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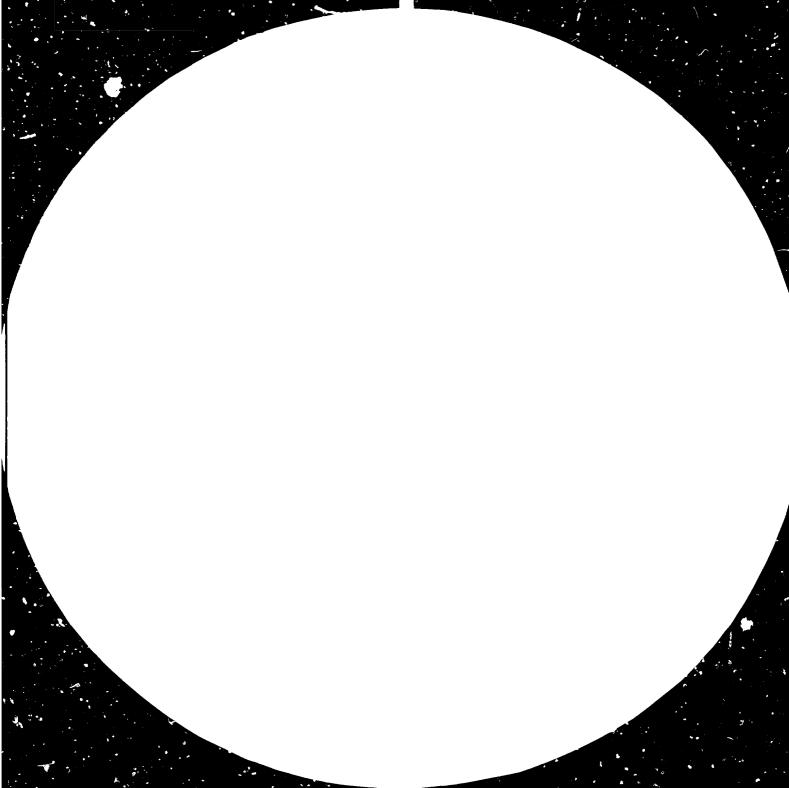
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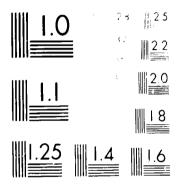
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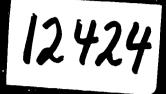
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SEMINAR



ON CO-OPERATION AMONG DEVELOPING COUNTRIES IN PETROCHEMICAL INDUSTRIES

Vienna, March 7-9, 1983

OPEC

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The Availability of Natural Gas in Developing Countries for Petrochemical Industries

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Explanatory Motes

The opinions and estimations of any figure presented in this paper do not by any means reflect the official opinion or figure of any OPEC Member Country, especially concerning reserves and petrochemical potentiality. paper is an overview of the prospects of the Third World for the production of basic petro-chemical products from natural gas 2. For this purpose, mainly secondary sources have been consulted. For the calculations concerned, we have used average or conservative factors, particularly for the estimation of associated gas reserves. Great difficulty was found in calculating the basic data, especially domestic requirements of natural gas for energy purposes in developing countries individually. Therefore, the single country's actual availability of natural gas for petrochemical purposes, as well as its potentiality for the production of basic petrochemicals, will surely defer from the figures estimated in this report. This is due to the fact that, in such a case, specific country's technical and economic factors would have to be used, i.e. gas analysis for each gas reservoir; specific yields of ethane/ethylene, methane/ ammonia-methanol; specific levels of potential gas exports in accordance with the country's plans; specific future policy regarding associated gas which is currently flared; etc. Consequently, all calculations presented within this paper are to be taken only as approximate figures.

Our analysis of raw material/feedstock availability for the production of major petrochemicals (methanol, ethylene and ammonia) in developing countries concentrates on natural gas, not only because it is the most efficient petrochemical maw material, but also because it, fortunately, is the most available one in the Third World area. We do not expect that, before the year 2000, significant quantities of hydrocarbons, at present utilized for energy purposes, could be shifted for petrochemical production due to the utilization of alternative sources of energy. Contrary to this, we think that natural gas could sufficiently cover the new energy needs as well as the petrochemical development in the Third World for a number of years.

¹ Third World includes those countries grouped by FAO-UNIDO-World Bank as "developing market economies".

Natural gas: naturally occurring mixtures of hydrocarbon gases and vapours remaining in the earth's crust in association with crude oil deposits or in separate reservoirs.

INTRODUCTION

This paper intends to be an assessment of the availability of natural gas as a petrochemical raw material in developing countries (DCs) and, consequently, of the sustained production of basic petrochemicals based on this raw material.

A survey and a computer run have been carried out to estimate the availability of natural gas for the production of basic petrochemicals (ethylene, ammonia and methanol) in 114 DCs. Since natural gas is the most efficient and abundant petrochemical raw material available in DCs, our research and estimations concentrate on its potentiality to produce basic products. Still, other reasons for choosing this resource as a basis of our analysis instead of other petrochemical raw materials are:

(a) its lower market price; (b) its lower processing costs; and (c) its lower yield of petrochemical by-products which are not heavily required by the DCs' market structure. We believe that the majority of petrochemical raw materials, such as naphtha, LPG and gas oil, will eventually shift completely to meet the energy requirements of DCs.

In order to estimate the sustained production of basic petrochamical products in the Third World, based on natural gas, a survey was also carried out with regard to the demand, production of and plants' capacity for basic products on a global and regional basis, as well as for a selected group of DCs.

Parts I and II constitute the above-mentioned assessment. The analysis relies on the comparison of the petrochemical raw material availability (natural gas) visavis the DCs' future demand for basic petrochemical products. Since, at present, the industry is plagued by a high level of plants' capacity under-utilization, one

cannot ignore its negative effects on the petrochemical developments in the DCs. For this reason, in the second part of our analysis, we also tackle this phenomenon, although only briefly, but in inter-relation with the first part of the analysis.

Part III presents the conclusion of the analysis and also serves as the basis for identifying the role of some DCs' co-operation in the development of the petrochemical industry in the Third World.

Finally, the results of the entire survey and calculations have been arranged in 35 tables which appear in the Annex.

FOREWORD

Beginning in the early 1920s, the world petrochemical industry experienced an impressive and rapid growth which did not decrease until five decades later. We may recall that the petrochemical industry was born during the 1920s when ethylene was produced on an experimental basis; then followed the production of ammonia from natural gas in the 1930s. During the decade thereafter synthetic rubber was produced, and later on the production of synthetic fibres, detergents and other aromatic products brought the industry to its current stage of development.

Output characterized this industry until the early 1970s, when about 70 million tons of basic petrochemicals were produced throughout the world. However, the world annual demand growth of 16%, as recorded during the period 1940 - 1960, decreased between 1970 and 1980 to 9% and for the present decade, the estimated average world growth of demand for petrochemicals will not exceed 4% per year. The traditional proportional relationship of the petrochemical industry's growth to the world GNP growth might in the future decrease from 2.5 to 1.4 times.

The great expansion of the petrochemical industry took place only in the economically developed areas as a result of two main factors prevailing in the past: unsaturated markets and artificially low feedstock prices, especially for natural gas, the most efficient raw material. Therefore, when the market in the aforementioned areas reached maturity, and when the prices of hydrocarbons were adjusted to their real levels, the growth of the petrochemical industry began to slow down. To illustrate this statement, until the early 1970s, the United States' petrochemical industry, thanks to its low-priced indigenous

natural gas supply and large unsaturated domestic market, has had a competitive advantage in terms of production cost while its competitors from Western Europe and Japan, with their naphtha-based industry relying principally upon imported hydrocarbons and smaller markets, always faced market disadvantage. However, the United States' industry's advantage already mentioned will, most probably, cease as of 1985. In that year, the U.S. policy of gas price deregulation will be fully applied, aggravating the negative effects of market saturation.

Since the price and availability of natural gas, as well as the size and condition of the petrochemical markets, have been shown to be some of the chief factors for healthy petrochemical development, the growing economies of the Third World, with their enormous gas reserves, appeared to have the best market opportunity for developing this industry.

There is no doubt that the establishment of the petrochemical industry is one of the most important factors for every developing country's economic growth and development, for this industry provides the materials for the production of thousands of final products, from food and medicines to all types of textiles, plastics and rubbers.

The set-up of this industry demands the satisfaction of some requirements: an acceptably large market, large investments of capital, adequate economic infrastructure, and the utilization of sophisticated equipment and technological processes. Consequently, not every DC can satisfy all the requirements, as many papers have already demonstrated.

This brings us to the thesis of our paper. In the case of most of the developing countries (DCs), the

development of the petrochemical industry is hindered, not only by some or all of the above-mentioned requirements, but also by two additional factors: by the non-availability of natural gas as the most efficient petrochemical raw material, and recently by the negative impact of the world's large petrochemical idle capacity. Therefore, co-operation among DCs is highly recommended, especially when we consider that a few DCs have plenty of natural gas available for the production of basic and intermediate products, while the majority of DCs could solve their market and financial constraint by integrating the industry with the production of end petrochemical products.

PART I

The Availability of Natural Gas for the Production of Basic Petrochemicals in Developing Countries

The natural gas reserves in DCs for petrochemical purposes are enormous despite the impact of exports and energy domestic requirements. However, this enormous potential exists in only a few DCs.

As of 1st January, 1982¹, the estimated proven reserves of non-associated gas in the DCs were 1,260 TCF4. After deducting the current level of gas allocated for exports and domestic energy requirements, that volume is reduced to 1,250 TCF. As for associated gas, the estimated proven reserves were 262 TCF on the same date. If we assume for the moment that the current average proportion of gas utilization (50%) in the total associated gas produced in DCs remains constant in the future, 131 TCF would be left from the estimated level of reserves. This volume, which eventually would be flared, plus the net quantity already estimated from non-associated gas, would constitute the 1982 total potential gas-based petrochemical raw material in the DCs, i.e. 1,381 TCF. From this total, 1,008 TCF of methane and 152 TCF of ethane could be utilized. Therefore, assuming 40,000 CF of gas for the production of one ton of ammonia or methanol, and 65,000 CF of gas for the production of one ton of ethylene, the DCs' petrochemical potential was enormous; ammonia (or methanol) and ethylene could be produced as quantities of up to 25 and 2.3 billion tons, respectively. It is important to know, however, that this great potential belongs to a few DCs only. Out of 114

See sources and references at the bottom of the corresponding tables in the Annex. For individual developing countries' data on natural gas reserves and potential production of methane, ammonia, methanol and ethane/ethylene, see Tables Nos. 10 to 18 and 22 to 30.

² Trillion Cubic Feet.

DCs surveyed, only 34 countries have natural gas reserves with the corresponding potentiality to produce each basic petrochemical product (see Annex, Tables Nos. 11 - 31).

