

THE PRESENT WORLD FERTILIZER SITUATION AND OUTLOOK TILL 1980

J B SKEEN, Triomf Fertilizers (Pty) Ltd

Introduction

Increases achieved in world food production in recent decades have been brought about primarily as a result of improved and increased use of fertilizers. Since it is estimated that the world currently requires an additional 25 million tons of cereals annually and since the world's reserves of arable land are limited, efforts have to be concentrated on increasing the annual yield per unit of land. In this regard fertilizers will continue to play a fundamental role. The implications of a sound fertilizer industry, stabilized by careful forward planning, in the battle to solve the world's food problems does not need to be emphasized.

During the last two to three years the world has undergone a bewildering turmoil of change which has effected every facet of national and international trade. World-wide inflation coupled with major shifts in economic power has resulted in considerable strain in the international money system. Concurrently a disastrous cropping season has culminated in a world-wide shortage of both fertilizers and food. This situation, seen in the light of a world population that is doubling every 35 years requires a clinical assessment of existing capabilities to satisfy the constantly mounting demand for food.

This paper is an attempt to analyse the reasons for the present world shortage of fertilizer and predictions on the extent to which the industry as a whole can satisfy future short-term demand are given. International trade is involved and its capricious nature makes forecasting a nightmare. A comprehensive study of the integrated mass of information available on international markets is beyond the scope of the exercise, which is a summary of the situation as analysed by various international experts.

Factors responsible for the present situation

The compound growth rate in the world consumption of fertilizers fell from 10,7 per cent between 1962 and 1967 to 7,0 per cent between 1967 and 1973. At the end of this period total consumption was estimated at 77,5 million metric tons on a plant nutrient basis. Developed countries (excluding Eastern-bloc) which currently account for slightly in excess of 50 per cent of the total world consumption were mainly responsible for the decline where growth rates dropped from 9,6 per cent to 5,6 per cent. Growth rates in Eastern-bloc countries, consuming about 28 per cent of the total world fertilizers, have remained high (about 14 per cent) while developing nations have also maintained a growth of 13-14 per cent over this period. From 1960 to 1973 the contribution of nitrogen to total plant nutrient consumption rose from 34 per cent to 47 per cent while that of phosphorus fell from 34

per cent to 29 per cent and that of potassium fell from 30 per cent to 24 per cent. The relative increase in nitrogen over the other nutrients occurred in both developed and developing countries and reflects the growing importance of this fertilizer constituent towards solving the world's protein requirements.

The growth rates in fertilizer consumption given above effectively conceal actual annual fluctuations especially in the developed countries. During the late fifties growth was apparently slow but even. It accelerated during the early sixties and mid-sixties and slackened off again during 1968 and 1969. Take-off after this relatively stagnant period was moderate and then spurted spectacularly from 1972 to date. Much of this increased demand for fertilizer initiated in North America and the USSR and to a lesser extent in developing countries.

With regard to the supply of fertilizer during these variable demand eras, the equation was more or less in equilibrium during the early sixties. Operating rates were satisfactory and prices were providing good returns. However the net situation gradually began to reflect a developing deficit in supply and, as a consequence of this increasing demand trend, producers and marketers, during the mid sixties, were full of optimism and all-out production expansions were planned and executed. This over-confidence in the future of the fertilizer industry was manifest mainly in developed countries and notably in North America. Major oil companies discovered this new branch of their petrochemical operations and stepped up construction work on new fertilizer plants. The resulting over-expansion and consequent overproduction coupled with the inevitable competition precipitated in a temporary price deterioration and consequent severe economic implications for a large percentage of the world's fertilizer producers. In a desperate attempt to keep production rates up excess product was dumped on the overseas market. As an example, nitrogen prices on the export market in 1971 fell to 30,4 against the index of 100 for 1956.

