

*"It is wiser for decision-makers to base energy policies on past and future behavior of oil prices rather than on the present temporary oil glut which may soon be over."*

## **Long-Term Prospects for Energy Prices**

by

Serafin D. Talisayon\*

### **INTRODUCTION**

After two oil price shocks, namely the quadrupling of oil prices in 1973-1974 as a result of the 1973 Arab-Israeli war and the more than doubling of oil prices in 1979-1980 as a result of the Iranian revolution and the Iraq-Iran war, energy prices have become one of the most important variables in international economy and in modern life.

Because energy in one form or another enters into the production of all goods and services, both in market-oriented as well as in centrally-planned economies, the level and future behavior of energy prices determine to a large extent costs of living and inflation worldwide. Oil prices determine the magnitude of flow of international exchange to oil producers. Oil prices influence balance of payments positions of non-oil Less Developed Countries (LDCs).

Indeed, the current level and expected future behavior of energy prices have become important considerations in assessing shifts in power and influence in international intercourse. They have become important considerations in national economic planning and in anticipating restructuring of industries and even shifts of consumer preferences and lifestyles.

This paper is a study on the factors most important in influencing future long-term trends in energy prices. It makes an attempt to forecast the most likely future behavior of energy prices during the next one or two decades. Information and insights herein are hoped to be useful inputs to planners both in the public and private sectors.

### **ANALYSIS OF LONG-TERM FACTORS**

At the outset, it could be estimated that in the remainder of the 1980s and most likely continuing into the 1990s, there are strong indications that real (i.e., corrected for inflation) energy prices will exhibit a secular upward trend. The factors contributing to this expected long-term trend are discussed below:

#### **1. Global oil supply-demand gap before the year 2000**

A United Nations study (1) which employed a computerized global model of the world economy estimated that cumulative world demand for oil by 2000 equals only about 77% of presently known world reserves. A Workshop of Alternative Energy

---

\* Professor, Philippine Studies Program, U.P. Asian Center, Diliman, Quezon City.

Strategies (WAES) held four years ago at the Massachusetts Institute of Technology and attended by 75 experts from 15 countries estimated that a global oil supply-demand gap would probably occur between 1985 and 1995 whatever scenario is assumed, e.g., either low or high economic growth, coal or nuclear energy as major alternatives, and a constant or rising energy price (2). Their conclusions agree essentially with the computations of M. King Hubbert of the U.S. Bureau of Mines in 1969 showing that by around 2025, about 90% of global ultimately-recoverable oil reserves would have been used up, and that global oil production would peak off and subsequently decline just after the turn of this century (3). Hubbert's approach, which had also been employed by others (4), includes analysis of production growth curves, proven reserves, and the observed secular decline in discovery per additional drilled foot.

Because the WAES forecasts did not anticipate the Iranian Revolution and the Iran-Iraq war and the resulting second oil crisis, the global demand-supply gap may have been postponed by about a decade, or it may take place within the period 1995-2005.

The WAES estimate is consistent with perceptions of Organization of Petroleum-Exporting Countries (OPEC) decision-makers seen from their statements. Venezuelan Oil Minister Humberto Calderon Berti revealed that OPEC could sustain the supply of oil for 15 years (5). He said that because of slow-down in nuclear plant construction and other unforeseen events, their forecast could be cut down to 10 years, or "by 1990, there could be a major supply crisis."

According to Ahmad Said, OPEC Chief of Research, Western Europe will find it difficult to meet its oil needs by 1985 (6).

### *1.1 Petroleum requirements of OPEC countries increasing fast*

Domestic oil requirements of OPEC and non-OPEC producer countries are expected to increase very rapidly in the next one to two decades. A tripling of domestic energy requirements has been projected by an OPEC study released late 1979 (7). A former energy adviser to the Prime Minister of Iran Dr. Fereidun Fesharaki, estimated oil consumption of OPEC countries to rise from 2.3 million barrels per day (MBD) in 1979 to 3.9 MBD in 1985, and up to 6.31 MBD in 1990 (8). This consumption will place an additional constraint on world oil supplies in the 1980s.

### *1.2 Energy requirements of LDCs*

Most projections of energy demand estimate higher consumption growths in LDCs due to their industrialization and development requirements.

