Abstract

The contemporary Global Economy is premised upon energy consumption. Industry and most of the transportation lie at the heart of economic development, and both have come to depend upon sustainable access to fossil fuels and electricity.

Demand for oil was around 75 million barrels a day in 2000, and the EIA estimates that it may nearly double by 2030 – without secure discoveries of oil reserves in the last years; and considering that the planet is not only getting more polluted, but also warmer. There have long been concerns about whether the current rate of consumption is sustainable from an environmental and economic point of view, so with this panorama, it is evident that a sustainable solution must be found. However, the problem is not so easy; not only the state and the private sector are involved, but also trade and labor unions.

Concluding, as a political strategy and then as scientific discovery, energy management will be the biggest challenge human beings will have to face in a short future.

Energy Management
Searching for the Solution Above the Ground

Introduction

Today, world population has reached 6.5 billion, and according to population projections, this figure will continue to grow at rates that were unprecedented prior to the 20th century. By 2050, world population is expected to rise to 8.5-9.5 billion, and this means that if nowadays it is a big challenge to provide resources to all of these people, this task will become even more difficult as time goes by. Along with population's growth, socio-economic standards have increased, and this progress is dependent on energy, and this implies mainly two words: Fossil Fuels (mostly oil and gas) and Electricity, the two most popular sources of energy developed till today.

Regarding oil, the worldwide consumption is predicted to rise from $83.5x10^6$ barrels/day to $103x10^6$ barrels/day by 2025. Natural gas consumption is also expected to rise from 92 trillion cubic feet/day to 128 trillion cubic feet in 2015 and then to 156 trillion cubic feet by 2025. However, these figures are meaningless unless we are aware of the fact that 90% of the world's reserves were discovered over 25 years ago. In 2000 there were 16 new large discoveries. In 2001 this value was 8, in 2002 it was 3, and then in 2003 it was zero. In a few words, world oil consumption currently outstrips new discoveries by a factor of 4 to one or four barrels of oil are disappearing for each one discovered.[1]

Concerning electricity, the situation is not much better, since up to 40 percent of the power stations that the world will need by 2020 have not been built, and according to the EIA[2], the consumption is projected to increase at a rate of 2.7 in average for the next 25 years.

To sum up, the problem is not only about energy demand. Scientific evidence suggests that the world is gradually growing warmer and that this "global warming" is due to human actions, and they primary suspect of fossil fuel emissions (mostly carbon dioxide) created in the burning of coal and oil.

In this scenario, it is evident that a sustainable solution must be found. The problem is currently affecting the whole planet and it will also affect future generations.

Energy Insight

To begin with, it is evident that, on the one hand, population and demand of energy are increasing. Now, to continue, let's look energy insight.

[1] Statistic values were obtained from the Energy Institute: http://www.energyinst.org.uk
[2] EIA (Energy Information Administration): http://www.eia.doe.gov

There are different criteria to classify energy, but from the sustainability point of view, there are three categories:

- Non-renewable: This includes stored energy sources that are not replenished at a faster rate than they are depleted. Examples are fossil fuels such as oil, natural gas and coal.

- Expandable: This kind is that which, with proper application, can generate more fuel through the breeding process than it consumes. Up to now, the most developed one is nuclear fission energy.

- Renewable: This includes, between the most popular, solar, wind, biomass as well as geothermal.

The challenge is to efficiently and effectively employ all natural resources, while simultaneously protecting the environment. It has already been discussed that non-renewable resources face two issues: not only do they deplete but they also degrade the planet's climate and ecosystems.

In the case of expandable energy resources, this kind is quite polemic, because although they have a powerful advantage in comparison to any other energy system, as it is known, this power can also bring dangerous consequences, not only in human accidents, but also as radioactive waste which is still waiting for an answer.

Finally, renewable energies perform a viable solution because, from an economic perspective, they have a real good break-even condition in comparison to other sources of energy. To understand this, a simple equation can be evaluated: by subtracting the energy obtained of it to the energy invested in the production, and if the value is economically profitable (when positive), then its sustainability can be evaluated by comparing it to the energy invested.

A Technological View and the Global Contradiction

Scientists such as physicists, biologists are, from another perspective, pursuing newer approaches to secure energy supplies for the future. As it has been said previously, the solution should be concerning expandable and renewable energy resources such as the nuclear energy, wind, direct solar heating, wind and biomass.