During this period, fertilizer consumption in the developing countries was doubling every five years and imported material could be purchased at prices lower than it would have cost to produce the same products locally. Consequently production planning was discouraged in these countries as more dependence was placed on relatively cheap imports which in 1972/73 accounted for almost 50 per cent of their total requirements.

In the five years up to 1973, the developed market-economy countries, wary of being caught in a similar situation to the 1968/69 era, also underinvested in new capacity and in some instances eliminated all capital spending

and actually cut back some production in 1969 by shutting down inefficient plants. With an average annual increase in world fertilizer consumption of 7 per cent and a slower increase in production capacity from 1967 an overall balance between supply and demand was again slowly being struck. The big crunch came in 1972 when as a result of a disastrous cropping year in the US, Russia, China, India, Australia and Indonesia reserves of food grains, feed grains, oil seeds and proteins plummeted to their lowest levels in 20 years. In a desperate attempt to increase food supplies there was an unprecedented surge in fertilizer demand throughout the world. To aggravate the situation American farmers increased their area under cultivation in 1973 and 1974 by 15 per cent adding some 18,2 million hectares to their total. With inventories depleted and sales exceeding production, prices began to rise in sympathy. The removal of price control in the United States during 1973 increased profitability on the domestic market and potential exports were diverted for local consumption. The net result was a steep rise in export prices which affected mainly the developing countries who were then without additional capacity. Despite herculean efforts on the part of producers, fertilizer supply failed to meet the demand in both developed and developing countries. The shortfall in developing countries has been tentatively estimated at 1,5 million tons of nutrients per annum for the last two years and is calculated to consist of 70 per cent nitrogen and 30 per cent phosphorus. During the initial stages of supply deficit, political upheavals, embargoes and the like sparked off a series of unbelievable price hikes in petroleum products on which the fertilizer industry is heavily dependant. This brought about increases in production costs, interfered to some extent with production schedules especially of ammonia and accelerated the shortfall. Nitrogen production being energy intensive depends on natural gas and other hydrocarbons for almost 90 per cent of the feedstock requirement; consequently fertilizer prices are extremely sensitive to rising oil and natural gas costs. The supply of rock phosphate during this crisis period was also being severely tested by a shortage of mining capacity and lack of adequate port facilities to move materials. In the face of this demand pressure, raw phosphate prices increased but also rose further in sympathy with increased energy costs.

Political undercurrents probably also contributed in some measure to a four to five-fold increase in phosphate rock prices experienced between 1972 and 1974.

The combined effect of increased freight and phosphate rock prices is shown in Table 1 and clearly indicates the magnitude of the cost increases which phosphate consumers had to bear.

Between January 1974 and January 1975 alone, prices of rock phosphate more than doubled so that while the above table indicates the magnitude of change it was by no means the end of the story as price changes in phosphate rock during the 12 months from January 1974 indicate (see Table 2).

TABLE 1 Comparison of landed rock prices in dollars/ton of product

Consuming countries	Early 1972	Early 1974
<i>Belgium/Holland</i>		
73/72 BPL from Florida	12,50	43,00
75 BPL from Morocco	14,55	48,00
<i>India</i>		
73/72 BPL from Florida	20,10	58,50
75 BPL from Morocco	19,10	76,00

TABLE 2 Listed export prices for phosphate rock in dollars/ton

Producers	Jan 1974	July 1974	Jan 1975
<i>Morocco</i>			
75/77 TPL (fas)	42,00	63,00	68,00
70/72% TPL (fas)	40,00	60,00	65,00
<i>Florida</i>			
77/76% TPL (fob)	29,53	46,73	62,00
75/74% TPL (fob)	27,07	41,34	55,00

To add fuel to the fire, escalating freight rates have contributed to increased prices where a doubling and often a trebling of rates registered prior to 1972 have occurred. The large tonnages of grain shipped from North America (to USSR and Japan), the greater increase in trade of alternative energy supplies and the impact of bunker oil costs are cited as the major contributors.

