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BECKER-BOOST, ERICH H. — ARTICLES and Speeches (1971)

Becker-Boost

REMARKS

Attached please find a copy of Mr. Becker-Boost's speech that he hopes to give at the UNIDO Fertilizer Symposium in New Delhi between October 11-13, 1971.

From

C. Gardiner (Secretary to Mr. Becker-Boost)

Filed in speech
BK

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL FINANCE CORPORATION

INTERNATIONAL DEVELOPMENT ASSOCIATION

FINANCIAL IMPLICATIONS OF MEETING THE FUTURE FERTILIZER NEEDS OF DEVELOPING COUNTRIES UP TO 1980

by Erich H. Becker-Boost

DRAFT
EBB:sg
October 6, 1971

I. THE TASK OF THIS PAPER

There are four methods of beginning a speech; one of them is by starting with a joke. My joke is as follows: I am going to present you with a paper on "Financial Implications of Meeting the Future Fertilizer Needs for Developing Countries up to 1980" by not having used a computer and by not even applying semi-logarithm paper in market forecasts, nor have I bothered with optimization problems.

SLIDE 1

As my first slide says, no one can talk as interesting as the fellow who is not hampered by facts and figures. I will produce about thirty slides with old fashioned graphic illustrations of how I see the problems of meeting future fertilizer needs. I have also restricted the use of fancy economic terms because I am assuming that we are among fertilizer specialists, who are always against justifying loss makers by merely giving economic reasons.

Not anyone talking about this subject is really an "objective" author: if UNIDO talks, they have to foster industry in developing countries. Nitrex must be in favor of fertilizer exports from Europe, and the engineering companies' contributions aim at selling plants, whatever the economic impact to the LDC may be. In my case there is an ambiguity: if I speak as a staff member of the World Bank Group, I am in charge of Development (IBRD) and as an IFC man, I have to consider plain financial profitability, but in both cases, our existence is best proven by as many projects done as justifiable. Altogether you may say that I should be basically investment oriented rather than commodity-import-oriented.

Having set out my subjective feelings, I would like to tell you that the first objective will be to verify and comment on consumption and demand forecasts. My second objective is to transform quantities and capacities into terms of money needed. My third objective is to outline whether, how, and where this money could be raised, and last but not least, I would like to talk about profitability of fertilizer ventures.

I may violate an old rule for speakers of not talking longer than forty-five monues and I ask you:

a. to forgive me for that in advance, and

b. to avoid snoring even if it's boring.

This slide gives you an outline of my paper since you have not received any copies in advance, and I should like to jump to an overview of sectors in which investment capital and recurring expenses will be needed.

SLIDE 2

This graph is intended to show you the many sectors in which you may have to pour money in order to make a fertilizer investment successful. It starts with the mining or other production of feedstocks, continuing with their transportation to the factory, and focuses around the fertilizer industry as such. Integrated parts of any investment in such an industry are investments in Planning and Engineering, in training of people, utility units, housing, amenities, and as a fashionable recent addition, ecological units. We will be discussing a second large area -- the distribution, marketing and field application of fertilizers. In the past, this has been a stepchild of most fertilizer project studies because it is much less glamorous than an impressive manufacturing facility is, but it is at least as important as direct plant investment is. A part of this section is also the financing of credits to the farmers as well as of facilities to store and to move the finished products, namely, the increased crop harvest resulting from increased fertilizer application which has to be moved either to the local population or even (as may well be in the future) into other countries.

II. FACTS, ASSUMPTIONS, AND FORECASTS UP TO 1980

1. The Problem of Forecasting

Although UNIDO has prepared a pace-setting paper on fertilizer demand and production projections up to 1980, I have endeavored to add or subtract, according to the knowledge within the World Bank Group, at least for those countries for which we have more recent information. A funny result is that you get straight lines on simple graph paper. This fact may be caused by the intermingling of so many different growth rates for production as well as for consumption in the various developing countries that in the average logarithm increases will turn over to a linear form. This is not in line with any of the growth curves used by economists:

- Gompertz curve
- Pearl-Red or logistic curve
- modified exponential curve and
- logarithmic parabola

or in other words, this result of an almost linear production/consumption increase in LDCs over the next ten years is a modified exponential curve of the $y = a + b\ x^n$ with n = 1 or it may be considered a logarithmic parabola without the squared term. When using such averages one must be careful. Think about the dog who has his tail in ice and his head in fire -- he should, on the average, feel well. I bet he does not.

SLIDE 3

The next two slides show the consumption and production forecast under various extreme assumptions: no investment would be made leaving the production as it now is, with two variants: either a constant consumption or an increasing consumption according to the growth rate as will be discussed later on. The balance between production and consumption would either remain at the present level or in the other case, the gap would increase to such tremendous quantities that fertilizer imports would have to be imported, or otherwise the success of the so-called Green Revolution would go down the drain. We may eliminate both of these extremes, and I use them for illustration purposes only in order to show that at constant production levels, we would have to import about 16 million tons of nitrogen by 1980 (half of the actual total world production) and 6 million tons of P_2O_5 requiring almost $3 billion per year for importing fertilizers.

SLIDE 4

The impact of investment as suggested in this paper on the net import requirement is shown under the same two assumptions:

1. with a constant consumption and
2. with an increased consumption

This last graph shows the impact of increased investment and sales activity: the gap in nitrogen supply will remain at the 1970 level with 3.5 MT N per year, but with a consumption increase of about 300%, and the phosphatic fertilizer gap will double from .8 to about 1.3 MT P_2O_5 per year, with a considerable increase in consumption of about 200% in ten years.

Having outlined possible, although not likely extreme cases, may I now draw your attention to another serious problem in forecasting, namely, forecasting the total required investment cost. This problem is three-fold: to determine the direct plant cost as of now based on actual prices, and to think of all the necessary investment which is related to any new factory. Both items then have to be corrected for cost escalation. Although many fertilizer projects have been carried out in the past, only recently the so-called new generation of big ammonia/urea plants have been introduced into developing countries and a very few only have completed erection, and therefore, our knowledge about specific and total cost of implementing such projects is still limited to a few cases. Direct plant investment for "standard" ammonia/urea complexes and phosphatic fertilizer plants may be estimated at 1971 costs, depending on the type of project and the country, within reasonable limits of accuracy of say ± 10 or ±20%. Quite generally, as will be outlined in Mr. Cottrell's paper, fertilizer projects cost much more than they have been estimated to cost, with the exception of only one case, in the Bank's experience. In addition to the problem of estimating the actual direct cost of a plant, we have to consider distorting factors prevailing in various countries, such as import duties on equipment which may vary during the construction time; this recently happened in one country and necessitated changes in the financial plan. Another problem is the contingency allowance for unknown financial burdens such as duties and taxes, provision for possible devaluation or revaluation or floating of the currency of the country in which the plant is to be built, or from which the equipment is expected to be supplied; this latter case is being called the dollar gap; finally, the old fashioned "inflation" factor which is more fashionably called the escalation factor.