There is an almost linear relationship between gross national product and energy consumption across countries (9). There has been an improvement in energy efficiency of national economies since 1974 (10). However, as nations – especially developing nations aiming for Western-style industrialization – continue to push forward their respective economic development programs, it is almost inevitable that an accompanying increase in world energy consumption will continue throughout the long-term planning horizon. This energy could come from oil or from other alternative sources, short-term likelihood being expected on the former.

### *1.3 Petroleum requirements of China and the Soviet Union*

Based on technical difficulties and delays in oil production in snow-bound northern Siberia, and on the increasing requirements for oil in the energy mix of the Soviet and Eastern European countries relying on Soviet oil, the U.S. Central Intelligence Agency (CIA) predicted a Soviet oil shortfall in the early 1980s.

CIA Director in 1979 Stansfield Turner predicted that Soviet oil production would have reached its peak at less than 12 MBD in 1979 and subsequently begin to fall (11). CIA then predicted that the Soviet Union in a few years would turn from an oil-exporting to an oil-importing country. Current Soviet oil production is 12.1 million barrels, contrary to CIA predictions. However, it is believed that the initial 1977 forecast by CIA had prodded Soviet planners to put priority on oil production and exploration to belie the CIA claim (12).

The Soviet Union is reported to have about 60 billion tons of proven reserves and there are controversial estimates by Swedish sources about 10 times this amount (13). If the latter is true, then the Soviet Union's oil shortfall and consequent demand on world oil markets would only be temporary.

China's reserves have been estimated variously from a few billion tons to as high as 70 billion tons, as well as optimistic assessments of prospects along the northern continental shelf of the South China Sea (14). However, China is experiencing similar problems in production facilities and projections of oil productions and exports for the next few years have been reduced (15).

Coal still dominates the energy mix of China and the Soviet Union, constituting about two-thirds and one-third of their total energy production, respectively (16). It is expected that as China proceeds with its single-minded national goal of becoming an industrial superpower by the Year 2000, and as both communist giants increase the efficiency of their prime movers (e.g., by dieselization, production of more trucks and automobiles, construction of oil pipelines to supplement coal transport by railway), their energy mix will shift more towards oil. After the Year 2000, it is expected that they will next shift away from oil together with the rest of the world as the latter moves away from the "oil era".

Because China and the Soviet Union have among the world's largest oil reserves, they will follow the cycle of "net oil exporting-self sufficiency-production decline" later than most non-communist countries.

## 2. Management posture of OPEC countries

Prior to 1938, when Mexican President Cardenas moved to nationalize foreign oil companies, oil producers were passive actors subordinate to the international oil majors. OPEC was established in 1960 in reaction to unilateral reductions of oil prices by the oil majors – a defensive move by OPEC.

Now, after the 1973 Arab-Israeli war and the 1979 Iranian Revolution that led to the first and second "oil shocks", OPEC's posture is entirely different. It is a politically conscious posture characterized by the desire and the power to substantially influence supply and prices of oil. It may be termed an active or management posture.

The objective of OPEC countries is to maximize benefit from sale of their oil, by raising the price of oil as high as the market could bear (the view held by price "hawks") or by raising oil prices to at least compensate for loss of purchasing power of petrodollars due to inflation in the West but not high enough to destabilize world economy (the view held by price "doves").

### 2.1 *Risks and vulnerabilities of oil revenues*

Many factors convince OPEC planners that oil remaining under the ground is more secure and advantageous to their national and economic interests than when oil is con-

verted to dollars or other liquid assets:

- (a) Inflation in industrialized countries erode the purchasing power of petrodollars;
- (b) The steady decline in the value of the U.S. dollar before President Reagan assumed his post and erratic fluctuations in exchange rates since the collapse of the Bretton-Woods international monetary system in 1975 place uncertainties in the value of their petrodollars;
- (c) The U.S. action of freezing Iranian assets “had a major negative psychological impact on the oil exporters” and tends to make OPEC countries “hostages to the holders of their assets” (17);
- (d) Oil remaining under the ground has greater certainty of appreciation over time, while sale of such oil is similar to liquidation of physical assets into cash and deposits, which are more vulnerable to factors in the international economic environment not under OPEC control.