It is possible to estimate the number of years of sustained production in DCs for various petrochemical products by taking the following two factors into account: the production potential of basic petrochemicals as described above; and the present and expected levels of demand and its growth (or the production capacity of plants in DCs). Due to the world economic recession, the DCs' demand for basic petrochemicals in general, at the end of 1982, is believed to be around the same level as it was in 1979, i.e. 12 million tons for ammonia, 0.9 million tons for methanol, and 2.7 million tons for ethylene. The corresponding plant capacities for the same year were about 10.52 million tons, 2.0 million tons and 3.4 million tons, respectively. Therefore, the number of years of sustained production in DCs, based on demand and plants' capacity, and applying the growth compounded formula³, would be at least 119 - 122 years for ammonia, or 84 - 88 years for methanol and 44 - 52 years for ethylene. If, however, we consider the impact of the expected annual growth of exports in the DCs (10%) and the domestic consumption of gas (11%)

Number of years = $\frac{\ln(\frac{TP}{PD})}{\ln(1+i)}$

where: TP = total potential production

PD = present/expected demand

The bases for considering capacity levels are explained in page 16. See also footnotes in Tables Nos. 1 - 6.

Refers to capability rather than capacity, following the FAO/World Bank methodology.

i = annual rate of growth of the demand/
plant capacity, for each product.

on those countries' capability to produce petrochemicals, the number of years of sustained production decreases (see Annex, Tables Nos. 9, 21 and 23).

Another factor to be taking into account is the geographical distribution of both supply of and demand for petrochemicals up to the end of the century in DCs as a group and individually. On a regional basis, the Middle East area presents the highest potential for production of the three basic products. With respect to demand, Latin America will exhibit the greatest future requirement for ethylene and methanol, while the Far East will demonstrate the greatest demand for ammonia. any case, each regional potential supply of petrochemicals would cover the expected demand for the corresponding three basic products, at least through the first quarter of the next century. On a country basis, however, the situation is different. With the exception of a few countries, the present and expected demand for patrochemicals in individual countries without natural gas endowment is not significant, although their total future consumption, especially of plastics and fertilizers, will be appreciable and fundamental for their economic growth.

As a matter of consistency, all countries' calculations are based on UN statistics which, in some cases, differ from other sources, especially with regard to some OPEC Member Countries' domestic consumption of natural gas. Table 35 shows our cross-checking and data analysis for OPEC local consumption of natural gas based on two sources.

In analysing in more detail the DCs' natural gas availability as petrochemical raw material vis-a-vis their demand for basic products, on a regional basis, we have divided the 114 developing countries into five regions¹. For the analysis of potential production/consumption of ethylene and methanol, the grouping of DCs was made according to the UNIDO's countries distribution while, for the case of ammonia, the grouping follows the World Bank/UNIDO/FAO countries' arrangement.

The analysis on a regional basis indicates two facts: (a) the plentiful availability of natural gas for petrochemical purposes in all regions, and (b) the great concentration of natural gas reserves in only a few countries within each region.

MIDDLE EAST/NORTH AFRICA

- a) No. of developing countries: 5
- b) total natural gas reserves: 183 TCF non-associated gas reserves: 165 TCF associated gas reserves: 18.4 TCF
- c) ratio total regional reserves/total DCs' reserves: 12.9%
- d) regional potential production of ethylene:
 290 x 10⁵ tons
- e) regional potential production of ammonia or methanol: 3,253 x 10⁶ tons.

Although this region comprises only five countries, its total natural gas reserves approximate those of the 28 countries of the Latin American region. Yet the highest concentration of gas reserves belongs to a single country, and therefore its petrochemical potential is considerable, not only within the region but also among all the developing countries of our analysis.

For the countries forming each region, see grouping as of Table No. 11 in the Annex.

To illustrate the above, we can say that the natural gas reserves of this region constitute about 13% of the Third World's gas reserves, i.e. 183.4 TCF, of which 74% belongs to Algeria, followed by S.P.L.A.J. which holds 19%. Thus, the petrochemical prospect for these countries is substantial, especially for Algeria which ranks among the five developing countries with the greatest petrochemical potential based on natural gas. Considering the impact of the compounded growth of demand for gas for purposes other than petrochemicals, this region could produce up to 290 million tons of ethylene and 3,250 million tons of ammonia or methanol, respectively.

So, based on the annual rates of the demand growth of 20% and 6% for ethylene and ammonia, respectively, this region can satisfy the demand for ethylene for at least 40 years, and can sustain production of ammonia or methanol for one hundred years.

MIDDLE EAST/WEST ASIA

- a) No. of developing countries: 12
- b) total natural gas reserves: 393 TCF non-associated gas reserves: 245 TCF associated gas reserves: 148 TCF
- c) ratio total regional reserves/total DCs reserves: 28%
- d) regional potential production of ethylene: 576 x 10⁶ tons
- e) regional potential production of ammonia or methanol: 5,906 x 10⁶ tons.

Although only three countries possess no natural gas reserves in this area, which holds one of the world's largest hydrocarbon deposits, the concentration of gas reserves in a few countries is very high. The natural gas reserves of this area, which represent 28% of the total DCs' reserves, can more than satisfy the regional demand for petrochemical products for a number of years.

Specifically, out of 12 countries only Yemen, Jordan and Lebanon have no gas reserves, and from the remaining nine countries, two share a large proportion of the regional gas deposits of 393 TCF. Saudi Arabia holds the most plentiful regional reserves, for both non-associated gas (40%) and associated gas (55%), followed by Qatar with 16% of the total remaining reserves. Based on the total magnitude of natural gas reserves of this area, and considering the expected growth of demand for natural gas for domestic energy purposes until the end of this decade, this area could produce up to 576 million tons of ethylene and 5,906 million tons of ammonia or methanol.

Consequently, we can also say that the Middle East/West Asia region follows the Third World characteristic of high concentration of gas reserves in only a few countries. Moreover, in this case, only one country (Saudi Arabia) holds the largest deposits of associated gas among all developing countries. Thus, the region's potential, either as a supplier of gas as a petrochemical raw material or as a petrochemical producer, is enormous. Ethylene regional demand can be satisfied for at least 40 years and, in the case of ammonia or methanol, for at least 100 years.

ASIA

- a) No. of developing countries: 26
- b) total natural gas reserves: 609 TCF non-associated gas reserves: 572 TCF associated gas reserves: 37 TCF
- c) ratio total regional reserves/total DCs' reserves: 43%
- d) regional potential production of ethylene:
- e) regional potential production of ammonia or methanol: 11,039 x 10⁶ tons.

The largest concentration of natural gas reserves among the five regions of DCs belongs to this area. Asia, therefore, represents the greatest regional petrochemical potential on the basis of this endowment as a raw material covering regional demand for basic petrochemical products for a number of years. It is, however, important to note that such potential is distributed only within nine countries, of which the Islamic Republic of Iran holds a very significant proportion.

In other words this region, where 572 TCF of the natural gas reserves is of the non-associated type, contains 42% of the total DCs' gas reserves, i.e. 609 TCF. Of the 26 member countries of this region, 17 countries have no natural gas reserves at all; among them are Israel, Korea and Singapore, which are some of the largest consumers of petrochemicals in the Third World. On the other hand, out of nine countries with gas deposits, the I.R. of Iran alone holds 85% of the total regional reserves, followed by Indonesia with only 4.7%. This clearly shows not only the tremendous potential of the I.R. of Iran for all purposes based on natural gas, but also the greatest singlecountry concentration of gas reserves within the entire Third World. Based on the magnitude of the total reserves of this area, we estimate that 45% and 46% of the total DCs' potential production of ethylene and ammonia (or methanol), respectively, can be supplied by this region.

Consequently, we can conclude that Asia, with a large concentration of natural gas reserves within a single country, could satisfy its regional demand for ethylene for at least 50 years and for methanol for at least 80 years (on the basis of 13% and 13.4% as the annual regional growth demand up to 1990 for each product, respectively).

LATIN AMERICA

a)	No. of developing countries: 28
b)	total natural gas reserves: 173 TCF
	non-associated gas reserves: 144 TCF
	associated gas reserves: 29 TCF
c)	ratio total reserves/total reserves DCs: 12%
d)	total ethylene potential production: 271 x 106 tons
e)	total ammonia (or methanol) production:

Although only few Latin American countries have natural gas reserves, representing 12% of total DCs' natural gas reserves, the petrochemical potential on the basis of this raw material is substantial; it can cover the petrochemical demand of the whole region for at least the first twenty years of the next century.

 $2,908 \times 10^6 \text{ tons.}$

In fact, out of 28 DCs, only 11 countries have natural gas reserves amounting to 173 TCF. This volume, where non-associated gas constitutes 83%, represents the third largest level of reserves among the five regions under study. From the above-mentioned total reserves, Mexico and Venezuela together hold 73% of the total regional endowment and, therefore, the greatest regional potential for the production of petrochemicals.

If we consider that in 1979 the regional demand for ethylene was 1.2 million tons, and the demand for ammonia and methanol 2.9 million tons and 0.3 million tons, respectively, and if we deduct from the total reserves the supplies of gas needed to meet domestic requirements for non-petrochemical purposes, Latin America would still have enough natural gas to produce ethylene for at least 40 years and ammonia or methanol for 100 or 60 years, respectively.

AFRICA

- a) No. of developing countries: 43
- b) total natural gas reserves: 55.2 TCF non-associated gas reserves: 43.3 TCF associated gas reserves: 9.9 TCF
- c) ratio total regional reserves/total DCs' reserves: 3.9%
- d) regional potential production of ethylene: 87×10^6 tons
- e) regional potential production of ammonia or methanol: 937 x 10⁶ tons.

This region, although composed of the largest number of developing countries, holds the smallest proportion of the Third World's natural gas reserves. On the basis of the gas available, however, this region's petrochemical potential seems adequate to satisfy the regional demand for a number of years, since a single courtry's demand will share a substantial proportion of the total African demand for basic petrochemicals.

That is to say, the total gas reserves in this region of 43 countries amount to only 55.2 TCF, i.e. 3.9% of the total DCs' gas deposits. It is important to note that, when comparing the phenomenon of concentration of gas reserves among the five regions, the African case is the most extreme; only seven countries out of 43 contain gas deposits, and Nigeria alone holds 90% of the regional endowment. Coincidentally, the demand for petrochemicals in this area is also highly concentrated in Nigeria. In fact, the largest share for basics by 1990 would apply to Nigeria, with a demand for 280,000 tons of ethylene and 240,000 tons of ammonia, respectively. The remaining countries, taken as a group, on the other hand, do not require more than 60,000 tons of ethylene per year. Based

on the annual demand growth rate of 16% for ethylene (Nigeria) and 6% for ammonia (regional), we estimate that the regional demand for basic petrochemicals could be covered for at least 50 and 100 years for each product, respectively.

From the above, we can conclude that the African region, although holding the largest number of DCs and the smallest proportion of gas reserves among all regions under study, would be able to satisfy its demand for basic petrochemicals, at least up to the first two decades of the next century.