In IFC we are right now trying to develop a method of better forecasting investment costs which is based on probability considerations and gives at least some indication of how big the probability of over- or underruning a most probable investment cost estimate is, but even with such sophistication, we should not expect a better than a plus or minus 10% estimate in single projects. When forecasting for a whole sector of industry like the fertilizer industry, and for many countries, the pluses and minuses should iron out, provided that we have available a reasonable set of figures for completed comparable projects, which we are beginning to have available.

Less reliable are estimates of indirect investment costs such as investments needed around the proposed fertilizer complex as such, as I was mentioning before and has been shown on the first graph.

If we keep this in mind (and it is only a selection of problems which did occur and which will most likely continue to occur, you will probably agree with me that any optimization study on various cases on nitrogenous and phosphatic fertilizer needs in developing countries may not lead any further. Although this sounds like a pitiful statement, it is not the case as long as the gap between supply and demand is so large that we may be allowed to plan on the basis of simplified assumptions.

2. Nitrogenous Fertilizers

We have seen in the previous slide that the forecast as used in this paper calls for implementing additional capability from 1969 to 1975 of about 7 million MT per year of nitrogen capability, plus 5.3 million MT per year capability in the Second 5-year period. This would only achieve the goal that with the forecasted consumption of about 14 million MT N in 1975 and about 20 million MT of N in 1980, the gap between production and consumption in developing countries would remain at about the 1969/70 level of 3.5 MT per year. Out of this, between 2.0 and 2.6 million MT of net imports are estimated to be needed to Socialist Asia. Details of this calculation will be found in my paper as it is expected to be printed. I have cut production as well as consumption forecasts, and have assumed that effective world consumption/production in 1975 will be about 44 million MT of N, and in 1980 about 60 million MT of N leaving no big gap for stockpiles and therefore -- no screaming by the nitrogen industry -- ! provided they don't repeat their mistakes from the past -- but who does not? What is experience: you recognize the mistake when you make it for the second time!

The trade in nitrogenous fertilizers in the coming decade will change considerably due to the expected tremendous consumption increase in LDCs by about 12 million MT of N. Finished fertilizer imports may increase to 7 million MT from 4.4 million MT last year; other sources say only 3 million MT of N has been imported; this indicates again the large differences in statistical information available.

SLIDE 6

Assuming a specific size of fertilizer plants of 180,000 MT of N annually in the first half and of 270,000 (which is equivalent to a 1,000 ton per day ammonia plant) in the Second 5-year span, one would need to build thirty-one more plants up to 1975 and another twenty plants in the latter half of this decade in developing countries alone. Although these figures seem to be high, there are already at least 20 similar projects under way, or in an advanced planning stage, and the remaining necessary projects may well be carried over into the Second 5-year period which does not affect the overall picture. This graph gives also the total investment capital employed. I have based this on the assumption that debottlenecking will cost about $150 per annual metric ton of nitrogen, and new plant capacity with the plant sizes as mentioned will cost about $400 per annual metric ton of N, decreasing to $325 for the bigger sized plants. These costs only cover direct plant investment as I have explained before.

Total added investment in developing countries up to 1980 is estimated at $4.2 billion dollars with a 60% foreign exchange component. If distributed in even installments over the ten or eleven years, about $400 million dollars financing would be required annually for the nitrogen fertilizer industry. This sounds almost like "Mission Impossible." Some shifting is likely from investment activity as forecasted for developing countries, more to the industrialized nations for which this forecast assumes no new plants to be built up to 1975 at all. Although the fertilizer industry is depressed and far from making profits, there is still some investment activity under way. This would rather mean a shifting of some of the new capacity forecasted for the developed countries from the later 1970's into the earlier years and total funds would be affected by such shifting only slightly.

SLIDE 7

I am now focussing on the question of importing nitrogenous fertilizers compared to local production. Since this issue has been discussed in great detail in a number of papers, I am only extracting some highlights. The first one is the production cost compared to the price to the farmer. I am showing you this slide mainly to achieve the right prospective, namely, the ratio between production costs and cost incurred when moving the product from the plant to the farmer. If we take out the excise duty, the farmer pays about double what the manager gets ex-factory. This is not only true for the example chosen, namely India, but it is more or less the same in all countries. If we work back from the price to the farmer (which is usually fixed by the Government) down to the ex-factory realization and then subtract all the cost items which have to be spent, in the example shown, nothing is left for profit. I don't think that this is a very satisfactory result and admittedly it may hopefully not be representative for the nitrogenous fertilizer industry in developing countries. But it at least explains the deficit so far experienced in most fertilizer factories. Still, some governments believe in big profits in this sector because they argue convincingly, why do still private companies apply for licenses to produce fertilizers? A good question anyway. In any case, it seems to be increasingly difficult to make up a $20 per MT of N profit which would be about considered a reasonable return as will be explained later. This graph shows furthermore the result of crystal ball studies regarding future cif prices for N fertilizers: it says, landed cost may be expected to remain on the actual low level of about $130 per MT of N.

3. Phosphatic Fertilizers

The nitrogenous fertilizer industry is somewhat easier to describe, to plan, to handle -- due to its dependence on usually one feedstock only and because nitrogenous fertilizers are earlier and better known than phosphatic, with some exceptions such as in Turkey. For supplying phosphatic fertilizers to LDCs, we may consider three ways, and the outcome of this I am going to show you on the following graphs.

First, three cases to get phosphatic fertilizers to a consumer are being shown -- Case A for straight imports, B for importing rock phosphate and sulphur, and C, shipping phosphoric acid and transforming it into final fertilizer in the consumer country.

The next three slides give production cost and import prices as estimated for these three cases, for Asia, Latin America, and Europe.

Summarizing, the cost of importing versus locally producing phosphatic products are shown on the following slide, and this indicates that in almost all cases total production costs are within the "grey area," that is, within the range of what one also had to pay for imported material.

The answer clearly can only be given in the economic appraisal of each project. Furthermore, freight cost changes make this industry more vulnerable than the nitrogen industry, as also shown on the slide.

A determining factor will probably be the phosphoric acid trade as shown on the next slide. I have only assumed a moderate increase up to 1980.

The import-export situation in LDCs is shown, and the direct investment cost in phosphatic fertilizer industry needed up to 1980, including its regional distribution.

Finally, the effect of this investment activity on the foreign exchange flow is given on the following graphs.

4. Potash Fertilizer

This sector is not handled in such great depth as the other industries. The main reason for this is that potash consumption compared to the other nutrients will remain small although in certain areas and with certain crops more potash needs to be applied especially when increasing the dosage of other nutrients.