## 2.2 *Limited absorptive capacities of OPEC economies*

There is a prevailing view among OPEC countries that their depletion policies should primarily serve national development objectives, rather than foreign energy demand and that “the efficiency of depletion policies,” in the words of Adnan Al-Janabi, Head of the Economics and Finance Department of OPEC, “can only be realistically tested by the degree of success in transforming the sale of oil assets into more durable and – hopefully – reproducible and growing assets in various forms of economic activity” (18).

Extra oil revenues, beyond that which could be usefully transformed into a self-sustaining development base, would remain as current account surplus deposited or invested outside OPEC countries and, therefore, subject to inflation, exchange rate fluctuation and other risks. There is, besides, a minority view among OPEC arising from the Iranian experience that too much oil revenues for development generated too fast may in fact become counterproductive to the fabric of social order and traditional cultures of their developing economies.

## 2.3 *Perception of some OPEC members that oil prices are still too low*

From statements of some OPEC leaders, it is apparent that they share the view that oil, in relation to alternative sources of comparable magnitudes as to later substantially replace oil, is still cheap. Oil is perceived as too expensive to burn, and that oil should be used for industrial purposes, it is best and uniquely suited for petrochemicals.

OPEC Deputy Secretary-General Fedhel Chalabi suggested that oil prices should be raised to \$60 per barrel to match the present price of producing synthetic oil, like liquefied coal, oil from shale and tar sands, etc. (19). OPEC Secretary-General Rene Ortiz said that oil prices will continue to edge upward for the next 10 to 20 years because present oil prices are too low to stimulate development of alternative energy resources (20).

A minority but forceful and prevailing view in OPEC is held by Saudi Arabia, which feels that oil prices should not rise too fast as to destabilize world economies and to trigger too rapid a shift to other non-oil energy alternatives in the West as to reduce future demand for Saudi Arabian huge oil reserves (21).

### 3. Delays in nuclear power plant construction

As of 1979, it has been reported by the Japan Atomic Energy Industrial Association that 21 nuclear plants have been cancelled for various reasons, including soaring construction costs and pressures from environmental interest groups. Typically, it takes about 12 years from project inception to the start-up of a nuclear power plant (22). These delays and long lead times are expected to throw off the timetable of many countries which would like to shift energy sources away from oil as rapidly as possible.

Lead times for the construction of new coal-fired power plants and prime movers are shorter. However, no delays are expected here in spite of considerable environmental costs of coal mining and burning (23). The reasons underlying this estimate are: firstly, coal reserves are much greater in magnitude than oil reserves: as much as 200 to 400 years world supply of energy is locked up in coal (24); and, secondly, the behavior of nations and industrial concerns has consistently been toward placing greater importance to industrialization and other energy-consuming economic activities over potential damages to the global commons (25).

The contribution of nuclear energy and coal to world energy mix is expected by some quarters to approximately triple by the Year 2000, nuclear energy accounting for about 10% by the Year 2000 of total world energy sources (26).

Studies on long-term (50 years) global energy paths by the International Institute for Applied Systems Analysis (IIASA) project only a 9.49% (low scenario) to 10.33% (high scenario) share of nuclear power by the Year 2000, rising to around 23% by 2030 (27). According to their model, world oil consumption will still rise in magnitude from now to the Year 2000, although its share will drop from 44% to around 35% by then. Another study on long-term (40 years) global nuclear energy paths assumed that the most likely scenario is Scenario L4 of the World Energy Conference (28). In this scenario, nuclear energy will fill only 16% of world energy demand, while oil use will continue to rise in magnitude but decrease its percentage share to 31% in 2000. In both studies, the percentage share of coal is projected to increase by only 2% from the present to 2000, although in magnitude there is an expected approximate doubling. Similar expectations were expressed by Director Ulf Lantzke of the International Energy Agency (IEA) (29). Another study, by London brokers Shepards and Chase, predicted much faster increase in demand for coal in international markets, from 79 million tons in 1980 to 284 million tons, in 1990 (30).