The preceding regional analysis demonstrates the phenomenon of high concentration of gas reserves in only a few DCs within each region. This fact shows why co-operation among DCs in the area of petrochemical production is needed. The petrochemical potential of some DCs is especially suited to take the lead in such cooperation. For instance, the present and expected petrochemical plant capacities of OPEC Countries make up a significant proportion of the total capacity within all the DCs 1. By 1990, in fact, OPEC's tonnage in the total DCs' plant capacity is expected to make up 35% for ethylene, 40% for methanol and 51% for ammonia. Further, OPEC's petrochemical raw material endowment is much greater than that of all the remaining DCs. In terms of natural gas raw material endowment alone, at least 80% of the total resource of the DCs is accounted for by OPEC Member Countries; if we add to OPEC reserves those belonging to Mexico, Argentina, Malaysia and Pakistan, 94% of the Third World natural gas reserves are located in only 17 DCs out of 114 developing countries (see Annex, Tables Nos. 7, 19 and 31)

See Tables Nos. 2, 4

But the mere availability of plentiful natural gas reserves for petrochemical purposes, as well as a high plant capacity in some DCs, are not the only reasons to co-operate with other DCs without natural gas endowment. Although insufficient finances and limited domestic markets constitute serious enough obstacles in themselves to petrochemical development in DCs, a third factor also constrains the establishment of new plants in some DCs: the high level of the world petrochemical idle capacity.

It therefore becomes important to estimate the level of the current and future petrochemical idle capacity on a worldwide basis, as well as the duration of this phenomenon. For this purpose, the world present and expected levels of demand for the three basic petrochemical products will be analyzed with regard to the corresponding world plant capacity.

PART II

The Impact of the World Petrochemical Idle Capacity on the Petrochemical Development of Developing Countries

We know that, with the present high degree of uncertainty regarding the future growth of the world economy, estimation of the petrochemical demand, and thereby of the level of plant idle capacity, has become riskier than ever.

Many forecasts made before 1979 concerning the petrochemical industry are now regarded as unrealistic. This is especially true for predictions about the ethylene demand level and its annual growth. Four years ago, the majority of experts agreed on the "conservative" figure of 6% as the most likely expected yearly growth rate for the world ethylene demand up to the end of the century.

Now, however, a growth rate of 3%, or half the rate of the earlier estimation, seems optimistic to many. Some exercises, however, must be carried out to get an idea of the possible impact of the world idle capacity on future petrochemical developments, especially in developing countries.

Tables Nos. 1, 3 and 6 show our estimation of the probable levels of idle capacity in the world, based on different ranges of annual growth in demand for each of the three basic products. The results indicated by these tables are also based on the assumption that all of UNIDO's predictions of capacity will, in fact, come true during the present decade. In arriving at the gross level of the world's plant idle capacity, no closures or shut-downs since 1979/1980 are considered.

Historically, some relationships have been observed between the respective growth rates of GNP and the petrochemical industry. For instance, during the period 1970 - 1981, the world annual growth of demand for ammonia (nitrogenous fertilizers) was about 1.3 times the annual world GNP growth during the same period. As for ethylene, the referred relationship (but for the period 1963 - 1978) was 2.4 times. In the future, however, these relationships may cease to continue due to the structural changes in the petrochemical industry, especially with regard to the cost of raw materials. Therefore, for our estimations of world demand, and consequently of world idle capacity, we have chosen world demand growth rates on the basis of the most recent and commonly reported rates and/or on reputable sources, and have applied some logistic to the figures. For ethylene and ammonia, respectively, the commonly reported annual growth rates of world demand of 2.5%, and the 4.3% rate as estimated by the World Bank/UNIDO/FAO

See sources and references at the bottom of the corresponding tables inserted in the Annex.

group, were chosen. In the case of methanol, an annual growth rate of 9.8% as estimated by Chem Systems Inc. was utilized, since the great promise of this product as a future fuel seems to be a more valid criterion than GNP growth.

According to these calculations, then, the world idle capacity for methanol production could last up to 1990 and, in the case of ethylene production, even longer unless rationalization of this industry occurs during the present decade. The case of ammonia seems to be somehow different since, as of 1987, a deficit of capacity could prevail.

So, let us see more details for each product. With regard to methanol's idle capacity, it is the least predictable. As mentioned before, its level of demand depends even more heavily on methanol uses for energy purposes (gasoline blending) than on the growth of GNP. If we accept Chem Systems' estimation of the rate of annual growth for methanol up to 1990 (9.8%), the level of the world idle capacity in 1984 would be 7.9 million tons, declining almost to balance by 1990 (see Annex Table No. 6).

Ethylene demand would be around 45.6 million tons by 1990 (using 2.5% growth/year), and if no closures or shut-downs occur, the level of idle capacity would be 21.1 million tons 1. A situation of balance would, therefore, be reached by that year if projects which have now become uneconcaical are cancelled and/or obsolete plants are shut down, together equalling a proportion of 30% of that total world capacity (see Annex Table No. 1).

As for ammonia, the World Bank/UNIDO/FAO group a few months ago estimated a 1.8 million tons surplus of

¹ Considering 100% as capacity utilization.

available supply of fertilizer production by 1987¹. This estimation is based on a demand growth of 4.3% for the period 1981 - 1987. If this rate remains constant through 1990, ammonia consumption for fertilizer production would be around 90 million tons. On the other hand, if we also take the WFU group estimation of available supply of ammonia for fertilizers in 1987, i.e. 77.8 million tons, the deficit in ammonia production for fertilizers would be 12.2 million tons in 1990. However, plant surplus capacity to produce ammonia for all purposes in 1987, as can be seen in Table 3, would be 33 million tons.

But it is not certain whether this surplus capacity would even partially cover the 1990 deficit. Historically, the rate of operation of ammonia plants has varied among developed countries, developing countries and centrally planned economies due to several factors. Moreover, ammonia consumption for purposes other than fertilizers will also grow. The World Bank/FAO/UNIDO group, when estimating the balance of production, does not consider the plants' capacity level, but rather the level of ammonia production obtainable for production of fertilizers which is called "available supply". Therefore, if we deduct the 1.8 million tons surplus of "available supply" (estimated by the WFU group for 1987) from our estimate of 12.2 million tons deficit for 1990, there would be room for some new ammonia plants as of 1987 with an upper limit of 10 million tons altogether. Table 5 shows that the Developed Market Economies as a whole and the regions of Africa and the Far East would face a deficit of ammonia production for fertilizers as of 1987.

Taking only the Third World, the picture is different. Deficit of plant capacity would appear during

See sources and references at the bottom of Tables Nos. 3 and 5 (Annex).

the second half of the present decade. Tables Nos. 10 and 24 show that by 1990 deficit of caracity for ethylene and ammonia production will be felt. The demand for basic petrochemical products - and therefore for intermediate or end products - is expected to grow faster in developing countries than in developed nations. For instance, by 1990 demand for ethylene in DCs will grow to 14.6 million tons which means 5.6 times the total 1979 demand. On the other hand, the ethylene demand will increase, in developed nations, only 1.3 times on the same basis. Taking another example, demand for ammonia in DCs will grow 2 times, i.e. to 22.4 million tons, between 1979 and 1990, while in developed nations it will increase only 1.6 times.

From the above, we must conclude that at least by the mid-1980s, a situation of world idle capacity for the production of all three basic products will prevail; this situation, therefore, will continue affecting the economics of international petrochemical development. Methanol production will not reach a state of balance before 1990. Ethylene production would achieve balance only if closures and/or shut-downs of plants, especially of obsolete ones, take place during the decade. Contrarily, ammonia would be in deficit of capacity as of 1987 if no new plants are built or if existing ones are not expanded; in some specific cases, small domestic ammonia plants of 1 hundred tons per day could be convenient, but a great part of the solution of the problem belongs to large-sized efficient plants. This situation, created particularly by the economic recession, will put even more pressure on the prices of petrochemical products. This pressure might even ensure that industry rationalization will continue as a natural reaction in developed countries, up to the point where only those plants which are large enough and guaranteed by a secure supply of the efficient raw materials would be able to "survive".

Consequently, from the above argument, in order to neutralise the negative effects of the world idle capacity, two approaches appear. It would be more adequate to expand the capacity for ethylene and ammonia production during the present decade only in developing countries which have plenty of material endowment and/or the potential power to penetrate the international market. For most of the DCs, therefore, it would be more convenient to import basic products and/or intermediate products in order to produce end petrochemical products than to establish new petrochemical plants for the production of basics. This is the base of the whole strategy recommended in this paper after analysing the availability of the most efficient petrochemical raw material in DCs, natural gas, and looking at the world petrochemical situation.

PART III

Conclusion

The thesis of this paper has been demonstrated when we remember that, in its first part, we found that, in the case of most of the developing countries, the development of the petrochemical industry is hindered, not only by limited finances, inadequate economic infrastructure and small markets, but also by the non-availability of natural gas as the most efficient petrochemical raw material. This situation is aggravated when, from the regional analysis, we demonstrated the high concentration of natural gas within each region in a few DCs. Moreover, it has also been proved, in the second part, that the world petrocnemical idle capacity affects the establishment of new ethylene and methanol plants in most DCs. Although room for new ammonia plants in DCs would exist as of 1987, some negative factors, however, would constitute obstacles to building large ammonia plants in most cases.

Therefore, those developing countries who are possessors of sufficient natural gas reserves, on the basis of their great petrochemical potential, could cooperate with other DCs in various ways in order to assist them in coping with their petrochemical needs. Of course, each sovereign country would determine this co-operation through its individual petrochemical policy; but the starting point could be the supply of basic and/or intermediate petrochemical products for the production of intermediate/end petrochemical products in other developing countries.

Finally, since adequate co-operation in the petrochemical arez is an important factor for our nations' economic growth and development, communication among developing countries is needed. Exchange of technical and marketing experience is more than important in the DCs' case. We can understand each other better by expressing, for our mutual benefit, the needs, advantages and limitations of our petrochemical industry development.

A N N E X

Table Nos. (Ethylene) : 8, 9 and 10

(Ammonia) : 20, 21 and 22

(Methanol) : 32, 33 and 34

These tables provide data taken mainly from UNIDO studies (see specific source details in each table).

Note:

Estimations on world idle capacity in Table
Nos. 8 - 10, 20 - 22 and 32 - 34 do not match
with the corresponding figures in Table Nos.
1, 3 and 6. This is due to the utilization
of UNIDO's demand annual growth rates for
the former group of tables, while for the
latter ones more recent (1982) rates of growth
were utilized. OPEC capacity for the production of major petrochemicals were updated
according to the official replies to our
petrochemical questionnaire of November 1982;
Table Nos. 2, 4 and 7.

Table 1

ESTIMATION OF THE WORLD ETHYLENE SURPLUS OR DEFICIT OF CAPACITY PRODUCTION* Million tons

	1979	1981	1984				1990				1990 ⁵					
				D							Obsolete Capacity Reduction					
				Demaile	Growth Rates/Yes			/rear as or 1981			50#		30%			
			2%	2.5%	34	45	23	2.5%	3%	41	2.5%	31	2.5%	31		
Ethylene	١,	Ι,				<u> </u>						1				
Demand '	37.4 ²	36.5 ³	38.7	39.3	39.9	41.1	43.6	45.6	47.6	61.9	45.6	47.5	45.6	47.6		
Capacity ⁴	46.6	1	61.2	61.2	61.2	61.2	66.7	66.7	66.7	66.7	53.4	53.4	46.6	46.6		
Surplus/(Deficit)	9.2		22.5	21.9	21.3	20.1	23.0	21.1	19.1	14.7	7.8	5.8	1.0	(0.9)***		
Reduction as	1	1		ł		į		Ì	}	ŀ				ł		
Obsolete Capacity	ļ			Ī		•]		1	J	13.3	13.3	30.0	20.0		

Elaboration: OPEC Downstream Operations Unit, 1982.