Many studies have been undertaken on the availability of potash, especially at the time when the prices dropped about two years ago and the Canadians exported potash at less than $15 per ton ex-mine. The production capacity is now assumed to be by far in excess over the actual production of about 15 million tons of K_2O and the capacity is estimated between 20-25 million tons of K_2O per year which compares to a total forecasted consumption increase in developing countries from now until 1980 of only 3.2 million tons K_2O per year. Some investment will be done in potash mining in some of the developing countries who have local potash resources (such as Spain, Israel, Chile, Peru, Jordan, the Congo, Ethiopia, Morocco and West Pakistan) but total potash capacity may not reach more than 2 or 3 million MT a year altogether. Still, this would cover the LDC demand increase, and open up additional trade possibilities among LDCs. The cost of net potash import into developing countries based on a cif price of $40 per ton of potash with 60% K_2O is only a fraction of the cost of the two other nutrients, namely, $133 million per year in 1975 and $189 million per year in 1980. Who knows whether the depressed potential prices will remain or even go lower or go back to their past level which was for a while almost double of what it is now?

5. Total Cost of Importing Fertilizers and Feedstocks

Future gross needs for fertilizer imports in developing countries have been estimated with this paper, based on detailed section studies, as follows:

	1969/70	1975	1980
	($ Million/year)		
N-Fertilizer Sector	646	845	1,197
Phosphatic Fertilizer Sector	348	592	769
Potash net imports	72	133	189
Total	1,066	1,570	2,155

Before arriving at this total, several assumptions have had to be made on top of those already mentioned: nitrogenous fertilizer manufacturing is supposed to be based 75% on natural gas, naphtha, fuel oil and other hydrocarbon feedstocks, priced at the equivalent of $20/MT; 10% of the total may be based on imported ammonia at $40/MT delivered costs, and the balance would still be produced from solid fuels (coal, lignite) and other sources. Phosphatic fertilizers as explained in greater detail before, will continue to be made from rock and sulphur, and some phosphoric acid trade has been encountered, as well as the manufacturing of nitrophosphates. I have not assumed any substantial contribution to the fertilizer sector from elemental phosphorus, but of course this method may revive, or better, come to life as soon as sulphur prices would start to climb again.

The big chunk in fertilizer import cost is presently made up of nitrogenous fertilizers with about 60¢ and decreasing by 1980 to about half of the total fertilizer import costs. Since I didn't have a crystal ball, these figures are based on actual prices and forecasts of experts with whom I have consulted. If I were able to forecast prices with a high degree of probability, I would not be forced to make my living at a moderate salary. Misinvestment in most of the fertilizer sectors proves that obviously people who get the big salaries today, are no better at making or evaluating such forecasts.

6. A Special Word on Freight Costs

This is a major part of total expenditures of fertilizer and feedstock trade. I have shown you the importance of freight costs in greater detail for the phosphatic fertilizer industry because for every ton of nutrient, one must at least move about two tons of product (in phosphoric acid, TSP) and about 4.5 tons per ton of P_2O_5 when producing fertilizers from rock and sulphur. For nitrogenous fertilizers, it is the other way around: finished fertilizers (urea) require the shipment of also about two tons of product for each ton of N, but for raw materials plus fuel, only slightly less than one ton per ton of feedstock has to be moved to the factory.

Any judgement of whether local production, or imports, is of greater benefit for a developing country, has been, and will continue to be, very much dependent on freight rates because the differences in freight of say $5 per ton of phosphate rock is equivalent to about $18 per ton of P_2O_5 and would be by far more important than differences in yield, or more or less attractive consumption figures, though all processes would of course suffer or benefit from freight rate changes. Freight rates for shipments in bulk and bags, moving across the world, cost between $3.50 and $17.00 per ton depending on the tonnage (from a few thousand up to 40,000 tons) are moved in fertilizer movements. Similar freight rates have been charged for instance for phosphate rock movements to India, from nearby Aqaba, and from Morocco, at $6-8 respectively per ton. Freight rates from Morocco to China were early in 1970 about $12 per metric ton compared to $23 a year ago, and Florida rock has also been shipped to South Korea for $12.50 per ton only.

These events in 1971 again illustrate the vagaries of the tramp shipping market, and the difficulty of predicting trends in freight rates. Although Japanese projections even early in 1971 forecasted a continuing boom in shipping, freight rates declined sharply. But although the size of ships has been increased, which are able to break even at low rates, this will probably not outweigh the continuing increase in seamen's wages, port charges, fuel prices, and increase in shipbuilding costs. A 200,000 ton ship costing about $13 million in 1967 is now said to be priced at more than $28 million to be delivered in 1973/74, and in addition, shipbuilding credits are now about 7% per annum compared to 5.5% per annum previously. With such large vessels, financial costs outweigh running costs which also escalate. Therefore, freight rates may be expected to rise again to cover costs of new tonnage which in turn will be needed for the expanding volume in trade, and last but not least, for fertilizer shipments. Average and peak rates vary so much that any forecast to be undertaken for a ten year period is merely a guess. This fact makes economic judgements which are mostly based on cif prices for competing imports, even more difficult.

In addition to freight rate charges, also port charges might vary considerably. In Trinidad for instance, port charges for fertilizers have increased within one year from $7.50 per ton to $12.50 per ton.

I again want only to put the various components of the total cost calculation into the right perspective and not to take an exactness which just cannot be expected.

7. Indirect Recurring Costs

This chapter is more of a reminder than something providing you with facts and figures. Other recurring costs besides fertilizers and feedstocks, are costs for seeds, pesticides, training of operating and sales personnel, expenses for management and technical assistance, including expatriate expenses, costs for spare parts, cost of licenses (if on a running royalty basis) and last but not least, costs of extending credit to farmers, cooperatives, and small banks. Some of these expenses are covered by the production cost estimates, at least they should be considered in an appraisal. Other recurring costs may be allocated to other areas of the economy such as provision for buying high yielding seed varieties, and pesticides, which items are usually covered in the agricultural sector. It has yet to be emphasized on the strong interrelationship as I have shown with my first slide between these many sectors determining the success or failure of fertilizer application, and therefore, of the so-called Green Revolution.

Subsidies given to farmers for buying fertilizers are another item to be covered under this headline. Such subsidies are a worldwide practice: for instance, in the United Kingdom last year, $24 million was allocated to such subsidies. In Senegal, subsidies must secure an attractive cost benefit ratio if the peanut price falls.

There are many, many more examples, the most elaborate ones being in Old Europe.

I have not been able to derive from available information an educated guess of how much these recurring costs may amount to and I believe I would need a medium-sized university to work on this subject. I believe it should be an objective of further study aiming at a differentiation between the components of indirect recurring costs and try to arrive at a reasonable estimate.