### 4. Long retooling cycles

Existing oil-fired power plants will take time before being shut down or phased out. Similarly, industrial prime movers currently in use will remain so for some time until they are replaced by those not depending on oil. The lead time for complete replacement is of the order of one industrial retooling cycle which is roughly between 10 and 30 years.

Historical data from U.S. experience show that it takes about 60 years for a new energy source to conquer 50 percent of the market. For the world, it takes about a century (27). The wood-to-coal shift during the last century and the coal-to-oil shift early this century would be followed by an oil to uranium-and-coal shift early next century. In all likelihood, the world's dependence on oil and fossil fuels will not disappear before the century is over.

The consensus of expert opinion is that large-scale energy alternatives may not be

available early enough to prevent escalation of oil prices resulting from worsening supply-demand gap before the Year 2000. "The worldwide struggle for (expensive) oil will continue," concluded Mr. Hafele, Deputy Director of IIASA (27).

The upper limit of oil prices is production cost of fluid-form energy alternatives which could be mobilized in sufficiently large quantities in the shortest possible time such that they could competitively bring down or hold oil prices. Oil from tar sands and oil shale, which could be economically extracted starting at \$40 per barrel (at 1981 prices), coal gasification and liquefaction and alcohols from biomass are among the best candidates. However, it is doubtful whether fuels from these sources could significantly affect petroleum markets in this decade. Coal liquefaction is very inefficient and is not yet competitive. Alcohol production, while the technologies long exist, is feasible only in countries with large areas of forested land or arable land for sugar cane or cassava crops. Even with full government support and participation by industry, these synthetic fuels (or "synfuels") could contribute only between 1.6 and 2.6 MBD in OECD countries by 1990 (31). Therefore, it is unlikely that synfuels could be produced in sufficient commercial quantities in the 1980s to hold down the escalation of real prices of oil.

## 5. Unlikely scenarios

A physical conflict in the Arabian (Persian) Gulf could conceivably take place resulting in the closing of the oil route through the vital Straits of Hormuz where about half of world-traded oil passes through. Such an unlikely but not impossible event would certainly push oil prices drastically upward and deal a crippling blow to the economies of Japan and Western Europe and the United States — linked together in an equalizing oil sharing agreement during emergencies through the IEA.

A U.S. Library of Congress study predicted that oil prices would rise to more than \$100 per barrel or three to four times current levels should this event take place (32). The Iranian Revolution and the Iraq-Iran conflict demonstrated the effect of oil production cutback or losses on spot oil prices.

## ON CURRENT OIL PRICES

The current oil glut appears to be a temporary situation.

Two factors strongly determine short-term oil price movements: the current depressed demand for oil as a result of the 1981-1984 economic slowdown, and decisions of the largest producer of traded oil, Saudi Arabia. Saudi Arabians fear that "if oil price is raised too quickly, Western efforts to devise substitutes and to restrain consumption . . . would accelerate to the point that oil would no longer be a primary source of energy," hence, eventually hurting the oil producing countries. Saudi Arabians want the price linked to some measures of global inflation, economic growth and currency fluctuations in the West, so that oil automatically rises slightly faster than inflation (33), ensuring a more stable world economy (34).

The Saudi Arabian policy is influenced by several factors:

- (a) To protect their deposits and investments abroad, and to maintain good relations with the United States on whom she depends for military hardware and for checking Soviet influence in the Gulf region (Saudi Arabian leaders are staunchly anti-communists), Saudi Arabia feels it is to her interest to help maintain a stable free world economy through gradual, predictable oil price increases.

- (b) With huge oil reserves that could easily outlast many oil producers, Saudi Arabia does not share the view of some producers with small reserves who naturally would like to sell their oil as fast as possible at the highest price the market can bear (21). Saudi Arabia does not want too rapid a shift to non-oil energy alternatives by the West as a result of too high oil prices, which would leave her oil she could not sell easily after the Year 2000.
- (c) Saudi Arabia perceives herself as the leader of the Arab bloc and the Islamic world.