Table 3 gives an indication of the increase in freight rates since 1972. These figures indicate that roughly \$14-15 has been added to the cost per ton of phosphate rock from the US to W Europe. However from Morocco or Florida to India or Japan the cost per ton has risen by \$20-30 to almost quadruple the pre 1972 prices. These figures are not precise since rates fluctuate but they provide an indication of the degree of change involved. Since this period, however, some spot rates have increased by a further 15-20 per cent.

Notwithstanding government control in most countries, on fertilizer prices, cost increases have had to be acknow-

TABLE 3 Spot freight rates for phosphate rock in dollars/metric ton

Exporting: from - to	1972	mid 1973	mid 1974
Tampa - Belgium/Holland	3,05	7,50	18-20
Casablanca - Belgium/Holland	2,80	4,40	8-10
Tampa - India	10,80	18,50	35
Casablanca - Japan	8,00	13,50	36
Tampa - Japan	8,50	11,60	30-35

ledged but countries dependent on imports lost considerable foreign exchange on the higher prices of imported fertilizer. These countries naturally were mainly developing nations and, as an example of the costs they had to bear, spot C & F export prices in on urea and double superphosphate were of the order of \$415 and \$390 per ton respectively.

It is reported that part of the increased price on exported material is in the form of compensation to make up for the losses incurred by producers during the extreme oversupply and depressed prices of the 1968/69 era. A portion is also attributed to non-recoverable production costs in situations where local price control restrictions have not allowed returns to be maintained at respectable levels.

The tight fertilizer supply situation in the developing countries could have been alleviated to some extent by raising the efficiency of their factory outputs, many of which are operating at levels below the break-even point which is about 70 per cent of rated capacity. The reasons for this low efficiency are manifold and include inter alia a shortage of raw materials, lack of qualified management and technical personnel, unreliable electricity supplies, shortages of spare parts and maintenance facilities and in some instances defective plant design. It is estimated that in India for example, the removal of these constraints could have increased production by nearly 25 per cent during the 1973/74 fertilizer year.

Future trends in demand and supply

In line with declining growth rates experienced since 1960 it is predicted that world fertilizer consumption will increase at an annual compounded rate of $5\frac{1}{2}$ per cent between 1973 and 1980.

In view of the high cost of essential energy inputs and other escalated overhead costs, prices will remain relatively high as new plants coming into operation catch up with demand. Farmers are still increasing their fertilizer use in developed countries although the rate of increase has slowed during the last year in view of high prices. On the other hand cost is a more decisive factor affecting use in developing countries where current high prices are causing many farmers and importing nations to restrict purchases. Demand is not the same as desire or need and is a meaningless concept unless a price is stated or implied. Consumption in India and Brazil was relatively low during 1973/74 while Bangladesh recorded an 11 per cent decline in use — this seen in relation to the average annual increase of 13 per cent over the previous five years in developing countries. There can be little doubt that excessively high prices will be tempered, to a degree, by a resistance on the part of the farmer to purchase. Indeed such a situation cannot be unexpected even in developed areas where soil reserves of phosphate, for example, have been increasing over the last few decades and where farmers are prepared to reduce production inputs without fear of a significant loss in

yield. The current improvement in the supply of phosphates is believed to be due to this very effect. On the other hand it can be argued that since fertilizer is an important input in food production food prices would rise even further if fertilizers were not used. Any resistance to increasing fertilizer is seen only as a temporary shock and very short-term. Nevertheless this still places many developing countries in a dilemma especially those smarting under the effects of increased oil costs. India, for example, is reported to require 50 per cent of her export earnings to pay for oil. Other vulnerable regions include South and South East Asia, parts of Latin America and Africa all of which are experiencing severe balance of payments problems and lack sufficient foreign exchange to pay for imports.