8. Total Direct Plant Costs

Adding up the investment activity for the nitrogenous and phosphatic fertilizer industry, we arrive at the following figures as illustrated with Slide ___.

Actual production capability (-- all following figures in million MT/y --) of about 4.2 N and 2.9 P_2O_5 will step up gradually to a final of 16.44 N and 9.33 P_2O_5 (including phosphoric acid). Direct plant costs for both sectors to be added will probably amount to:

- from now until 1975 = $3.1 billion,
- from 1975 until 1980 = $2.5 billion, or

a total of $5.6 billion including a foreign exchange component of about 60% of total.

9. Indirect Investment Costs

SLIDE __ (repeat)

In many project appraisals we have received in the World Bank Group, no adequate consideration has been given to the indirect costs which require to be financed, and without those, the plant as such could never be a financial success, as well as no benefit to the country. I have endeavored to estimate these costs, but after a number of attempts, I have given up and like to refer this issue to comprehensive separate studies among the interested parties.

I am talking about the items we have mentioned in my first slide, namely:

(a) Supply of Feedstocks to the fertilizer industry. Some examples in the nitrogenous fertilizer sector: the naphtha supply may require refinery expansion (India) and naphtha barges (Zuari), natural gas pipelines may have to be built (Shahpur, Kuwait, Sonatrach, Dawood, Pusri) or even now gas wells may have to be drilled (Pusri, Dawood); fuel oil tank cars may be needed (Nangal project), or railroad cars to transport coal (Zambia, Talcher, Ramagundam), and coal mines may have to be started or expanded (Thapar project). In the phosphatic fertilizer field, no expansions of existing phosphate rock mining are necessary to meet future demand, but in some countries such as Tunisia, beneficiation will probably be necessary.

For export purposes, mines will be developed and expanded in Senegal, UAR, Peru and other countries, and in India, exploration and mining the Udaipur phosphates will probably become one of the major investments in the fertilizer sector. Also, new rail lines, marshalling yards, and ports may have to be built or extended in order to get rock phosphate to the fertilizer plant (Tunisia).

For sulphur and potash, although no direct investment may be needed to create new capacity, funds may well be requested to secure continuous and sustained supply, again with emphasis on transporting and storage.

(b) Utilities is another area in which financing may have to be secured before a fertilizer plant could successfully operate. Examples are the many power failures in almost all developing countries (as in New York during the summer months) and this very point has been mentioned so often in the UNIDO questionnaire that no doubt should be left about the necessity of investments for making power supply more reliable considering the even increasing costs of each day shutdown in the ever growing plants. The same applies to water. IFC is involved in a project which may even be delayed costing big money, due to late completion of water supply facilities. In Kuwait, sea water desalination caused high costs and trouble.

(c) Transportation is a most important point, relevant to fertilizer transport to godowns and farmers. Quite often, the number of boxcars and locomotives have been grossly underestimated and therefore, financing has not been secured for such transportation facilities. Even coastal barges for fertilizer shipment may have to be financed in some cases (PUSRI). The IIFCO project in

India, for example, will need an additional investment of at least $30 for each MT of N shipped to transport ammonia from Gujarat to Kandla.

(d) Distributing and warehousing eats up almost every amount of money, but in most cases, it may prove highly profitable to pour money into such a pithole. Examples where this has been done are Ultrafertil (Brazil), and projects in this country are beginning to heavily invest into this sector.

(e) Costs of housing, site preparation (Madras, Shahpur), ecological facilities, may need further quantities of money which often are forgotten when projects feasibility studies are undertaken.

(f) Cost of Planning and Engineering, finally, may have to be financed as well, not only as an integrated part of any one project, but also as an item of overhead cost. Planning and Engineering, for instance is estimated to cost up to $50/MT of new N capacity which sums up to $500 million to be spent in this decade. This surely deserves a close look!

10. Total Funds Needed Up to 1980

Summarizing the results of the foregoing studies, I have arrived at the following amounts of money which will be needed to meet LDCs fertilizer requirements.

			(In $ Million)	
Recurring Costs (F.E. only)				
	1969/70	about	950 per annum	
	1975	about	1,320 per annum	
	1980	about	1,700 per annum	
Direct Investment Cost			Total	F.E.
	1969/70-1975	about	3,100	2,000
	1975 - 1970		2,500	1,400
	Period up to 1980		5,600	3,900

Any indirect investment costs are not included and they may easily ask for funds in the same -- or bigger -- order of magnitude. From the gross needs, export earnings may be subtracted, which, without counting on potash exports yet, amount to:

$140 million/year	in 1970
$320 million/year	in 1975 and
$640 million/year	in 1980

I should again like to emphasize on the expected low accuracy or reliability of such figures: no result can be better than the inputs used, and I have sketched many of the uncertainties involved. The famous computer slogan says G I G O: Garbage in - garbage out. Anyway, we have at least the order of magnitude of funds which probably will have to be financed up to 1980.

III. FINANCIAL IMPLICATIONS

1. Financing Recurring Costs, Imports of Fertilizers, Raw Materials a. o. Commodities

As derived in the previous paragraph, total funds needed to meet the recurring import requirements of LDCs, are estimated at

about $ 950 million/y in 1970 (actual)

about $1,320 million/y in 1975/76, and

about $1,700 million/y in 1980/81

OECD has estimated that

in 1970, about $1,440 million F.E. and

in 1980, about $4,710 million F.E.

in current charges may be needed to finance fertilizer consumption in LDCs (except

Socialist Asia). These figures cover the purchase of finished fertilizers and feedstock for local production when applicable.

Other authors and agencies have arrived at different figures. For example, USAID (Gleason) estimated in 1969 that in 1975 about $1,500 million per annum would be required for all fertilizer imports (but probably excluding Socialist Asia). The Thirty-Seventh Report of the ACC of the U.N. Economic and Social Council in May 1971 cites the Indicative World Plan according to which in Asia including the Far East, $2,392 million at 1962 prices, would be the total fertilizer requirement in 1975. These estimates again differ greatly, but at least, they are in the same order of magnitude -- billions of dollars equivalent, every year in the seventies.

Costs of the other commodities which need to be imported in order to sustain operations or to guarantee a success of the direst plant investment have not been assessed as of yet w th a reasonable degree of exactness. A special word, though, needs to be said about spare parts and chemicals and catalyst imports financing. Quite frequently, its timely provision is hampered by administrative obstacles, quite apart from the lack of foreign exchange funds, and subsequently causes shutdowns of plants. The Bank has suggested that developing countries should endeavor to establish either spare part pools, or lift the limits up to which plant management is entitled to directly order spares, or to even create a spare part foreign exchange fund restricted in its use to that very purpose. What use does a $70 million investment make if a lacking $10,000 part causes the plant to shut down with not only losses of multiples of this amount per day, but also losses in foreign exchange benefits which were counted on when the plant was conceived.