Perception by developed countries in the West is typified by Australian Energy Minister John Corrick who stated that the glut in the world market gives the Western consuming nations a "breathing space" to move to other fuels before the next energy crisis (36). His statement was supported by the IEA when, upon reviewing the energy policies and programs of industrialized nations, it announced that they face the possibility of a third oil price shock during the 1980s. The third shock could occur if the industrialized countries failed to achieve a smooth transition to a better balanced economic growth in 1990. IEA agreed on increased use of coal, gas and nuclear energy, conservation of oil and holding down of oil imports in order to survive because the glut is a temporary situation (36).

They expressed fear though that the ensuing dampened economic growth and increased inflation could seriously affect the prospects for exploiting non-oil energy resources in the 1990s (37).

Because the present oil glut is partly artificially engineered and partly due to the momentary mild recession in the West due to the second oil shock of 1979-1980, it is the better part of prudence for decision makers to base energy policies on long-run past and likely future behavior of oil prices rather than on the present temporary oil glut which may soon be over.

## REFERENCES

1. Wassily Leontieff, Anne P. Carter and Peter A. Petri: *The Future of the World Economy – A United Nations Study*. New York: Oxford University Press, 1977.
  2. Carrol Wilson: *Energy: Global Prospects 1985-2000*, Report of the Workshop on Alternative Energy Strategies. New York: McGraw-Hill, 1977.
- Paul S. Basile: *Energy Supply-Demand Integrations to the Year 2000*, 3rd Technical Report of WAES, Cambridge: MIT Press, 1977. On page 18, the author states:
- "The central results are that in spite of reduced overall demand growth, in spite of strong conservative measures, in spite of higher oil prices and vigorous actions to bring in additional supplies . . . the sum of national expectations for oil imports in the year 2000 is . . . larger than the WAES aggregate estimates of the maximum potential oil exports. The result is prospective oil shortages."
3. M. King Hubbert: "Energy Resources" in *Resources and Man*. Freeman: National Academy of Sciences-National Research Council, 1969, pp. 157-239.
- M. King Hubbert: "Survey of World Energy Resources" in M. Ganger Morgan: *Energy and Man: Technical and Social Aspects of Energy*. New York: IEEE Press, 1975, pp. 3-19.

4. See M. A. Elliott and H. R. Linden: "A New Analysis of U.S. Natural Gas Supplies" in *Journal of Petroleum Technology*, XX (1968), pp. 131-141. Or see Charles L. Moore: *Projections of U.S. Petroleum Supply to 1980*. Washington, D.C.: U.S. Dept. of Interior, Office of Oil and Gas, 1966.
5. *Associated Press*, February 24, 1980.
6. *Times Journal*, April 9, 1980.
7. "Lower OPEC Supply Seen by 1990s", *Times Journal*, September 9, 1980.
8. Fercidun Fesharaki: "Global Petroleum Supplies in the 1980s: Prospect and Problems" in *OPEC Review*, IV, No. 2, Summer 1980, pp. 27-49.
9. See, for instance, S. Fred Singer: "Human Energy Production as a Process in the Biosphere" in *Scientific American*, CCXIII, 1970, pp. 175-190. Or see Chauncey Starr: "Energy and Power" in *Scientific American*, CCXXV, 1971, pp. 37-49.
10. James Bartholomew (*Far Eastern Economic Review*, May 29, 1981, p. 67) quoted Chase Manhattan Bank figures which show an increase in energy (oil) efficiency of world industries starting 1979-1980:

Year	Free world oil consumption in million bbl/day	World industrial production (1975 level = 100)	Oil used per point of industrial production
1973	49.1	108	0.45
1974	48.2	109	0.44
1975	44.9	100	0.45
1976	48.7	109	0.45
1977	49.9	113	0.44
1978	51.4	118	0.44
1979	51.4	124	0.41
1980	48.9	123	0.40

11. "Soviets After Oil, US Congress Warned", *Phil. Daily Express*, April 23, 1980, p. 8.
12. "The CIA and Soviet Oil", *Newsweek*, June 8, 1981, p. 51.
13. "Huge Oil Deposits Found in Siberia", *Bulletin Today*, December 7, 1980, p. 25; "Big Oil Find in Siberia", *Times Journal*, December 7, 1980, p. 1; "World Biggest Oil Find Doubted", *Phil. Daily Express*, December 8, 1980, p. 22; "Soviets Mum on Siberian Oil Discovery", *Times Journal*, December 8, 1981, p. 1.
14. *Agence France Presse*, January 4, 1981.
15. "Reduced Chinese Oil Supply Bared", *Times Journal*, February 22, 1981, p. 9.
16. Yuan-li Wu: "China's Energy Resources and Prospects", pp. 25ff and Leslie Dienes: "Energy Self-sufficiency in the Soviet Union", pp. 10ff, both in *Cur-*



*rent History*, XXVI, No. 407, July/August 1975 issue (which featured “Energy and Scarce World Resources”).

