change what was considered as a resource into an economic reserve. As a matter of fact, it is petroleum engineer's challenge to extract economically the lower quality resources.

The present situation was actually predicted by McCabe (1998) with his Cornucopian Pyramid Concept of Energy Resources published in the AAPG Bulletin. The pyramid concept does not suggest an infinite resource, but it is so huge as it runs in astronomical figures. It is simply not possible to quantify a finite amount of energy resource available for the future –as some resource may never be extracted as alternative energy sources becomes available and competitive. Fossil energy resources depend on its quality, the lesser the quality of the resource, the greater amount of resources becomes. The pyramid illustrates the concept of vast resources available and that at any one time the price of extraction increases as one goes lower in the pyramid, but over time advances in technology tend to decrease the costs of extracting all fuels.

So what are presently called "Unconventional Hydrocarbon Resources" are actually simply lower quality resources, which through present-day extractive technology becomes economically feasible as reserves. The quantity of this lower quality resource will be much greater than the higher quality resource. Finding this lower quality resource is also less expensive and less risky as most of resources have been identified. Because of the less risk and less exploration cost for these low quality resources it is unlikely that the still existing/remaining high risk high quality hydrocarbon accumulation will ever be explored in the foreseeable future, especially where data are not available. With the development of these resources it is doubtful that world oil price will ever soar again, as no foreseeable shortage of oil reserves can take place. At present-day level there appears to be no sign that there will be an increase of production of these low quality hydrocarbon resources. On the other hand, the availability of oil and gas shale resource is subject to environmental concern for the environmental damage caused by fracking extractive technology.

In the meantime, there still appears considerable in mature basins exploration for the remaining reserves in hidden accumulation. Exploration for hidden accumulation does not only requires new ideas in play concepts, but also new development in exploration technology, especially seismic, and other geophysical methods, as many parts of the basins remains blur.

The future of petroleum exploration remains to be seen how far the alternative energy resources development can meet the increasing world demand for energy, especially for the transportation requirement.