Notwithstanding these constraints the generally held view is that fertilizer consumption especially nitrogen will continue to grow very rapidly and with new capacity now in construction or planning a situation of relative parity should persist at least till 1980. This naturally assumes no bottle-necks in plant construction and start-up especially in view of the severe shortage of skilled construction and engineering personnel. Competition for the services of these people has greatly contributed to escalating capital cost requirements of new plants.

Ironically even assuming the availability of capital and raw materials additional capacity could be severely limited by sufficient suitably qualified people.

On the positive (or negative) side, developments contributing towards solving the supply/demand equation are subject to other reservations as well. A situation in which world food stocks are suddenly built-up by one or two very successful harvest years could have the effect of lowering the demand for fertilizers in developed countries thereby causing large tonnages of potential domestic supplies to be re-routed onto the open market. The financial implications to fertilizer producers are obvious.

The volatile nature of the fertilizer market makes long-term predictions subject to considerable error but although market forecasting is a difficult and onerous task one cannot shy away from it. The following is a summary regarding expected developments with respect to the nitrogen, phosphorus and potassium situation up to 1980. A short discussion on sulphur is also added for interest in view of its intimate relation to the phosphate industry.

Nitrogen

Sources of reference vary in their predictions on supply and demand for nitrogen but all agree that the overall situation is expected to remain tight up to 1976. In 1973 the actual deficit in nitrogen supply was 0,4 million tons and the estimated shortfall in 1974 is placed at about 1 million tons. This represents about 2,5 per cent of total world demand. In order to maintain stable market conditions

and to cover losses and other non-consumption requirements a 4 to 5 per cent excess of supply over demand is considered essential. It is therefore anticipated that during 1975 and 1976 unstable market conditions will persist as consumption and supply maintain a precarious equilibrium. In order to make up for the relatively low growth in consumption (8 per cent) in 1974 developing countries have indicated an expected increase in consumption during the current year of 17 per cent. This expectation is somewhat optimistic in the light of their infrastructural development, irrigation plans and most important of all, their foreign exchange situation.

World-wide planning and construction of new nitrogen plants has been stimulated by current high prices and anticipated attractive returns and all indications are that a surplus should exist between 1977 and 1980 providing completion dates are met. Excesses for 1977, 1978 and 1979 are all estimated to exceed the required 5 per cent of demand but construction delays, reduced operating rates and shutting down of inefficient plants could see a return to tight market conditions. The supply/demand situation in 1980 based on conditions existing prior to April 1974 are given in Table 4.

Assumed operating rates are N America, E Europe – USSR, Oceania, W Europe – 95 per cent; other developed – 85 per cent; developing and other Asia – 70 per cent.

These figures suggest a return to parity and tight conditions in 1980 but capacity announced since April 1974 and not included in this table could add well over 5 million tons to this excess. It is impossible to list all new developments since plans for additional capacity are announced almost every month and should all 'firm' and 'possible' announcements come on stream, supply would exceed expected demand by a substantial margin in 1980 – possibly some 5 or 6 million tons or almost 10 per cent of expected consumption. Much of the new capacity will be from North America, China, USSR and the Middle East. Persian

TABLE 4 *Expected nitrogen fertilizer supply, consumption, and balance, by region, 1980 ('000 tons N)*

Region	Supply	Consumption	Balance
North America	13 152	11 274	1 878
W Europe	11 712	9 481	2 231
E Europe and USSR	14 021	15 643	-1 622
Oceania	167	303	- 136
Other developed	3 401	1 333	2 068
Total developed	42 453	38 034	4 419
Latin America	2 525	3 071	- 546
Africa	1 107	1 263	- 156
Asia	5 864	7 099	-1 235
Total developing	9 496	11 433	-1 937
Other Asia	4 564	6 844	-2 280
World Total	56 513	56 311	202

Gulf countries have obvious advantages over others with regard to financial resources, location for export and raw material availability for nitrogen production. It is anticipated that these together with other developing countries will bring their share of total world nitrogen capacity from 13 per cent in 1973 to 23 per cent in 1980 – an increase of over 13 million tons.