- * The figures corresponding to "surplus/deficit" are simple exercises after comparing supposed levels of downed vis-a-vis those capacity levels recorded by UNIDO**, without considering any temporary plant closures or permanent shutdowns as of 1979.
- ** When referring to UNIDO as a source, the reference used is the "Second Worldwide Study on the Petrochemical Industry", July 1981 and annexes.

N

- *** Deficit.
- The levels of demand for 1984 and 1990 have been estimated using rates of annual growth ranging from 2% to 4%. The base year is 1981 level which is actually lower than that of 1979 as reflection of the severe world economic recession.
- 2 UNIDO.
- UNIDO Mr. U. Maukka's estimation as a result of recent investigations on secondary sources, see "The Petrochemical Industry", July 1982 (not yet published).
- UNIDO The records on capacity consider existing capacity in 1979 plus additions published and firmly committed up to 1984 and 1987.
- With the purpose of approaching a balance situation, the estimated levels of demand for 1990 (based on 2.5% and 3% as annual growth) are compared to those levels of capacity for the same year but reduced by 20% and 30% as supposed obsolete capacity.
- Oil and Gas Jettinal "Sthylene Report", 6th September, 1982, reports 4%/year as the upper limit for the future world ethylene demand growth. It also quotes from a Probe Economics' study, 2.6%/year for US demand growth for ethylene. As for W. European ethylene demand increase, Petroleum Times, November 1982, page 21, quotes from J. H. Choufoer's (Royal Dutch Company) Study, 1.7%/year.
 The same source, estimates W. Buropsan capacity at over 32% by 1990.

Table 2

OPEC Estimated Capacity

Ethylene

(1,000 tons)

Country	1976	1977	1978	1979	196C	1961	1982	1983	1984	:985	Later
Algeria 1)*	120	120	120	120	120	120	120	120	120	::0	
Ecuador ²⁾	-	-	•	•	-	•	•	-	-	-	140
Gabon ³⁾	-	-	-	•	•	-	-	-	-	-	
Indonesia 41 *	-	-	-	-	-	-	-	-	•	-	340
Iran ^{5] "}	•	-	-	26	26	26	26	26	26	346	50G
Iraq+6)	-	-	-	-	-	-	-	-	-	:35	
Kumait *7) *	-	-	-	•	-	-	-	-	_	-	350
S.P.L.A.J. * ⁶)	•	-	•	-	-	-	-	-	•	336	
Migaria 3) *	-	-	-	•	•	-	-	-	-	-	306
Qatar +10)	•	-	-	-	-	280	290	280	280	280	
Sandi Arabia *11)	-	-	-	-	-	-	•	-	-	1,736	
J.A.E.*12)	•	-	-	-	•	•	-	-	•	-	
Venezuela ^{13)*}	15C	15G	150	150	150	150	150	150	150	150	430141
Total OPEC	270	270	270	296	296	576	576	576	576	3,077	•
Total World ¹⁵⁾				46,560					61,200		
OPEC & World				0.6					1		

Elaboration: OPSC Downstreem Operations Unit

Sources

- * OFEC petrochemical questionnaire of Movember 1962.
- 1) Algerian sthylene capacity initiated in 1972 with 120,000 t/y.
- Ecuadorian plans for ethylane production have been delayed, most probably engineering studies will start
 as of 1985.
- 3) No projects or plans exist at present according to secondary sources.
- 4) International Hydrocarbon Processing (IEP) Boxecore, October 1982, reports completion date in 1984.
- 5) UNIDO's survey, August 1962.
- 6) CAPSC Petrochemical Seminar, Nevember 1981.
- 7) This expecity was planned to be ensured in 1985 but the project is still under revision according to secondary sources.
- 8) At present this plant is under construction expected to be onstream in 1985, TEP Boxscore, October 1982.
- 9) Official information provided in the Seminar "Petrochemicals and the Nigerian Zoonomy", 22nd Septembur, 1902, in Lagos. This plant will be omstreen by 1967.
- 10) OFEC assumal quanticemaire, 1979; Petrochemical Conference, Greece, 1980; OFEC 5th Working Party on Petrochemicals, July 1981.
- 11) Official reply from Saudi Arabia to UNIDO's survey in December 1962.
- 12) No plans have been reported to the OPEC Secretariat.
- 13) Venezuelas ethylene capacity initiated in 1975 with 150,000 t/y.
- 14) Information provided by the Venezuelan Mational Representative to OPEC Statistics Unit in February 1982.
- 15) UNIDO's study "Second Morldwide Study on the Petrochemical Industry, Process of Restructuring", June 1981, Annexes, page 6.

^{*} Information checked with UMIDO's records.

Table 3

ESTIMATION OF THE MORLD NITROGEN (AMMONIA) SURPLUS OR DEFICIT OF CAPACITY PRODUCTION*

Million Metric Tons Nutrient

(1)	(2)		(3)		(4)	(5)	(6)				
	1901-02		1984-85	,	1984-85	1986-87	1990				
			Consumption Growth Rates/Year**								
		As	of 1961	-82	As of	1981-82	As of 1986-87				
Ammonia (Nitrogen)		3%	41	51	4.60	4.3\	3%	41	4.3N	5%	
Consumption	61.5	67.2	69.2	71.2	70.4	75.9	85.4	88.8	89,8	92.3	
Capacity	101.2	117.5	117.5	117.5	117.5	122.9	122.9	122.9	122.9	122.9	
Surplus/(deficit)	39.7	50.3	48.3	46.3	47.1	47.0	37.5	34.1	33.1	30.6	
Supply Capability	79.4	92.3	92.3	92.3	92.3	97.6	97.6	97.6	97.6	97.6	
Surplus/(deficit)	17.9	25.1	23.1	21.1	21.9	21.7	12.2	0.8	7.8	5.3	
Available supply	62.6	73.4	73.4	73.4	73.4	/7.8	77.8	77.8	77.8	77.8	
Surplus/(deficit)	1.1	6.2	4.2	2.2	3.0	1.8	(7.6)	(11.0)	(12.0)	(14.5)	

Blaboration: OPEC Downstream Operations Unit, 1982.

Source: The UNIDO/FAO/World Bank Fertilizer Working Group, 13th August, 1982 (where reference is made to this group as source, it is called "group").

Source for columns (1); (2); (4) and (5): Group.

Source for columns (3) and (6): OPSC assumptions, i.e. rates of growth and levels of surplus/(deficit).

^{*} Important note: See Group's notes, table 5.

^{**} Since it is difficult to assume one specific rate of demand growth, a range of rates which tends to include all different forecasts has been used.

Table 4

ARROTLA

(1,000 tame)

Country	1976	1977	1978	1979	1980	1981	1982	1283	1984	1985	Lates
Algeria T) *	330	330	330	330	330	660	660	660	39 0	99 0	
Zourior ²⁾	-	-	-	-	•	-	-	-	-	•	300
Gabon ³⁾	-	-	-	•	-	•	-	-	-	-	
Indonesia 4) *	-	-	-	1,610	1.610	1,610	2,180	2,150	2,180	2,180	
Iran ^{5) *}	370	370	376	370	370	370	7 0 0	706	1,096	1,096	
Iraq ^{6) •}	66	66	300	300	990 ^{?)}	990	990	990	990	99 0	
Kuwaic*6) *	660	660	66C	660	660	660	660	660	660	990	
5.P.L.A.J. +9)	-	-	330	330	330	330	660	66C	660	660	
Nigeria 10) *	-	-	-	•	•	-	-	-	-	-	300
Qatar +11)	•	297	297	297	594	594	594	594	594	594	
Saudi Arabia 12)	-	-	200	203	200	200	530	330	530	530	
U.A.E. 131	-	-	-	-	•	-	•	330	330	330	
Venezuela 14) *	792	792	792	792	792	792	792	792	792	792	
Total OPEC	2,218	2,515	3,279	4,889	5,876	€,206	7,766	8,058	8,822	9,152	
Total World [5]				65,540	73,900	76,960	81,010	84,670	88,179	91,650	
CPEC * World				7.4	7.9	8.0	9.6	9.6	10.G	9.9	

Elaboration: OPSC Devestress Operations Unit

OFFIC Statistics Dait

* Information checked with UNIDO's records.

Sources

- " OPSC petrochemical questionnaire of Movember 1962.
- 1) Associal capacity started at Arrw with 330,000 t/y in 1970. OAPEC Seminar, Howenber 1961. The official reply to OPEC questionnaire of . Wember 1962 reports semonia present capacity of 450,000 t/y.
- Engineering studies for the construction of associa plant of 330,000 t/y have been delayed according to secondary sources.
- 3) No information is reported in official or secondary sources.
- 4) Telex sint by the Indonesian Ministry of Mines and Energy to the Secretariat on 21st May, 1960. Project of 570,000 t/y to be completed by 1962 was reported by International Hydrosarbon Processing (IEF) Buscore, June 1979. IMP, October 1962, reports completion of two more projects totalling 3,000 t/d by the mid-1980s.
- 5) Iranian ammonia production started in 1963 with Shiraz plant with a capacity of 40,000 t/y. In 1970, Bendar Khomeni plant of 330,000 t/y was inaugurated. By 1962, Bendar Khomeni plant's capacity was expected to be expanded to 660,000 t/y. As of 1984, Shiraz plant capacity will be extended to 396,000 t/y.
- 6) Basrah plant started with a capacity of 66,000 t/y in 1971. OAFEC Saminar, Hovember 1961.
- 7) According to the information provided in CAPEC Seminar 1981, capacity was increased to 990,000 t/y as of 1980. CAPEC paper "Oil Downstream" by A. Al-Mattari, 1980, reports Iraq's capacity by 1970 of 600,000 t/y having plans of additional capacity after 1985 of 990,000 t/y.
- 8) Shusibe plant was put onstreem in 1966 with a capacity of 132,000 t/y. In 1972 this plant was expanded to 660,000 t/y. As for the future, by 1985, Shusibe plant will have a capacity of 990,000 t/y.
- 9) According to the OPEC annual questionneire, 1979, S.P.L.A.J. amonia production capacity starrac in 1978 with Bruga plant with 330,000 t/y: by 1962 a second plant of 660,000 t/y was completed. Plans for an additional capacity of 330,000 t/y are reported by INP Boxscore, October 1982.
- 10) No amounta production exists at present according to the official information sent by talex by the Mational Representative to OPEC in July 1962. IEF Boxacore, October 1962, reports plans for a 1,000 t/d capacity at present in the engineering stage.
- 11) Oil and Gas Journal Worldwide Petrochemical Directory, 1980, reports 900 t/d onstream in 1977. OAPIC publication "Oil Domestream" by A. Al-Mattari, 1980, reports Qatar's capacity in 1979 at 394,000 t/y with no plans for the near future.
- 12) Saudi Arabian paper "The Status and Future Impact of Petrochemical Projects in Saudi Arabia" by S. Al-Hady, Platt's Petrochemical Conference, 1980. The Oil and Gas Journal Morldwide Petrochemical Directory 1979/80 reports 600 t/d as existing capacity by 1978. IEP Boxscore, October 1982, reports completion of Jubail ammonia plant of 330,000 t/y by 1982. This fart was also previously reported by "OPEC Oil Report" published by the Petroleum Economist. 1979.
- 13) Provisional information taken from secondary sources. LEP Boxscore, October 1982, reports an estimated completion of a plant of 1,000 t/d by 1983. This figure matches with the one presented at the OAPET Seminar, November 1981, as well as with UNIDO's records.
- 14) Venezuelan ammonia production capacity started at £1 Tablazo with 1,800 t/d in 1974. By 1976, a new capacity of 600 t/d at Moron was completed. No plans for expansion of capacity have been announced according to secondary sources.
- 15) Current World Pertilizer Situation and Outlook, 1977-78/1980-85, FAO, Rose, 1980-81.