Four ways have been used for procurement and financing of these commodities, and most probably these ways will remain the prevailing methods to be used in the fertilizer sector:

1. GRANTS
2. AID BY CREDIT
   a) bilateral tied aid
   b) bilateral untied aid
   c) multilateral aid
3. "AID BY TRADE"
4. Regular payments in cash

There is no argument from a financial point of view against fertilizer supply as a grant. Only about $9 million annually has been reported to have been granted during the 1966-1969 period. But these grants, as most grants, are not always given without the donor expecting recognition from the recipient (this recognition may be shown in the political field). It has also been reported, that some deliveries were of such a bad quality (high biuret contents in urea) that the reputation of fertilizers was damaged. Also, if unsuitable types of fertilizers are given away from surplus stockpiles, it may hurt the agricultural extension work in developing countries. Therefore, one shouldn't say "never look a gift horse in the mouth," or "beggars must not be choosers."

Grants cost the donor countries often less than is apparent due to the higher prices used in valuing and publicly announcing such grants, and due to the fact that the donor country's industry benefits from keeping their wheels turning. Lots of words for $9 million a year (plus Eastern Bloc grants, if any), isn't it?

Many discussions frequently distorting the facts have concentrated on the issue of tied aid versus untied aid. The overall picture indeed so far is governed by merely one method of financing, namely: tied aid including supplier credits.

Although incomplete, recent investigations by OECD show that in the three years from 1966 through 1968, out of a total aid for financing fertilizer imports into a number of LDCs of between $164 and $235 million per annum, more than 80% was channeled through tied aid (which also implies the higher cif prices in this trade). These amounts compare to a total of $1,320 million which is forecasted to be needed in 1975/76 to import fertilizers alone. A good portion will be needed for Socialist Asia.

Eastern Bloc countries are (mostly on a bilateral basis) exporting to LDCs with government procurement organization with a state trading system based on bilateral clearings. Such fertilizer trade is usually planned well ahead and according to Mr. Boudewijn of Nitrex, has proven quite successful in the last years in India, Pakistan, Ceylon, UAR, Latin America and other areas. Since these supplies have been, and probably may continue to be, on a "balanced trade" basis which offers outlets for consumer and industrial goods produced in LDCs, and payments to be due in non-convertible currencies, this part of the financing requirements of LDC fertilizer needs is difficult -- if at all -- to estimate at least as far as convertible foreign exchange is concerned. Both features (payment and trade balance) offer intangible advantages to LDCs which are not being offered by most Western industrialized countries. With some simplification: Eastern countries offer "AID BY TRADE" and Western countries "AID BY CREDIT."

Now if one endeavors to calculate the real cost to an LDC for imports of fertilizers financed by the various kinds of aid, tied or untied, and compared to "AID BY TRADE," the answer is without a doubt in the economic rather than in the financial field. Input/output information is not even sufficiently available for the actual status especially on the "AID BY TRADE" aspect, and less likely would any attempt prove successful when projecting up to 1980/81. I therefore should close this section with this though unsatisfactory statement. I could not, however, refrain from at least putting the three cases in graphic artwork.

SLIDE 30 (Tied Aid)

The first graph shows that for every ton of fertilizer (DAP chosen as an example) which is purchased under tied aid contracts, the price as stated on the bill appears much higher than what is reported to be the actual "free trade world market price." This is caused, for instance, by high freight costs which are an intrinsic part of some tied aid arrangements. Calculations were made in the Bank on the relative impacts of interest rates and maturities on financing and repayments. Some economists and I have agreed that the conclusion to be drawn is that increased nominal costs by tied aid are often offset by concessional terms granted. No more figures on this subject. One can argue that towards the end of long maturity periods, each dollar repaid is worth less than when the fertilizer was purchased. This is the inflationary side of the medal. One can also argue that if the donor country would let the credit earn interest instead of giving it to a developing country for fertilizer purchases, it would accumulate interest, and interest on interest. In any case, there is a gross aid component involved. Its gross value, however, is reduced by the subsidy which is indirectly given to the donor country's fertilizer industry as shown on this slide. This is indeed a rather complex matter and as I excused my ignorance before to you, I find that this is an economic rather than a financial problem.

SLIDE 31 (No Aid)

This slide only seems to be self-explanatory: delivery against cash. But what are the costs of this cash money to the purchaser? Also, the supplier may have to sell at rock bottom prices, so it's more complicated than it appears to be.

SLIDE 32 (United Aid)

This is what the Pearson Commission has recommended that the Partners of Development should aim at. The graph shows that it is second best (after grants) for recipient countries, and also second best (after cash payment) for donor countries; both at least on paper.

2. The Financing of Investment Capital 1/

A. The Magnitude of the Problem

Fertilizer plants are getting bigger and bigger. Costs per plant are also increasing in terms of specific costs, since ever larger capacities do not result in sufficient economy of scale to outweigh the worldwide cost escalation especially in the equipment and construction field, and to equalize higher costs involved in the increasing use of local engineering and procurement in LDCs. Cost of these services grow faster than the 3-4% average dollar inflation around the world, and they make up a good portion of total investment in fertilizer projects.

1/ This issue has also been discussed in the UNIDO monograph #6 on "Industrialization of Developing Countries: Problems and Prospects", Chapter 7.

As shown before, average costs per plant in LDCs are expected to further increase in the 1970-1980 decade:

- nitrogenous fertilizer plants may cost up to \$100 million even more doubling annual capacities from now 160,000 to 330,000 MT of N, at the end of this decade and
- phosphatic fertilizer plants may cost up to \$60 million with also about doubling annual capacities from as much as 300,000 MT of P_2O_5 towards the end of this decade.

Based on detailed individual assumptions made for the N and P_2O_5 sector, and leaving out the potash industry (assuming a sufficient supply capacity already being available for the LDC during this decade), the investment activity, and money needed, to implement additional annual production capability in LDCs of 13.2 million MT of nutrients in the first half, and 8.5 million MT in the second half ($N + P_2O_5$) is, in a nutshell, as follows:

	From 1969-1975		From 1975-1980
	about 78	and	50 fertilizer plants ($N + P_2O_5$)
will have to be added, which costs altogether	3.1	plus	2.5 billion \$ = \$5.6 billion
with a foreign exchange portion of about	2.0	plus	1.4 billion \$ = \$3.4 billion

SLIDE 2

I show this very first slide again to remind you that in addition to direct plant costs, the necessary indirect investment in infrastructure, such as utilities supply, and especially transportation (rail cars, trucks) and warehousing, may well add fund requirements on the same order of magnitude during the same time span, plus the still enormous amounts of money needed to supply fertilizer as a commodity increasing from about $1 billion per year now to more than $2 billion per year in 1980. Financing the future fertilizer needs of LDCs sounds like an unsurmountable problem.