The central problem in developing countries remains the low operating rates of production units of around 70 per cent compared to the almost 100 per cent in developed regions. Reasons for this low output have been enumerated but it has been calculated that a 10 per cent increase in efficiency at 1974 prices represents a saving on import bill of some R1 200 million. Not only will improved efficiency reduce production costs by spreading overheads but future investment needs are reduced. At current escalating capital costs, economics of new plants will be vastly different to the estimates currently used in profitability studies.

With regard to the nitrogen industry in general, any down-trend in future ammonia prices will lie in reducing fixed costs assuming no easing in energy costs. Improved technical efficiency on present designs is believed to be near the theoretical maximum and variable costs are expected to receive little relief from this quarter. Reduction in fixed plant costs arising from technological changes in the ammonia process itself appears to offer the only source of salvation. The following extract is taken from a recent publication of Nitrogen.* "As technology has improved and as fertilizer producers have adopted more economic scales of operation the cost of synthetic nitrogen supplies for agricultural and industrial purposes has fallen fairly steadily over the last 20 or so years, certainly relative, in the case of the farming sector, to other necessary inputs. The price movements observed in 1973/74, occasioned by exceptional circumstances, have upset this pattern somewhat, but domestic prices in most producing countries are still below the level to which they would have risen had they kept pace with the general level of inflation since the mid-1950's."

Phosphorus

Taken over the last 25 years world consumption in P_2O_5 fertilizers has grown at a rate of 6 per cent per annum but year by year increases have been somewhat sporadic. Based on past trends it is expected that consumption from 1975 will increase at a compound rate of about 4,5 per cent per annum to reach 31,2 million tons P_2O_5 in 1980.

Presently there has been a considerable improvement in the supply of phosphates on the world market and a surplus from 1976 is predicted. This trend is expected

*Nitrogen – March/April 1975 – p. 37. The British Sulphur Corporation.

to continue into the late seventies as additional capacity expansion comes into production. With few firm commitments after this period a return to a possible market balance during 1980 is anticipated. The expected supply and demand balance in 1980 by region is given in Table 5.

Assumed operating rates are Developed countries – 85 per cent; Developing countries – 60 per cent.

The figures contained in the above table indicate that both Latin American and Asian countries will be in a deficit position with North America and Africa being the major suppliers.

It is expected that virtually all the increase in world P_2O_5 consumption will be attributed to wet process phosphoric acid and that the use of straight single superphosphate and basic slag will decline absolutely. Based on new phosphoric acid plant announcements as at August 1974 which are expected to supply an additional capacity of about 10,5 million tons P_2O_5 North America, Western Europe, North Africa, and Eastern-Europe-USSR will account for about 86 per cent of the total. This increased production which is expected to raise the anticipated phosphoric acid capacity in 1980 to about 30 million ton P_2O_5 should increase the proportion of phosphoric acid in world phosphate fertilizer consumption to over 50 per cent. Phosphoric acid dominates the phosphate fertilizer industry in North America in that 82 per cent of phosphate production is attributable to this intermediate, while in Europe and Socialist countries the proportion in 1971/72 was less than 50 per cent. This low percentage was attributable largely to the production of nitrophosphates, basic slag and superphosphates but in the light of new developments, phosphoric acid is expected to dominate these phosphate fertilizer industries in the not too distant future.