Table 5
WORLD NITROGEN SUPPLY DEMAND BALANCES
(Million Metric Tone Nutrient)

	1981/82	1982/63	1983/64	1904/85	1985/86	1986/07
EVELOPING M.E.						
Africa						
Capacity	0.41	0.76	1.03	1.03	1,21	1,37
Supply Capability	0.12	0.16	0.61	0.68	0.72	0.82
Available Supply	0.06	0.11	0.50	0.57	0.61	0.69
Consumption	0.69	0.75	0.81	0.89	0.96	1.01
Surplus (-Deficit)	-0.63	-0.64	-0.31	-0.32	-0.35	-D. 32
Latin America						
Capacity	4.79	5.22	5.59	6.57	8.69	6.89
Supply Capability	3.20	3.61	3.98	4.58	4.93	5.13
Available Supply	2.74	3.04	3.33	3.87	4.18	4.35
Consumption	2.85	3.07	3.21	3.35	3.50	3,64
Surplus (-Deficit)	-0.11	-0.03	0.12	0.52	0.68	0.71
Near East						
Capacity	3.11	3.61	3.99	4.26	4.93	5.05
Supply Capability	2.21	2,56	2.65	3.11	3.64	3.74
Available Supply	1.93	2.25	2.33	2.74	3.22	3.30
Consumption	1.81	1.98	2.14	2.32	2.47	2.60
Surplus ("Deficit)	0.12	0.29	0.19	0.42	0.75	0.70
Fer East						
Capacity	8.70	9.82	10.18	11.21	12.99	13.95
Supply Capability	6.14	6.93	7.35	8.15	9.29	10.37
Available Supply	5.30	5.99	6.38	7.08	8.06	9.01
Consumption	7.25	7.84	8.32	6.85	9.44	10.10
Surplus (-Deficit)	-1.95	-1.85	-1.94	-1.79	-1.38	-1.09
•	-1.03	-1,03	. 7.67	, 3	1130	
Other Developing M.E.		2.20	0.00	0.00	0.00	0.00
Capacity	0.00	0.00		0.00	0.00	0.00
Supply Copebility	0.00	0.00	0.00		0.00	0.00
Available Supply	0.00	0.00	0.00	0.00		0.02
Consumption	0.01	0.02	0.02	0.02	0.02	
Surplus (-Deficit)	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02
OTAL DEVELOPING M.E.						
Capacity	17.00	19.40	20.79	23.07	26.02	27.25
Supply Capability	11.75	13.26	14.57	16.52	18.58	20.06
Available Supply	10.03	11.39	12.54	14.24	16.07	17.35
Consumption	12.81	13.64	14.50	15.43	16.39	17.37
Surplus (Deficit)	-2.50	-2.25	-1.96	-1.19	-0.32	-0.02

(Cont. Table 5)

WORLD NITROGEN SUPPLY DEMAND BALANCES

(Million Metric Tons Nutrient)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
TOTAL DEVELOPED M.E.						
Capacity	37.37	37.96	36.91	40.34	40.72	40.88
Supply Capability	32.45	32.82	33.61	34.67	35.15	35.47
Available Supply	24.43	24.69	25.16	25.90	26.23	26.33
Consumption	23.08	24.24	25.38	26.12	26.76	27.49
Surplus (-Deficit)	1.35	0.45	-0.22	-0.22	-0.53	-1.16
HORLD TUTAL						
Capacity	101.37	107.18	111.62	117.53	121.19	122.92
Supply Capability	79.41	83.28	87.44	92.25	95.34	97.58
Available Supply	62.61	66.01	69.50	73.41	76.11	77.76
Consumption	61.50	64.67	67.69	70.41	73.11	75.95
Surplus (-Deficit)	1.11	1.34	1.81	3.00	3,00	1.81

Source: The UNIDO/FAD/World Bank Fertilizer Working Group, August 13, 1982

NOTES

Nitrogen

"Capacity": refers to nominal or nameplate ammonia capacity.

"Supply Capability": refers to production capability of ammonia. It is estimated by applying country-specific operating rates, based on past performence and other factors, to existing capacity and phased-in new capacity. New capacities are phased-in as 80/90/100% for developed market economies and centrally planned Europe, and as 65/65/100% for developing market economies and Socialist Asia for the first three full years of operations. Phasing-ins, closures, expansions and other charges in capacity are prorated according to the number of months in a year.

"Available Supply": refers to supply potential of nitrogenous fertilizers. It is derived from ammonia "supply capability" and non-associa sources of nitrogen. Industrial uses, and processing and distribution losses are subtracted from associa "supply capability" to derive 'associa available for fertilizers', Production of nitrogen from non associa sources is added to 'associa available for fertilizers' to estimate "available supply". The assumed processing and distribution losses are:

Region Processing and Distribution Loss Developed Market Economies 78 Developing Market Economies 108 Centrally Planned Economies 178 Eastern Europe excluding USSR 78 Socialist Asia 158

i

.

[&]quot;Consumption": refers to estimated use for 1981-82, and to forecast Comand thereafter.

[&]quot;Surplus (Deficit)": refers to difference between "available supply" and "consumption".

Table 6

ESTIMATION OF THE WORLD METHANOL SURPLUS OR DEFICIT OF CAPACITY PRODUCTION Million tons

	1979	1981		1984 1990					1984			
					Dess		owth Re		ear*			Obsolete Capacity Reduction
			l									301
Methanol			61	7%	84	91	51	79	81	. 91	9.813	9.843
Demand ¹	11.7	12.02	14.3	14.7	15.1	15.5	20.3	22.1	23.9	26.1	28.03	15.9
Capacity 1-7	13.84		23.8	23.8	23.8	23.8	29.6	29.6	29.6	29.6	29.6	16.7 ⁶
Surplus/(deficit)	2.1		9.5	9.1	8.7	8.3	9.3	7.5	5.7	3.1	1.6	0.8
Reduction as 5 Obsolete Capacity												7.1

Elaboration: OPEC Downstream Operations Unit, 1982.

Sources: When referring to UNIDO as a source, the reference is the "Second Worldwide Study on the Petrochemical Industry", July 1981 and annexes; and GOIC, the reference is "Industrial Uses of Associated Gas", 1981.

1 UNIDO, Page 11 Annexes.

² ECN, Market Report, 5th October, 1981, Page 14. Quoted from Chem Systems' Study "New and evolving uses for methanol".

3 Source: See note 2. Chem Systems estimates methanol demand in 1981 at 12 million tons and 28 million tons by 1990 and by the end of the century at 52 million tons. Therefore the estimated annual growth is 9.8%.

GOIC estimates world capacity in 1979 at 13.47 million tons and demand at 10.16 million tons, and demand in 1990 at 23.35 million tons. See also notes in Table

5 This would be the 30% of the total plant capacity expected by 1984 if no closures or shuldowns take place as of 1979.

6 Corresponds to the total capacity expected by 1984 reduced by 30% as supposed obsolete capacity proportion or simple excess of capacity.

7 Capacity for 1984 and 1990 corresponds to UNIDO's records. The liquid of 1990 represents total capacity of 1979 plus additions published of projects firstly committed up to 1987.

* Since it is difficult to assume one specific rate of demand growth, a range of rates which tends to include all different forecasts has been used.

Table TOPEC Estimated Capacity

Methanol

(1,000 tons)

Country	1976	1977	1978	1979	1980	1961	1982	1983	1984	:983	Later
Algeria!	100	100	100	. 100	100	160	100	100	100	100	-
Ecuador ²	-	•	-	•	-	-	-	•	-	-	-
Gabon ³	-	•	•	-	•	-	•	-	-	-	-
Indonesia	-	-	•	-	•	-	-	-	-	3304	-
tran ^{5*}	-	•	•	-	•	•	-	-	•	-	-
Iraq ⁶	-	-	-	-	-	-	-	-	-	-	-
Kuwait 7*	-	-	•	•	-	•	-	•	-	-	-
5.2.2.A.J. ⁹	-	-	330	330	330	330	330	660	660	660	•
Nigeria 9*	-	-	-	-	•	-	-	-	-	•	-
Qatar 10	-	-	-	-	-	-	-	-	-	•	-
Saudi Arabia 11	-	-	-	-	-	-	-	600	1,200	1,200	-
U.A.E. 12	-	-	-	•	-	•	-	-	•	-	-
Venezuela	-	•	•	-	-	-	-	-	-	-	-
Total OPEC	100	100	430	430	430	- 430	430	1,360	1,960	2,290	
Total World 13				13,476	n.i.	n.i.	n.i.	14,957 ¹⁴	n.i.	n.1.	
OPEC & World				3.2				9.0			

Elaboration: OPEC Downstreen Operations Unit

OPSC Statistics Unit

Sources:

- * OFEC perrochemical questionnaire of November 1982.
- 1 Official information sent to the OPEC Secretarist in July 1962.
- ² According to secondary sources (CEFE officials), there are no plans for methanol production in Equator.
- 3 No plans for the construction of methanol plant in Gabon have been reported in official or secondary sources.
- 4 Date of completion. This plant will be located at Manyo Island.
- ⁵ Plans for a methanol plant of 165,000 t/y will be onstress some time during the next five years according to official information sent to the Secretariat in August 1982.
- 6 No plans for the construction of methanol plant from official or secondary sources.
- No plan- have been reported for the construction of a methanol plant.
- 8 Provisional information taken from secondary sources: LEP Boxscore, Crinber 1961. Start-up estimated. AP Dow Jones, 9th November, 1981. OPSC annual questionnaire 1979 reported the first methanol plant started in 1978.
- 9 No plans have been officially reported for the construction of a methanol plant in Migeria.
- 10 No plans have been officially reported for the construction of a methanol plant in Qatar.
- Information provided by the Saudi Arabian delegation to the 5th Working Party on Petrochemicals, July 1981. Middle East Pronomic Survey, August 1962, page 6.
- 12 No plans have been officially reported for the construction of a methanol plant in the U.A.E.
- 13 "The Industrial Uses of Associated Gas", GOIC UNIDO Study, April 1981.
- 14 Corresponds to effective production rather than capacity.