Reminding you further of what I have said about profitability of fertilizer projects around the globe, you may agree or at least understand my worry about the chances of providing for funds of that magnitude, most of which are needed and must be drawn in a shorter than ten year period, involved in the even not-so-ambitious expansion program as outlined at the beginning of this speech.

B. Available Resources

The first question may be: which resources are available altogether for financing the total fertilizer needs, both for commodity and investments finance? As far as the financing of imports is concerned, we have already touched the point when we talked about tied and untied aid. It is, in any case, loan money which is required. The terms on which it can be borrowed are quite different depending on the source. USA, UK, and Japanese aid have been given with 0-3% interest rate, 18-50 years maturity, including even up to a ten-year grace period. Last but not least, future availability will evidently depend on the pressure of sales, and the overall fertilizer market situation which I do not dare to forecast in public.

With regard to the financing of projects, that is, of new fertilizer plants and additional investment needed, we should differentiate between direct and indirect investment.

Direct plant investment is assumed to be bound to a production company, and this will, for financing, require equity capital as well as loan capital. Presumably, different resources have to be tapped for both kinds of money. I do not intend to give a comprehensive overview on "External Sources of Financing" available for Individual Projects in Developing Countries" because in 1970 UNIDO published an excellent directory on this very subject.

Let me just pinpoint the two different types of capital -- so-called "risk" capital, and loan capital. You need both foreign exchange and local currency, the extent of each depending very much upon project and country.

Usually, the foreign exchange portion is harder to come by than local money, but this latter statement is getting increasingly wrong with the ever larger sums in local currency required for fertilizer projects. Risk (or equity) capital is scarce in most countries.

Therefore, sources of equity even in local currency may be difficult to fund although for instance in this country, share issues for fertilizer projects had been oversubscribed within a few days. International organizations and regional and bilateral institutions and banks can also provide such capital, for instance, IFC, DEG, ADELA, PICA, SIFIDA, East African Development Bank, African Development Bank, and International Investment Corporation for Yugoslavia. Semi-private development banks such as ICICI and TSKB have also invested in fertilizer projects. In some cases, government guarantees are required, but IFC, for instance, makes equity investments without government guarantees.

Loan money can be received from the same sources, and in addition, there are private banks, international agencies such as the World Bank, EIB, ADB, etc. who may lend money to fertilizer projects. Supplier credits which are more or less guaranteed by the supplier country's government play an important role in this sector of industry, but they usually carry either a high interest rate with short maturities, or due to restricted competition, they involve high price plant equipment and services. The same applies for what I have said about financing fertilizer imports. With respect to tied and untied aid, the cheapest loan money such as IDA and USAID credits, has 40-50 years maturity and carries only a nominal service charge of 3/4 of 1%. Such money can only be given to governments which relend it to the fertilizer company on commercial terms prevailing in that country.

An essential porposal which I would like to make regarding <u>indirect investment</u> is to relieve fertilizer projects from the burden of also financing parts or all of infrastructure, marketing, railroad, etc., but to look out for other, if possible, cheaper sources of money as I have just mentioned. There is a danger involved: if, with the commitment of building a fertilizer complex, those absolutely vital investments will not be added in time due to missing financial arrangements, the success of the core project is endangered. Therefore, any commitment in a factory should and must be tied to a government commitment of putting up the funds, and other resources such as manpower, to create the environment necessary for a successful fertilizer industry.

C. Ownership of Fertilizer Plants in LDCs

SLIDE 34

One might say, "he who owns, pays." I have prepared a graph on the ownership structure of the fertilizer industry in LDCs. The groups and bodies involved are:

- government and private companies in the developing and in the developing countries, and
- multi- and bilateral equity investors such as IFC.

Many government or governmental entities themselves operate, or participate in, fertilizer complexes. Major examples are:

In Asia:
- FCI and FACT in this Country,
- USSR and Eastern European Countries,
- PUSRI in Indonesia

In Latin America:
- Pemex in Mexico,
- IVP in Venezuela,
- Petroquisa in Brazil,

In Africa:
- OCP in Morocco,
- Siape and ICM in Tunisia,
- Sonatrach in Algeria

In the Mediterranean and the Middle East:
- HIP in Yugoslavia,
- IGSAS in Turkey,
- Fertilizer companies in Qatar, Kuwait, Saudi Arabia and Iran and others, including potash operations in various countries.

. This list is an overwhelming one when comparing it with the much smaller list of privately owned and operated fertilizer plants in LDCs. The graph names a few of them in Tunisia, Senegal, India, Pakistan and Brazil.

I presume that in the future, the relative share of privately-owned and operated plants will tend to further decrease if no remedies are taken by governments to attract private capital -- provided governments include this task in their programs.

D. Government Financing

There are basically three sources of governmental financing in LDCs:

- the government's own resources in local and foreign currency,
- bilateral loans by foreign governments (AID)
- international sources (IBRD and IDA, IDB, ADB and others) who channel their lending through governments.

Most governments have made, and continue to make, capital available for construction of new plants as well as infrastructure projects connected with those programs. A substantial amount of money which governments have fixed with existing investments necessitates them to sustain the projects and to rationalize them which again needs money.

The respective governments also have undertaken to provide loan money from multilateral and bilateral sources, and have tied up themselves in such long-term agreements so as not to leave too much leeway for future activity -- which is grave now that the projects get bigger and the amounts of money needed grows far beyond what has already been spent.

In some instances, the government not only had difficulties with providing the foreign exchange portion of financing, but also in supplying the local currency at the time it was needed (Turkey - Mersin; Indonesia - Petrokimia; and others). Foreign exchange will continue to be more difficult to supply from the government's own resources, except those who have access to funds, and/or give highest priority to fertilizer projects either as an import substitutor (India, Pakistan, Turkey) or an foreigh exchange earner (Morocco, S. Arabia, Algeria, Tunisia, Iran, Venezuela, and Mexico).

Bilateral loans from foreign governments are available from industrialized countries with the objective of assisting that country's engineering and supplier firms in getting awarded contracts in a highly competitive market -- that means -- the government subsidizes exports from its own country. I have mentioned the often ambiguous nature of such credits in the case of fertilizer import financing.

The role of international financing agencies will be dealt with on separate papers during this Conference, namely Samuel Cottrell's paper on World Bank Experience in Financing Fertilizer Projects in LDCs, and Roger Carmignani's paper on "The Role of the World Bank Group in Assistance to Fertilizer Production in LDC - Economic Aspects." Furthermore, most of the other institutions will report about what they have done, or intend to do, in this field.