Countries expected to be the major importers of phosphoric acid in 1980 include non-Socialist Asia (1 million

TABLE 5 Expected phosphate fertilizer supply, consumption, and balance, by region, 1980 ('000 tons P_2O_5)

Region	Supply	Consumption	Balance
North America	8 843	6 600	2 243
W Europe	6 755	7 183	- 428
E Europe & USSR	8 227	7 385	842
Oceania	1 514	1 507	7
Other Developed	1 359	1 176	183
Total Developed	26 698	23 851	2 847
Latin America	1 194	2 305	- 1 111
Africa	1 553	647	906
Asia	1 314	2 510	- 1 196
Total Developing	4 061	5 462	- 1 401
Other Asia	1 703	1 912	- 209
World Total	32 462	31 225	1 237

tons P_2O_5), Latin America (0,5 million tons P_2O_5) and possibly Eastern Europe (0,6 million tons P_2O_5). Mexico is expected to remain the world's largest trader in phosphoric acid but the USA, Morocco and South Africa are likely to emerge as other leading exporters. Together these four countries could account for over half the seaborne exports in 1980.

The prospects of phosphoric acid supplies increasing faster than import demand has encouraged potential exporters to seek firm markets before the market weakens. However, while adequate facilities are being planned to produce phosphatic fertilizers the main concern of the industry is the availability of phosphate rock. The increase in demand over the last few years has been met largely through expansion and better utilization of existing mines and drawing from producers stock-piles. Any further increase in production output will have to come from new mines. This situation cannot be changed overnight. To increase production will require opening of new mines and more importantly the new mines will require new machinery. This is complex machinery, it is expensive and requires long lead times for delivery, installation and efficient functioning.

In the light of improved prices, deposits throughout the world are being actively explored, evaluated and examined for possible exploitation. For countries which are major phosphate importers the recent fourfold increase in prices has provided a massive stimulus to seek out alternative sources of raw materials from within their own borders. However, the investment inertia inherent in any major industrial decision will no doubt delay to some degree the opening of mines in new regions. At the present time 50 per cent of phosphate rock supplies are traded internationally and with other world wide deposits now becoming economical this percentage could drop in the future. North and West African producers are expected to increase their share of world seaborne exports from 51 per cent in 1973 to 63 per cent in 1980 with Europe as a whole consuming some 60 per cent of total world trade.

It is expected that in 1976 and 1977 the phosphate rock market will tend increasingly toward a balance providing all new capacity expansions come to fruition. Between 1977 and 1980 an additional 30 million tons will be required to meet demand which would reach a level of 135,5 million tons in 1977 and 165,5 million tons in 1980. Of this 20 million tons, it is estimated that 80 per cent will come from USA, North Africa, Australia and USSR-China. These predictions are heavily influenced by what may prove to be too optimistic an assessment of phosphate rock developments in the Socialist countries. If expected developments in USSR-China fall short of production predictions the increased demand will have to come from the international market and in view of the large quantities involved the impact could be substantial. The general problems common to all producers such as lack of equip-

ment, power shortages plus the added complication in developing countries regarding skilled labour, general infrastructure etc. could quite easily delay some new mining projects and upset the anticipated balance.

Regarding future prices, these will rest heavily on the extent to which USSR - China phosphate rock production predictions are correct, assuming a constant demand pattern. It is believed that Morocco may well also provide special long term credit facility schemes to consumers in developing countries with acute foreign exchange problems thereby maintaining an increasing demand. On the other hand many major rock exporters are investigating in phosphoric acid plants in order to substitute rock exports with a higher value intermediate. This could have an adverse effect on prices through a resistance by importing countries to purchase a higher value product which would affect balance of payments. The reluctance on the part of the farmers to accept the full extent of the recent price increases in phosphate could in the end have effect on new capacity expansions and the extent of such a resistance will probably only be felt towards the end of 1976. Stockpiling of fertilizers and rock in importing countries, arising from a fear of continued shortages, has been reported and the false demand that this has created may well result in an oversupply position in future.

Potassium

In all predictions on demand and supply a surplus of potassium is indicated between 1975 and 1980. Although considerable discrepancy among forecasts is in evidence the dramatic increase in world demand between 1972 and 1974 was satisfied largely by Canadian and USSR producers with the Canadians increasing their output during this period by some 33 per cent. This increase resulted from better use being made of existing capacity but in view of labour shortages and unreliable equipment delivery schedules, serious doubts are expressed whether the existing production can be further increased. There is some doubt whether the start-up of new potash mines reported in 1973 had any significant impact on 1974 production figures and the tight market at the time probably reflected to some extent the failure of these new projects to materialise.