SUPFLY-DEMAND

ESTIMATED RAW MATERIAL AND ETHYLENE PRODUCTION FROM NATURAL GAS

IN DEVELOPING COUNTRIES

	(:)	:2:	(3)	(4)	(5)	(€'
REGIO:	Demand for Ethylene	Production Ethylene	Existing Capacity	Capacity Excess!	Sustained Prod- uction Based on	Ethylene Potential
Country	Tons 103	Tons 10'	Tons 10'	(Deficit)	Demand - Plants Capacity	Production Tons 10 ⁶
AFRICA, of which	-	•	-	-		6_
Nigeria						79
Gabor.						1
N. AFRICA, of which	100	100	120	20	42-70	299
Algeria			120			228
Egypt						7
Libya						53
Morocco						
Tunisia	`					11
W. ASIA, of which	50	50	100	50	36-38	576
Bahrain						15
Iraq		<u> </u>	30			63
Kuwait						88
Qeter						103
Soudi Arabia						207
Turkey			60			1
U. Arab Emirates						51
Other			10			
ASIA, of which	900	900	1,000	100	54-71	1,007
India		 	240		1	17
Indonesia					1	45
Iran			30			860
Meleysia		 				30
Pakistan					Ţ	27
Phillipines						-
Rep. of Korea	<u> </u>		150		1	C
Mingapore			 			0
Thailand						14
Other Asia			580	 	1	14
CHINA	430	430	540	110	n.a.	n.a.
LATIN AMERICA, of Mileh	1,200	1,200	1,600	400	39-52	271
Argentina			170		+	27
Bolivia						9
Brazil			740	 		3
Chile			60			4
Columbia			20			ò
Ecuedor			1		1	7
Mexico	1	1	440	 	 	115
Peru		1			1	2
Venezuela	1		150	1		80
Andean Countries	1					
Trinidad-Tobago	1					14
Other	1		20	1	-	٠
TOTAL LDC's	2,680	2,680	3,360	680	44-52	2,254
OPEC	n.a.	n.a.	330	p.1.	+	1,907

Elaboration: OF: Downstream Operations Unit, March 1982

Source:

Columns (1) (2) (3): THIDO "Second Morld Mide Study on the Petrochemical Industry, Annexes; June 1981," Column (3) is developed based especially on THIDO's last study as well as on SRI country by country estimations.

Columns (4) (5) and (6) are our estimations.

Note: Some totals could not correspond due to rounding.

TAROSAT. Countries: Ecuador, Columbia, Peru, Bolivia and Venezuela.

SUPPLY + SEMAND

ESTIMATED AND NATURAL AND ETHYLENE PRODUCTION FROM NATURAL GAS

IN DEVELOPING COUNTY LES

1984

	(1)	[2]	(3)	(4)	(5)	(6)
 	Desend for	Production	Existing	Capacity	Sustained Prod- uction Based on	Ethylene
REGION	Ethylene	Ethylene	Capecity	Excess/	(veezs)	Potential
Country	Tons 10°	Tons 10'	Tons 104	(D+ '.E) T .01	Demand - Plants Capacity	Production Tons 10°
AFRICA, of which	-	-	•	· -		a7
Nigeria						79
Gabon			1			1
-N. AFRICA, of which	400	400	450	50	37-63	299
Algeria			120			227
Egypt			-	<u> </u>		7
Libya			330			50
Ногоссо						
Tunista						t L
W. USIX, of which	650	650	900	150	31-33	576
Sahraan			-			15
:req			150			63
Kunnit			-			#1
Çetar			280		 	103
Saudi Arabia					 	247
Turkey			360		 	1
U. Arab Emirates			-	 	 	51
Other			i		 	0
					10.66	1 004
ASIA, of which	1,900	1,900	2,300	400	49-66	1,006
India	312	240	246	(72)		17
Indonesia		1	250			45
Iras			126			860
Relays La		<u> </u>	-			30
Pakistan			<u> </u>		1	28
Phillipines	ļ	<u> </u>		<u> </u>		•
Rep. of Kares			850	<u> </u>		3
Singapore			300			0
Theiland			•			14
Other Asia			920			14
CEDA	700	700	950	250	B.4.	p.4.
LATTH AMERICA, of which	2,621	2,667	3,360	539	34-47	268
Argentina	166	166	250	84_		27
Bolivia	•	•		-		9
Brasil	1.274	1,220	1,220	(54)		3
Chile	58	sa	100	122		4
Columbia	•	•	120*	•		9
Ecuedos		•	•	•		7
Mexico	953	953	1,440	487		114
Peru	•	•	•	•		2
Venežueja	•	•	150*	•		79
" Andeen Countries	370	270	270*	(100)		
Trinided-Tobero	1	T				
Other	1		7		1	
TOTAL LDC's	6,471	6,317	7,860	1,3891	36-47	2,249
OPSE	n.a.	п.а.	1,606***		+	1,304
	50,021	49,767	61,160	11,139		
WORLD		1				

Elaporation: OFSC Downstream Operations Unit.

Sources

Columns (1) (2) (3): UNIDO "Second Morid Wide Study on the Petrochemical Industry, Annaxes; June 1981.

Columns (1) (2) (4): Latin America is our estimation based on 17.5% yearly growth from SRI figures for 1983.

Columns (5) and (6) are over estimations

Columns (1) shows CNIDO's figures but adjusted for OFEC Countries according to our more recent information.

Total Excess/Deficit capacity of 1,317,000 Tons does not match with the difference of total desand vis-e-vis total capacity 1,389,000 Tons due to the difference of 72,000 Tons found separately for India. Some other differences could exist because of rounding.

Countries: Equator, Columbia, Peru, Bolivia and Venezuela.

^{**} By 1985, Soudi Arabian capacity will be 1.6 dillion ton/year. *** By 1985 OFEC capacity will be 4.1 million ton/year.

ESTIMATED RAN MATERIAL AND STRYLENE PRODUCTION FROM NATURAL GAS

IN DEVELOPING COUNTRIES

•	e	Ė.	_	
•	-	_		

	(;·		(2)	141	/51	i ĉ
REGION	Demand for Ethylene	Production Ithylene	Existing Capacity**	Capacity Excess/	Sustained Proc- metion Based on (years: Dennic - Plants	Ethylene Istantial
Country	Tons 10'	Tons 102	Tons 10'	(Defacit) Tens 10'	Dennic - Plants Capacity	Tons 10°
AFRICA, of water	301	300	300	-		٤.
Mideria		300	300,			75
Gabor.			0			1
N. AFRICA, of which	80 0	590	590	(210)	31-59	297
Algeria			120			227
Egypt.			140			7
Libya			3304			53
Respecto			0			•
Trackia						11
V. ASIA, of which	2,450	2,650	3,07€	426	26-27	574
Belgrain			3301			15
lpac			180		1	63
Keesit			750"			87
Cetar			200*			103
Supři Arabia			1,606*			247
Turkey			360			3
i. Arab Emireces						51
Other						7
MIL. of which	3,800	2,930	2,920	(960)	43-60	1,904
India			820'			17
Indonesia			330			45
lren			136			259
Rejayeja						36
Pakistan		-	100			26
Phillipped		<u> </u>	250			
Rep. of Korea			1,200			0
Singapore		·	300			<u>_</u>
Thelland	}		150			15
Orber Asia	-	_	920	 	+	13
CALIN	1,400	1,400	1,810	410	L.s.	2,4,
TYLD WENG' W WIR	5,642	4,314	4,710	(932)	29=41	261
Argentine	312	332	350	218		27
Bolivia	•	•	360			9
Meth	2,548	1,220	1,220	(1,328)		,
CMD+	316	116	180	64		4
Co) makin	 	*	120	•		
Equator	-	•	140*	<u> </u>		7
Mex.150	1,906	1,906	2,940	34		111
Peri			250	-		A PROPERTY OF THE PERSON NAMED IN
Venezue):	740	740*	150	•		7€
Andean Countries	/40	740-	820	ac ac		
Trinided-Tribego	 			 		13
Othet	 	+	+	 		
TOTAL LDC's	14,592	12,174	13,406	(1,186)	33-41	2,23E
OPEC	R. &.	2.4.	4,082	<u> </u>		3.85£
NORLD	71,092	L.A.	66,706	(4.386)	1	

Flaboration: OFIC Downstream Operations Unit.

Sources: "Second Worldwide Study on the Perrochemical Industry" - June 1981 (called UKIDO).

Note: Solumn (1) UNCOC's projections.

Column (1) for Latin America is projected from 1884 table figures stillining DMIDC demand/growth rate for Latin America 1884-90, 12.24 per year,

Column 12 Based on solumns 11 or 12 .

² DAPEC, "Dil Downstrom" 1980,

Are OPEC Secretarist's records.

^{**} Estimated expectity up to 1987 based on first plans recorded by UNIDO. Some figures have been converted amountable to our records expectably for OFTC.

World capacity is estimated so LDC's especities requestered up to 1987, and rest of the world capacities replacement up to 1964.

^{*} Anders Countries: Equador, Colombia, Peru, Bolivia and Venezuela

Table 11

DATEL SCIONER 14,1982

ESTIMATED BAN MATERIAL FUR THE PETRICHEMICAL INDUSTRY IN LESS DEVELOPED COUNTRIES DUNCE! MATURAL GASZUM WORLD ENERGY SUPPLIES CRUDE GIL/OIL AND GAS JUKMAL 1979

	PRIMEU RESIRVES MAJ.GAS	DEMASS OF	POTENTIAL ENVLEME PROJECTION	THINE DIT RESERAES BUTTER	ESTIMATED ASSOLIATED GAS	POTENTIAL ETHYLEME PRODUCTION	FOIAL POTENTIAL * INVLEAS PRUDUCTICA
	M.F	BCF	MILL. FORS	WIFF-BOF	MLL.CF	MILL. TOMS	MILL. IGAS
ANJUL A	1175	3	5	1200	AU00-0	l)
BENIN	•	•	•	•	•	•	•
BUTSHANA	•	•	•	• .	•	•	•
BOYOND I	•	•	•	•	•	•	•
CAPE VERDE	•	•	•	•	•	•	•
CENTRAL AFRICA	•	•	•	•	•	•	•
CHAD	•	•	•	•	•	•	•
CLAUR IS	220	•	•	400	200.000	•	•
CU14-43 C2 [BUU] [53C0	•	•	700	200000	•	•
EGG. GUINEA	•	•	•	•	•	•	•
EINIOPIA	•	<u>•</u>	•	•	<u>.</u>	•	•
GAUGIA	500	i	ĭ	500	250000	<u> </u>	ĭ
GANDIA	200	•	•		2,7555		•
AKAHÙ				j	3560		
GU1.1EA					•	•	-
WINEA-BISSAU	•		•	•	•	•	•
- IVGAY COAST	•	•	•	•	•	•	•
KENTA	•	•	•	•	•		•
LESLEIN	•	•	•	•	•	•	•
LIBERIA	•	•	•	•	•	•	•
HAUAGASC AR	•	•	•	•	•	•	•
MALANI	•	•	•	•	•	•	•
NAUR I FAILLA	•	•	•	•	•	•	•
MAURITIUS	•	•	•	•	•	•	•
MIZAMOLJUE HIGEK	•	•	•	•	•	•	•
NIJERIA .	41400	23	76	17400	8 700000	•	iś
HERITA .	41400	4.5	79	11700	410000		• •
SAU TUME	•	•	:	•	•	•	•
SCHEUAL		•	•		· · · · · · · · · · · · · · · · · · ·	-	:
SEVCHELLES	-		•	:		-	<u>.</u>
SLEANA LEOME	•	•	i	•	•	•	•
SOMALIA	•	•	•	•	•	•	• '
SUDAN	•	•	•	•	•	•	•
SHALILAND	•	•	•	•	•	•	•
luid	•	•	,	•	•	•	•
UGARIDA	•	•	•		2	•	•
CAREROUM	•	•	•	140	20000	•	. •
IANZAHIA	•	•	•	•	•	•	•
SAIRE PULLA	50	•	•	1.15	6750Ô	•	•
ZAMBIA	-	•	•	1.2		•	•
******	•	•	•	•	•	-	•
AFRICA	45325	35	n	19782	4481000	11	47
ALJEKIA	132000	231	223	8440	4220040	5	224
LUTPI	3000	47	5	3103	1550000	2	i
LIUYA	24000	47	· 48	2 1500	11750000	13	53
MURULLU	25	3	•	•	•	•	•
1041214	4000	11	. 10	2250	1125000	ı	11
M. E A S 17	165025	340	214	37290	18645000	20	299