17. Fesharaki, *op. cit.*
18. Adnan A. Al-Janabi: “The Supply of OPEC Oil in the 1980s” in *OPEC Review*, No. 2, Summer 1980, pp. 8-26.
19. *Reuter*, September 2, 1980.
20. *Reuter*, February 26, 1980; *Times Journal*, April 11, 1980.
21. “Saudi Oil Price Strategy Bared”, *Times Journal*, July 11, 1981 page 13. “Saudis Warn on Large OPEC Price Increase”, *Bulletin Today*, July 11, 1981, page 2.
22. *Associated Press*, March 12, 1980. A good in-depth study of nuclear power plant lead times is by Richard K. Lester: “Nuclear Power Plant Lead-times”, International Consultative Group on Nuclear Energy, 1978.
23. Strip-mining of coal is destructive of the ecological balance and natural capital of extensive areas. Carbon dioxide from burning of fossil fuels cannot be re-absorbed by the world’s forests and farms and by the oceans fast enough. Consequently atmospheric carbon dioxide concentrations have been increasing steadily since 1850 and the threat of global warming and climatic changes due to the “greenhouse effect” is real but not accurately predictable by the experts. See *Man’s Impact on the Global Environment – Assessment and Recommendations for Action*, Cambridge: MIT Press, 1970; or Philip Conkling: “Modeling the Global Carbon Cycle” in *Coevolution Quarterly*, XXIII, Fall 1979, pp. 8-20.
24. M. King Hubbert, *op. cit.*
25. Climatic change, in both its wide spatial and temporal effects, dwarfs “those of normal man-made technical and social change” and is “a virtual prototype of a problem poorly matched to existing human institutions.” See Charles F. Cooper: “What Might Man-Induced Climate Change Mean?” in *Foreign Affairs*, LVI, No. 3, April 1978, pp. 500-520. If the results of the various meetings of the U.N. Conference on Law of the Sea are any indication, then the great difficulties met when national and commercial interests are intertwined or conflict with interests of the “global commons” are real and motley. See Rene Albrecht-Carr et al.: “The Global Commons” in *Journal of International Affairs*, XXXI, No. 1, Spring/Summer 1977.
26. Associated Press, June 10, 1980; “More Use of Coal Seen in 20 Years”, *Times Journal*, March 3, 1981, p. 14.
27. Wolf Hafele: “A Global and Long-range Picture of Energy Developments” in *Science*, vol. 209, July 4, 1980, pp. 174-182.
28. Thomas J. Connolly, Ulf Hansen, Wolfgang Jack and Karl-Heinz Beckurts: “World Nuclear Energy Paths”, International Consultative Group on Nuclear Energy, 1979.
29. “Coal Demand Forecast to Double by 2000”, *Daily Express*, June 10, 1981.

30. "Real Price of Coal to Double in 10 Years", *Bulletin Today*, July 2, 1981, page 21.
31. Niel de Terra and Willem Smit: "Synthetic Fuels: OECD/IEA High Level Group Proposes Plan for Commercialization" in *OECD Observer*, No. 111 July 1981, pp. 27-29.
32. *Times Journal*, October 16, 1980, p. 1.
33. "Daily Telegraph on Oil", *Daily Express*, April 25, 1981, p. 4.
34. "Oil Price Freeze Seen in OPEC Meet", *Times Journal*, May 10, 1981, p. 13.
35. "UK Action Puts Pressure on 2 OPEC Producers", *Bulletin Today*, June 17, 1981, p. 1.
36. *Ibid.*
37. "Another Oil Price Shock Seen in 1980s", *Times Journal*, July 3, 1981, p. 11.