Considerations on environmental pollution and global warming suggest, in particular, a new energy economy using hydrogen as a nuclear, solar or wind energy carriers, for a transportation and residential electricity use. In this future energy scenario, internal combustion engines would be supplemented and gradually replaced by fuel cells producing electricity through an electro chemical process using hydrogen, and releasing non-polluting water vapor as a combustion product. Complementarily, solar/wind farms and nuclear power plants could feed cheap electricity into the electric grid. The world could have

cars running primarily on nuclear, solar, and wind energy, and at the gasoline equivalent of less than U$S.25/litre.

Now, if successful solutions have been discovered, the question is why they have not been implemented. Are they really not economically viable? Or are auto manufacturers or petroleum companies resisting this trend? Or is it a matter of political power?

However, as the problem is really becoming a major issue, solutions such as biodiesel (fuel derived from biological sourcesan oil) for some regions/markets have appeared, and hybrid cars in others, but this trend contradicts the globalization one which stands that any product could be manufactured in one place and consumed in another. Then, in the case of a source as biodiesel, how could this be overcome between motorists and people who do not have to eat in places like Asia that do not have enough farmland to do both things, or, in the case of a hybrids, how could this be economically viable when one of these cars cost 3 times an average third world gas car?

Up to now, energy was a kind of commodity in the way it was generated and consumed. Up to now, globalization was the answer to all communication and unviable economic situations. Up to now, nobody cared about how inefficient the internal combustion engine is, and how polluted the planet was getting, or in some degree, we worried about pollution, but we didn't about the climate because it wasn't so relevant. So the difficulty is not only economic and environmental, but also it looks like unviable for the social-economic model developed so far.

Searching for the Solution Above the Ground

As far as is known, the problem is quite complex. There are companies, ONGs, countries, international organizations, the whole world is involved since it is the industry with most revenues, and finally, because it is the reason build a world like this one (it would be difficult to imagine a world without energy). As expressed in the St. Anthony's International Review (The international Politics of Oil)[3]:

"...contemporary politics is not simply about the state but is about the broader political economy. Due to the enormous concentration of capital in the hands of relatively few companies and the strategic importance of energy for every government, the oil industry has often been used to illustrate the changing relationship between the state and business. Large private oil corporations, it is claimed, hold immense power to influence public policy concerning, for example, trade and investment policies, as well as the broader regulatory environment. All of these issues highlight the diversity and complexity of the international politics of oil."

[3] St. Anthony's International Review - The international Politics of Oil. See References

In this sense, and what has not been stated before, is that this complexity implies a crisis which has sent government of industrialized nations into scramble, using diplomatic means and military means when deemed necessary, to secure access to the remaining large oil basins in the world. Without realizing, the problem has become a crisis since it has began a race to find and achieve the scarce resources of oil that are left, instead of searching another way of solving the problem, or making an analogy to W. Chan Kim words, instead of *"making the competition irrelevant".*

The problem has gotten out of focus, and the major risks to this outlook are not below ground, but above ground, in such forms as political turbulence, abrupt changes in contract terms, and controversy over fiscal terms. The problem is always rounding a confrontation between government, private sector, and in some cases labor and trade unions, that for one reason or another (mainly bureaucracy), can not finally find an effective solution. The problem is always because each side wants to take advantage for its part, instead of trying to find a solution for all. Only when the problem would get really deep, they will really try to dialogue and find a solution, but as far as they don't do it, there will be worst consequences. Commenting on future oil supplies, Robert Esser from CERA[4] said:

"…is an issue that needs serious consideration. After all, the planet has a finite resource, and the world is consuming 30 billion barrels a year. But the understanding of the situation needs some clarification. Key considerations include technology, economics, timing, fiscal and regulatory terms, and a comprehensive understanding of current and future productive capacity."

Conclusion

With 6.5 billion people in the world, by 2030 this number is expected to reach 8 billion. The global economy will then double in size with growing number of energy users with a common quest for improved standards of living. It is projected for the 2030, that energy demand will increase by 50 percent form today's level, driven by economic expansion and population growth. Oil, gas, and coal will probably remain dominant at about 80 percent of the total energy consumed, with increased carbon dioxide emissions from both developed and developing nations.

In this way, it will be a major challenge to meet energy needs of a growing world in an environmentally sound fashion. Doing so, will require substantial investment and continuing technological innovation and will more likely be achieved trough open global economy. However, nothing of this will be effectively achieved if a solid, well-planned political strategy is not performed, understanding the multiple variables and consequences it has.

[4] CERA (Cambridge energy research and consultants): http://www.cera.com

Without doubt, as a political strategy and then as scientific discovery, energy management will be the biggest challenge human beings will have to face in a short future.

References:

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