٠ د

Table 12

DATE: UCTOBER 14,1982

ESTIMATED RAW MATERIAL FOR THE PETRUCHEMICAL INDUSTRY IN LESS DEVELOPED COUNTAIES SOURCE: NATURAL GAS/UN WORLD ENERGY SUPPLIES CRUDE DIL/DIL AND GAS JOURNAL 1979

•	PRUVED RESERVES NAT-GAS	DOMESTIC DEMAND	POTENTIAL ETHYLENE PRODUCTION	PROVED RESERVES CRUDE DIL	ESTIMATED ASSUCIATED GAS	PUTENTIAL ETHYLENE PRUDUCTION	TOTAL POTENTIAL ETHYLENE PRODUCTION	
	acr	BCF	MILL. TONS	MILL.BOL	MILL.CF	MILL. TONS	HILL TONS	
BAHRAIN	9000	123	15	240	120000	•	15	
VENEN	• ,	•	•	•	•	•	•	
IRAQ	27500	75	46	31000	15500000	17	63	
PAGHDL	•	•	. •			•	•	
KUWĄII	31000	102	52	65470	32700000	36	88	
LENANGN	•	•	•	•	420000	i	j	
DAAN	2000		3	2400	1200000	_	103	
CATAR	60000	71	101	3760	1000000	2 89	247	
SAUDI ARABIA	73230	20	158	163350	81675000	07	271	
SYRIAN ARAB	1505	94	•	2000	1000000	1	4	
REPUBLIC	1500	24	2	125			ì	
TURKEY	500	•		149	62500	•	•	
UNLTED ARAB	20500	17	35	29411	14705500	16	51	
EMIRATES	20500	**	33	27711	14103360	10		
M. E A S T/								
W. A S I A	245230	522	414	297686	148843000	162	576	
** * 3 * * *	213230	700	•••		•			
AF GHAN I STAN	_	12	•	•	•	•	•	U)
BANGLADESH	8000	•	14	•	•	•	14	٠.
BISUTAN		•		•	•	•	•	
BURMA	135	13	•	25	12500	•	•	- 1
CYPRUS	•	•	•	•	•	•	• •	
KAHPUCHEA	•	•	•	•	•	•	•	
FIJI	•	•	•	•	•	•	•	
HONG KONG	•	•	•	•	•	•		
A3 OK	9300	60	16	2000	1300000	1	17	
INDUNES IA	24000	214	40	7400	490000	5	45	
IRAN	49000C	249	929	38000	29000600	32	660	
ISRAEL	•	-	•	•	•	•	•	
LAU	•	•	•	•	•	•	•	
MALAYSIA	17000	21	29	2800	1400000	2	30	
MALDIVES	•	•	•	•	•	•	•	
NONGUL I A	•	•	•	•	•	•	•	
NEPAL	•	•	•	•	•	•	. •	
PAKISTAN	15800	192	26	209	100000	•	21	
PAPUA	•	•	•	•	•	•	•	
PHILIPPINES	•	•	•	25	12500	•	•	
KOREA	•	•	•	•	•	•	•	
SINGAPURE	•	•	•	•	•	•	•	
SOLUMON	•	•	•	•	•	•	•	
SRI LAHKA	•	•	•	•	•	•	•	
THAILAND	8000	•	14	•	•	•	14	
VIETNAM	•	•	•	•	•	•	•	
ASIA	572235	779	967	73250	36625000	40	1007	

DATE: SCISBER 14,1902

ESTIMATED RAW MATERIAL FOR THE PETRUCHEMICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SUURCE! MATURAL WAS/UN WORLD EMERGY SUPPLIES CRIME DILL/UIL AND GAS JUURNAL 1979

	PROVED RESERVES MAILGAS	DEMESTIC DEMAND	Luomicsion Einatene Laifuliat	PROVED RESERVES CRUDE GIL	ESTIMATED ASSOCIATED GAS	Suding 1 tou Final Fue Sulful I ve	POTAL POTENTEAL ETHYLENE
	ALF	ac f	MILL. FIMS	MILL.MAL	MLL.CF	MILL. TONS	PRODUCTICA MILL. TONE
' MITTLLES	•	•	•	•	•	•	
AKGEHI INA	15200	94	26	2480	1200000	ì	27
BAHAMAS	•	•	•	•	•	•	•
r an 4 a d) z	•	•	•	2	LOCO	•	•
HAT I A I V	5400	•	•	150	75000	•	•
BMALIL	1500	43	2	1220	418086	1	3
CHILE	2500	28	•	400	200000	•	•
CULUMATA	5000	161		710	355000	•	•
COSTA RICA	•	:	•	•	•	•	•
CUMA	•	ı	•	•	•	•	•
DOMINICAN KEP.		:	•	•	•	•	•
EL JAUJ A EL JALVADUM	4000	3	7	1100	550000	ı	7
GREHADA	•	•	•	•	•	•	•
GUATEMALA	•	•	•			•	•
GUTAIA	•	•	.•	16	8606	•	•
MIII	•	•	•	•	•	•	•
HOMBUNAS	•	•	•	•	•	•	•
JANA ICA		•		•	•	•	•
MEXICO	54000	1072	73	31250	15425000	ıj	:
MICARAGUA	21000		••	711.74	12412000	• •	
PANANA	-			:	<u>•</u>	•	• ,
PARAUJAY				•	•	•	•
PENU	1100	zi	ž	455	327300	•	;
SURTMANE	•	•		•		-	<u>-</u>
IR141DAD/IUBAGU	8000	•	13	700	350400		16
UNULUAY	•	•	•	•	-		• • • • • • • • • • • • • • • • • • • •
AEHESMET V	42800	1215	70	17476	8935000	15	44
LAIIN							
ATERICA	114500	2124	240	54473	28234500	31	276
IOIAL							
DEVELOPING							
CAUNTRIES	1 180645	4463	1991	484481	242240500	264	2254
SAJJI AKABIA	91530	26	150	143350	6147500%	49	241
VEHEZJELA	42800	1215	70	17070	8935000	10	***
1421	478000	249	829	58000	29006600	32	840
ALSERIA	132600	231	223	8110	4220660	75	228
UNITED ARAB	•			31.15	***************************************	_	
EMIRATES	20500	17	35	29411	14705500	14	51
1.4IILINES LA	24600	214	42	9600	400000	` <u> </u>	45
NIGERIA	41400	23	70	17460	6784000	9	15
IKAJ	27500	75	46	31000	15500060	17	Å3
KU4AII	31000	195	52	45400	32700000	36	11
LISTA	24000	47	41	5.3200	11750000	13	53
ÇAFAR	40660	71	101	3760	1880000	2	103
GA ii Jil	500	•	1	500	250000	•	
ECUADUR	4000	3	,	1100	550000		į
LPEL	99(930	2344	1673	429131	214665500	234	1901

DATE: OCTOBER 14-1982

ESTIMATED RAW MATERIAL FUR THE PETRUCHENICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SUURCE! MATURAL GAS/UN MORLU ENERGY SUPPLIES CHUDE OIL/OIL AND GAS JOURNAL 1984

	PRUYED RESERVES	DEMAND	POTENTIAL ETIPLEME	PROVED RESERVES	ESTIMATED ASSOCIATED	POTENTIAL ETHILENE PRODUCTION	TOTAL POTENTIAL ETHYLENE
	MAT-GAS	•	PRODUCT IUN	crape air	GAS		PRUDUCTIC
_	BCF	BCF	MILL. TOMS	MILL. SOL	MILL.LF	MILL.IUMS	MILL.TONS
HOUL A	1175	9	2	1400	600000	ŧ	3
NIN	•	•	•	•	•	•	•
TSWANA	•	•	•	•	•	•	•
RUND I	•	•	•	•	•	•	-
PE VERDE	•	•	•	•		•	•
MIRAL AFRICA Ad	•	•		-	•	•	•
dókus	•	•	•	•	•	•	•
N30	2 200	•	•	400	200000	•	4
IBUJIL	•	4	•	•	•	•	•
U. GUINEA	•	•	•	•	•	•	•
HEUPEA	•	. •	•		250000	•	i
iii)	500	15	l	300	430000	•	:
AIA	•	•	•	;	3500	•	
AidA	•	•	•			•	
INEA - MISSAN	•	•	-		•	•	•
LHEA-BISSAU URY CUAST	•	•			•	•	•
MAY OML COW21			•	•	•	•	•
SUTNU	_	-	•	•	•	•	•
SERIA	•	•	•	•	•	•	•
DAGASLAR	•	•	•	•	•	•	•
LAMI	•	•	•	•	•	•	•
URITANIA	•	•	•	•	•	•	•
UR1 T (US	•	•	•	•	•	•	•
2AA4 LUUE	•	•	•	•	•	•	
<u>JER</u>		•	•	17400	8700000	į	19
GERSA	41400	39	70		***************************************	_	
ANDA	•	•	•	•		•	•
O TIME Negal	•	•			•	•	•
YCHELLES	•	•		•	•	•	•
ERRA LEONE	ž		•	•	•	•	•
HALIA	•	•	•	•	•	•	•
DAN	•	•	•	•	•	•	•
ALLAND	•	•	•	•	•	•	•
ú.)	•	•	•	•	•	•	•
AINA	•	•	•	4.4	70000	•	• -
MENDOM	•	•	•	140	10000	•	•
AIVASH	•	•	•	•	•	•	:
PER VOLTA		•	•	135	47500		•
1RE	50	•	•	122	31,700	•	•
Md [4	•	•		_	-	11	87
FRICA	45325	59	77	19782	9991000		
JERIA	132000	419	223	8440	4220000	9	227
1471	3000	79	5	3100	1554000		.!
UYA	24000	92	40	23500	11750000	13	53
MIRCO	25	, 5	. •	:	*******	•	ıi
INESEA	6000	19	10	2250	1125000	1	• • • • • • • • • • • • • • • • • • • •
E 4 S 1/					19444086	20	299
H. AFRICA	165025	616	278	37290	10643000	20	277