The World Bank Group, I may summarize, has through mid-1971 lent to or taken participation in twelve fertilizer projects in ten different countries with a total commitment of $170 million. This seems low in relation to the total future needs. One must realize that the total cost of these twelve projects by far exceeds $500 million which is quite a substantial amount of investment, also compared to future needs.

A most complex example of mixed multi- and bilateral financing is the PUSRI urea expansion in Indonesia, with three sources of funds involved. The experience with these negotiations led us to the word: "The problems with financing increase with the square of the number of institutions involved." Thus, in the case mentioned, we would have nine-fold the problems which were encountered in a straight two-way financing.

E. The Role of Private Capital: Partnership with Fertilizer Companies from Industrialized Countries

SLIDE 34

As shown on Slide 34 (Ownership), quite a number of fertilizer projects have been implemented with foreign participation almost exclusively with private companies originating in developed countries. Total risk capital invested by private firms in LDCs fertilier industry, as of 1970/71, I guess may be on the order of $50 million.

The experience with such investments is discouraging so far. Only a few -- if any -- fertilizer companies in LDCs are profitable. The added risk involved in a sector which is as dependent on infrastructure, government action, weather, etc. as the fertilizer industry is, does neither help to create an investment euphoria in the private fertilizer sector. Furthermore, the size of fertilizer plants is growing also in the LDCs requiring up to $100 million or even more for one single ammonia-urea complex, and sometimes more than $6 million for phosphatic fertilizer plants. These amounts of money simply are not available in an industry which for years had -- and still has -- to live with depressed prices, and they are surely not attracted if long payout periods increase the risk inherent in any foreign investment.

Reasons beyond purely financial considerations, such as:

- the non-transferability of funds previously generated in an LDC, often linked to the blocking by local governments of investments in other than the "core" industries,
- the need to maintain a market position, and
- to get a foothold in the agricultural market which may foster other sales (such as pesticides, plastics) might still attract investments by private companies in the LDC fertilizer industry.

In all other cases, in order to attract foreign participation in a fertilizer venture, incentives in form of "fringe benefits" may be necessary. Such "benefits" may also reduce the long-term risk involved in a flat equity participation, by getting out at least a part of the long-term investment within a shorter period of, say, three or four years after that investment had been made.

Incentives could be, and have been in various cases:

- technical assistance and management contracts,
- know-how and process license contracts,
- delivery of catalysts, and
- chances to supply fertilizers during the seeding program under a "most-favored-supplier" clause.

In addition, if the fertilizer company owns, or participates in, an engineering firm, this might give some additional profit potential.

SLIDE 35

The next graph (35) shows such partnership incentives.

The figures may indicate any currency, and a participation of a Company A originating in an industrialized country, of 25% in the equity of a fertilizer company B in an LDC has been assumed. Other also voluntary assumptions made are:

- seeding program covers four years with altogether 80% of annual sales of company B which are estimated at 80, and a profit of 2 (which is 6% of sales) resulting from these sales.
- Return on investment starts six years after the equity investment will be made, and is expected to be 10% on equity (not discounted),
- Technical assistance, license, and know-how contracts will yield some profits to company A besides such intangible benefits as keeping planning staff at work during low workload times in the home country,
- Risks are assumed to be involved in the transfer of profits, for example, re-and de-valuation or floating of currencies,
- Engineering costs total about 15% of investment, and the risk involved in this business such as guaranteeing performance, etc. is limited to 50% of an engineering (fixed) fee of 5% of total investment, with profits of this part of the transaction including net profits from equipment suppy (minus risk insurance, and other capital cost), amounting to 5% of total investment.

Apparently there are three types of such participations with a profit and risk potential as explained below:

(a) a flat participation of A in B; profit potential is limited to an assumed flow of 1 per annum and with a risk element, only 3/4 may be returned, giving a payout time of t = 13 1/3 years plus 4 profit-free years after the investment has been made, or about t = 17 years, which is not considered attractive.

(b) with all of the tangible and intangible fringe benefits mentioned, the calculation might result in a 9-year payout period, and

(c) with also the inclusion of the engineering and supply business, the payout equation solves with a total payout period of about 7 years after the initial investment.

Since the assumptions are merely guesses, and this graph is only meant to illustrate the implications and complications and ways of thinking behind some fertilizer investments, it is of no use to do cash flow calculations which, of course, may lead to an entirely different picture, darker or lighter, depending on the case, and the man who has to make the decision. This reminds me of the HARUSPEX who was an augur in Ancient Rome, decided on whether or not the Roman Legions should go into battle by basing his predictions on the inspection of the entrails of sacrificial animals. Nowadays, management and governments look at at us people involved in planning as the old Romans did on their Haruspex. My forecasts do not intend to replace the entrails of sacrificial animals.

4. Profitability: Return on Investment in Fertilizer Plants in LDCs

Virtually three factors influence the purely financial judgement, stripped of any economic considerations, of whether or not a fertilizer plant may be considered profitable:

- the opportunity cost of money in the country,
- the interest rate to be paid on the loan portion of the investment as a weighted average of all loans for that project, and
- the debt: equity ratio fixed for the respective investment.

From these three factors, one may derive a voluntary figure for minimum return R_E on the equity portion of the investment, which should include the risk element involved, further developments, etc. This will be a matter of management judgement how the return on equity (or the dividend) should compare to the opportunity cost of money in that country, and whether one should look for better opportunities other than this fertilizer project to invest a given amount of money. This view of course neglects any economic consideration such as foreign exchange savings by reducing imports and so forth. It starts from the assumption that in any country, money has its "opportunity cost," at which rate it could earn profits -- as straight interest on a bank, or as an investment in an enterprise.

In most fertilizer companies, like in other industries, a debt:equity ratio of 60:40 is considered a sound basis of financing, and should be used for estimating the expected profit on the equity portion. Based on this ratio, one derives a simple formula:

$$\text{Return on Equity} \geq 2.5 \times \text{opportunity cost of money} - 1.5 \times \text{interest rate.}$$

At a given interest rate of say 10% per annum and an assumed opportunity cost of money of 16% per annum (which is equal to the overall yield, or return on total investment), the profit on the equity should at least be 2.5 x 16 - 1.5 x 10 = 25% per annum. This as we all know is not at all easy to achieve -- possible at all -- in any fertilizer plant in the world. Profits have been low or non-existent in recent years, and international competition in both finished fertilizer and feedstock and intermediates seems to continue to be keeping down profits even in the red.

Experience with fertilizer projects in LDCs with regard to profitability are specifically discouraging. Three main reasons may be held responsible for this fact:

- the plants which were built many years ago and which are now producing at a sustained level, are either too small or use obsolete processes, or both;
- the plants built more recently, are still in a stage of early operations with a high financial load or small production preventing them from profit making, and
- the generally depressed price situation of this industry in the world.