Despite increases in Canadian potassium supplies the USSR is uncontestedly the world's largest producer and indications are that it will continue to increase capacity throughout this decade irrespective of the intentions of other producers. Saskatchewan mines are currently operating at 80 per cent of nominal capacity and government attitudes to mining taxation have delayed capital expenditure on expansion and de-bottle-necking. The Canadian potash industry is caught between the federal government and provincial government on tax on income from natural resources. The net effect of the dispute has been to bring any plans for expansion to a complete halt. However, as in the case of phosphate rock, rising prices and grow-

ing tightness of supply have stimulated interest in other sources of potash around the world and it is expected that new projects should add some 10 m tons K_2O to the world capacity by 1980 thus raising total world production to about 31 million tons K_2O per annum. Again, by far the majority of this expansion is expected to come from the USSR thus increasing its lead as the major producer. Currently the USSR (27 per cent) together with Canada (23 per cent) account for half of world production and various producers associated with West European industry for slightly over 25 per cent of the total. Estimates of world demand at the end of the decade range from 23,4 to 25,5 million tons K_2O and the predicted 5-7 million ton surplus automatically assumes a future dip in prices. However, the strong monolithic sales organizations in Western potash industry could very well manipulate the market to ensure continued attractive returns for their producers. These cartels are expected to supply some 60 to 70 per cent of the total international seaborne market for potassium chloride and are in an ideal position to ease back on production schedules to counteract unfavourable prices.

Sulphur

Nearly 40 per cent of the world sulphur consumption is used in the production of phosphate fertilizers and the intensive demand for fertilizers during the past few years has culminated in a proportional increase in demand for sulphuric acid. The consequence naturally has been an escalation of world sulphur prices rising to an all time high for spot deliveries early in 1975. However, the current declining demand for phosphate fertilizers brought about mainly by high prices and high stocks believed to be held at both farm and retail level has manifested itself in a declining interest among sulphur buyers willing to pay high prices for immediate delivery.

The 1974 world production of sulphur-in-all-forms stood at 51,6 million tons of which almost 70 per cent came from the Western world. Consumption during this period totalled 48,4 million tons with brimstone demand showing a massive increase and accounting for about 60 per cent of this total. The strong expansion in brimstone consumption was occasioned by the increased requirement of the phosphate industry in the United States and these needs are expected to escalate. Indeed, it has been reported that sulphur supplies, for some of the new projects due to come on stream, have not yet been secured and with primary producers in the Frasch industry producing at the limit of effective capacity and West Canadian stocks limited by transport problems the demand pressure could very well be maintained.

As a salvation to future sulphur shortages producers are expecting significant contributions to brimstone supplies from sulphur recoveries at oil refineries in the Arabian Gulf. Should these fail to materialise, producers could well find an exceedingly tight supply situation developing after the end of the present decade.

Conclusions

The differential between agricultural product prices and input costs, notably fertilizers and energy, coupled with the availability of credit facilities, is perhaps the most reliable barometer of fertilizer demand and the relative changes between these prices roughly indicate the degree of expected demand. Despite the tremendous increases in fertilizer, energy and other farm inputs product prices have, and always will, rise in sympathy to maintain a healthy profit margin and ensured viability of the farmer. Although short-term demand may prove to be erratic and unpredictable, medium term (5 year) consumption will seldom deviate significantly from historical trends since food consumption, barring catastrophic upheavals, must follow population growth albeit perhaps not at the same rate. There is every likelihood, therefore, that the fertilizer industry will follow the same erratic and cyclic growth patterns experienced in the past medium term predictions should not deviate significantly from past trends. The problem is to contain the peaks and valleys of oversupply and undersupply to within reasonable limits.

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