Some examples with reasons for profit-deficiencies are:

Project	Reason for "Profit-deficiency"
1. SIES, Senegal	low groundnut prices depressed the cost: benefit ratio for the farmers therefore low production at high cost.
2. NPK, Tunisia	high price for low-grade rock, and low TSP prices on most markets, not outweighed by high plant utilization
3. Ultrafertil, Brazil	excessive marketing cost (caused by too much personnel and poor study); inefficient plant design; inexperienced management caused retarded startup
4. Fertisa, Peru	plant too small and using obsolete processes; sales of urea at distress prices which in turn caused by low import prices (no protection).
5. ESFAC, Philippines	"low cost" plants causes high operating cost; high cost of raw material; intermittent supply of refinery gas, power failures; sea water cooling caused many shutdowns.
6. Mersin	situation deviated from planning status: closure of Suez Canal causes high ammonia import costs.
7. Banda Shahpur, Iran	tremendous investment cost overruns mainly due to site problems and additional feedstock pipeline; management problems; high financial burden caused by long construction period.
8. KFC, Kuwait	too small plant, prolonged initial operations period.
9. Zambia	excessive investment cost for a much too small plant, with no sufficient market for a less suitable product.

This low profitability if prevailing would seriously hamper the development of a sound financial basis, and even endanger the repayment of loan capital. The example urea price, production cost, and profit, indicates the narrow margin in which most projects have to exist.

V. CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this speech should not be to show you the big problems involved on the financial side of meeting the future fertilizer needs of developing countries. Everyone in our industry knows about that, although I may have provided you with some updated figures. I am obliged to indicate, at least, ways of how to solve some of these problems. I don't dare mark one problem as being a major one and naming the other as a minor problem because this situation may change from day to day.

The fifty-dollar question is whether a program as sketched which in a 10-year-period needs implementation in LDCs of 128 new fertilizer plants, is a doable proposal. My answer is yes, it should be. As of July 1969, the total number of fertilizer plants was estimated by the British Sulphur Corporation to be:

640 ammonia plants
280 phosphoric acid plants
400 nitric acid plants and
1,500 fertilizer product plants.

Although this has been implemented over more than half a century, we nowadays have available much more efficient and well organized engineering firms, who would be able to handle more than this number of plants, especially when also drawing on increasing availability of Engineering skill in developing countries themselves.

My <u>first</u> recommendation is to ease the workload for both planners and bidders by choosing standard sizes and types of plant. The present generation of ammonia plants may already be considered as being a standard size in the 600-750 ton per day capacity range. A good example for such "standardization" is FCI with 4 plants built at virtually the same capacity and layout. Urea standard single train plants crystallize around the 1,000 ton per day mark. I suggest that developing countries, together with interested organizations and engineering firms, now settle on the next size range for ammonia and urea and also for phosphatic fertilizer units. I believe that we all would benefit from such standardization, last but not least when estimating capital costs.

My second conclusion and recommendation is connected with using local sources of services and supply. Whilst I am personally against overdoing local involvement in too early a stage, I feel strongly about relocating part of the engineering company's work into such developing countries in which a major demand for fertilizer engineering work exists or may be expected. Although this procedure has already started with some success, including partnership arrangements, it could improve substantially. The cost of engineering which constitutes a considerable part of the total capital requirement could then shift into the local currency sector, besides the training effect and the creation of new jobs. As a task in the late 1970's, I consider to make local engineering groups in major developing countries capable of handling complete projects and only basic design or basic engineering would still have to be supplied from the more experienced engineering companies in industrialized nations and from licensors.

My third proposal is based on the overwhelming importance of indirect investments needed to make the fertilizer application a success. I therefore propose that a comprehensive study be initiated for estimating such indirect costs, which have to be financed up to 1980, specifically in marketing. It is manditory that these funds must be separated and allocated to the various other sectors other than fertilizer in which they may play an even more important role such as in agriculture, petroleum and mining, railroads, site development and ecology. I believe that we may relax on the direct fertilizer factory building activity although this may require considerable effort, but much more effort undoubtedly will be required in the distribution and marketing fields, including establishing or improving credit facilities.

I further believe that it is to the benefit of all Partners in Development, that implementing capacity for export purposes should be, if at all, concentrated in developing countries with adequate resources who may earn foreign exchange. This fourth proposal aims for fostering trade in fertilizers among developing nations, rather than selling these goods from industrialized countries on whatever the terms are. I know that this probably will not work but it still should be said over and over again.

I am in favor of untying international aid, specifically in financing investment capital, and I strongly believe in the advantages of international competitive bidding rather than using bilaterally tied sources. My proposal number five is that all information about real investment cost should be gathered and forwarded to interested parties, and to get a good picture about reasonable plant and equipment costs and prices which again would be facilitated by standardizing fertilizer plant types and capacities. I know of a case in which a nitrogen fertilizer plant with less than 100 tons per day ammonia capacity a year has been priced at about $25 million.

The sixth conclusion and suggestion concerns the high portion of freight rates as I have shown to be indicative of the fertilizer industry whether you produce it locally or import finished products. Therefore, the requirements of shipping capacity should be evaluated in great detail up to 1980 and recommendations for types and sizes of ships to be built or used by developing countries to be worked out, specifically for the fertilizer industry which would include phosphoric acid and maybe molten sulphur transport facilities.

Another conclusion and suggestion - number seven - is connected with the economic considerations involved in planning the fertilizer industry. It is a problem to determine the C & F values of fertilizers and feedstocks under so-called free trade conditions. It would be helpful if a kind of standardized hypothetical price calculation could be made up for favorable locations for nitrogenous and phosphatic fertilizer plants which should include reasonable profits, and to have this hypothetical fob price as a basis for comparisons and for establishing protection required when evaluating the merits of any new project in any country. Even with this instrument, one would still have the big fluctuations in freight rates which determine C & F prices and therefore the competitive position of a new project.

My last proposal, number eight, is a simple question: who is setting priorities for fertilizer projects in developing countries which compete in a limited international money market?

Now, before starting the discussion, if any, in which I will try to use lakhs and crores instead of millions, I should like to underline my good position: as a staff member of the World Bank Group, specifically, the International Finance Corporation, I am not expected to be an adequate partner for you to discuss technical and fertilizer matters because I would claim to be a Banker, and therefore, should not be expected to have available answers in the technical field.

If you, as my colleagues in the Bank often do, step into too much detail on financial matters, I can always refer to my sole education as a simple chemical engineer so having again a good excuse for not answering financial questions. This ambiguity is shown on my last slide.

SLIDE 37