(.) |-|

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DATE: UCTOBER 14,1982

ESTIMATED AAM MATERIAL FUR THE PETRUCHEMICAL INDUSTRY IN LESS BEVILUPED COUNTRIES SUURCE: MATURAL GAS/UN MURLD ENERGY SUPPLIES CRUDE DIL/OIL AND GAS JOURNAL 1984

	PROVED MESERVES MAT.GAS	DOMESTIC DEMAND	POTENTIAL ETHYLENE PRODUCTION	PROVED CAUDE UIL	ESTIMATED ASSUCIATED GAS	POTENTIAL ETHYLEME PHUDUCTION	TOTAL POTENTIAL ETHYLENE PRODUCTION	
	BC F	867	MILL. TOMS	MILL. BOL	· MILL.CF	MILL. FUNS	MILL IGHS	
BAIRAIN	1000	211	13	240	, 12000c	•	15	
TEMEN	•	•	. •	•	•	•	•	
CARL	27500	126	46	31000	12200000	17	43	
MAGRUL					•	_•	. •	
KUWAIT	31000	307	52	45400	32700000	36	44	
LEJANON	****	•	:	24.00		:	:	
PARU	2000		3	2400	1200000	i		
GATAR	40000	120	101	3740	1000(00	2	103	
SAUDI AKABIA	13236	47	150	163350	81675000	89	247	
SYRIAN ARAB	1400	46	•	2000	1000000			
MEPUBLIC THREE	1500	40				•	•	
TURKEY United Arab	500	•		125	42500	•	1	
ENIMATES	20500	34	35	29411	14705500	16	51	
ENINATES	20300	37	••	27711	14103300		71	
M. E A S T/								1
W. A S I A	245230	885	414	297686	146843600	162	574	
** ~ * * *	417234		V.V	4,,,,,,		•••	,,,	w
AFGHANISTAM	•	27	•	•	•	•	•	00
BANGLADESH	9000	15	14	•	•	•	14	
BINGTAN	•	. •	•	. •	•	•	•	- 1
BURNA	135	22	•	25	12500	•	•	•
CYPRUS	•	•	•	•	•	•	•	
KAMPUCHEA	•	•	•	•	•	•	•	
FIJI	•	•	•	•	•	•	•	
INNS KONE		•	• •	***		:	.:	
INDIA	9300	101	16	240C	1300000		11	
INDUNESIA	24000 490000	391 434	40 828	9600 58600	4800000 29000000	3 32	45 440	
IRAN ISRAEL	170000	434		30000	2700000	32		
LAO	•	•	•	•	•	•	•	
MALAYSIA	1700	43	20	2 800	1400000	•	. 30	
RALDIVES	11000		44	4000	140000	•		
NUNGOL I A	•	. •	•	•	•	•	•	
MEPAL	•	•	<u> </u>	•	<u> </u>	-	:	
PAKISIAN	15800	324	26	200	166060	-	26	
PAPUA	.,,,,,	***	-			-		
MILLIPPINES	<u> </u>	-		25	12500	•		
KOREA	_							
SINGAPURE	-	-	·	•	•		•	
SULUHUN	-	-	•	•	•		•	
SRI LANKA		•	•	•	•	•	•	
THAIL AND	8000	-	14	•	•	•	14	
VIETHAN	•	•	•	•	•	•	•	
	47000			*****	24496000	4.0	1004	
ASIA	572235	1349	744	73250	36625000	40	1004	

DATE: UCTOBER 14, LYWZ

ESTIMATED RAW MATERIAL FUR THE PETROLHENICAL IMPOUSTRY IN LESS DEVELOPED COUNTRICS SOURCE: NATURAL GAS/ON WORLD ENERGY SUPPLIES CHUDE DIL/UIL AND GAS JOURNAL 1984

	PRUVED RESERVES NAT.GAS	DUMESTIC DEMAND	POTENTIAL ETHYLENE PRODUCTION	PROVED RESERVES CRUDE DIL	ESTENATED ASSOCIATED GAS	POTENTIAL ETHYLENE PRODUCTION	TOTAL PUTENTIAL ETHYLENE PRODUCTION
	BLF	WCF	MILL. TONS	MILL.BOL	MILL.UF	MILL. IIMS	MILL. ICHS
MITTLES	•	•	•	•	•	•	•
ARGENT INA	15200	158	25	2400	1200000	1	21
BAHAHAS	•	•	•	•	•	•	•
BARPADOS		•	•	2	1000	•	•
AIVIJOS	5400		•	150	75000	•	7
SMAZIL CHILE	1500 2500	72 49	7	1220	610000	1	,
COLUMBIA	2500 5000	271	•	400	260000	•	2
COSTA ATCA			•	710	355000	•	•
EUGA	•	į	•	•	•	•	•
ROMINICAN REP.	•	•	•	•	•	•	•
ECUADUR	4003	•	•	1100	>50000	:	:
EL SALVADOR	4003		•		330000	•	•
GREIANA	•	•	•	•	•	•	•
GUATERAL A	•	•	•	16	800 0	•	•
GUY ANA	•		•	••	5500	•	•
HAITE	_	•	•	•	•	•	•
HOMMINAS	Ξ		Ī	•	-	•	•
JAMA ICA	Ĭ	•		•	•	•	•
MEXICO	39000	1804	97	31250	15425000	17	114
NICARAJUA	•				.,,,,,,,	••	•••
PANAMA	•	•	· ·		<u> </u>		•
PARAGUAY		•			-	•	:
PERJ	1100	39	ž	455	327500	Ξ	į
SURTHANE	•	•	•	•			:
IR ENEUAD/TUBAGO	8000	148	13	700	35000 0	•	14
URUGUAY	•	•	0		•	•	
VENE LUEL A	42800	2047	49	17670	8935000	10	79
LATIN	144500	4598	237	56473	20236500	31	; 268
		1010	• • • • • • • • • • • • • • • • • • • •		20230300	,.	200
TOTAL							
DEVELOPING	1100440	1844	4.55	4.44.4.4			
COUNTRIES	1100465	7500	1405	484481	242240500	264	2249
SAUDE ARABIA	93230	47	150	163350	01675000	49	247
AE AE SOEF V	42806	2047	-69	17670	8735000	10	79
17 1	490000	436	929	36000	29000000	32	840
-L & ER LA	132000	419	223	8440	4220000	3	227
UNITED ARAB		***		0,10	VII.0000	•	
EMERATES	20500	34	35	29411	14705500	16	51
INDURES IA	24000	361	40	9600	4800000	• • • • • • • • • • • • • • • • • • • •	45
NIJEKIA	41600	39	10	17400	87C000C	í	iś
CARL	27500	126	44	31000	13360060	17	43
KUWATI	31000	307	52	45406	32700000	36	ii
LIBYA	24060	92	40	23500	11750000	13	53
GATAR	60000	120	101	3760	100000	2	103
GAJUN	500	15	i	500	250000	-	,
ECUAINIK	4000	. 5	Ĩ	1100	550000	i	ī
UPEC	995936	4069	1670	429331	214665500	234	1904

DATE : OCTOBER 14-1485

ESTIMATED RAM MATERIAL FUN THE PETRUCHENICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SOUNCE! MATURAL GAS/UN MORLD ENERGY SUPPLIES CRUDE OIL/OIL AND GAS JOURNAL 1490

	PROVED RESERVES NAT.GAS	DOMESTIC DEMAND	PUTENTIAL ETITLEME PRODUCTION	PAGYED RESERVES CRUDE BIL	ESTIMATED ASSOCIATED GAS	POTENTIAL ETHYLENE PAUDUCTION	TOTAL POTENTIAL EINVLENE PRIDUCTION
	M. F	ALF	MILL. FORS	MILL. BOL	MILL.CF	MILL.IONS	MILL . IONS
ANGULA	1175	*	\$	1200	40000u	1	3
BENIM	•	•	,•	•	•	•	•
ANTSHAMA	•	•	•	•	•	•	•
au au iai 1	•	•	•	•	•	•	•
CAPE VERDE		•	•	•	•	•	•
LENTHAL AFRICA	•	•	•	•	•	•	•
CHAD	•	•	•	•	•	•	•
COMUNAS.	•	•	•	•	•	•	•
Cultiu	2200	•	•	400	300000	•	•
01136311	•	•	•	•	•	•	•
ENU. JUINEA	•	•	•	•	•	•	•
ETHIW IA	•	•	•	•	•	•	•
GANUN	500	20	L	500	250000	•	
Alukas	•		•	•	•	•	4
GHANA	•		•	7	3500	•	•
GUINEA	•	•	•	•	•	•	•
WINEA-BISSAU	-	•	•	•	•	•	•
IVUNY CUAST	•	•	•	•	•	•	•
KEHTA	•	•	•	•	•	•	•
LESOTIN	_	•	•	•	•	•	•
LIBERIA	•	•	Ě	•	•	•	•
MÁDAGASLAR	-		•	•	•	•	•
MAL AN I	_	-		•	•	•	•
ALMATIAUAN		•	•	•	•	•	•
MAURITIUS	•	•	•	•	•	•	•
MITANATONE	· ·	•	•	•	•	•	•
MIJEN	-	•		•	•	•	•
NIGERIA	41400	72	10	17400	670000	•	79
HAATINA	•		•	•	•	•	•
SAU TOME	-	•	•	•	•	•	v
SEMEUAL			•	•	•	•	•
SEVCHELLES	_		•	•	•	•	•
SIEANA LEUNE			•	•	•	•	•
SÚ IAL IA			•	•	•	•	•
SUDAH	-		•	•	•	•	•
SHAZILAND			•	•	•	•	•
1000	· ·		•	•	•	•	•
UL ANIJA	-			•	•	•	•
CAREKUNIN	-		•	140	70009	•	•
AlFASHAL	-		•	•	•	•	•
UPPER VULTA	-	•	•	•	•	•	•
LALAE	50	•	•	135	47500	•	•
LANJIA		•	•	•	•	•	•
• • • • • • • • • • • • • • • • • • • •	_						
AFRILA	45325	110	71	197#2	4491000	1.1	87
	* * ****		222	4440	4220000	•	221
ALGERIA	133000	#48	***	3100	1550000	í	•••
turfi	3000	140	•3	23500	11750000	13	si
LIUYA	24000	200	70	£ 3 3 (FV)	1112000	•	•
MUNICEU	25	35	10	2250	1125000	i	ıi
, DUNISIA	6000	,,,	10	2270	1143004	•	••
N. LASI/	165025	1263	277	37290	18645000	20	257

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Table 18

DATE: OCTOBER 14,1982

ESTIMATED RAW MATERIAL FUR THE PETRUCHEMICAL INDUSTRY IN LESS DEVELUPED COUNTRIES SOURCE: MATURAL GASJUN WORLD ENERGY SUPPLIES CRUDE DIL/DIL AND GAS JOURNAL 1990

	PROVED RESERVES MAI.GAS	DOMESTIC DEMANO	PUTENTIAL . ETHYLENE PNUDUCTION	PROVED RESERVES CRUDE DIL	ESTIMALED ASSUCIATED GAS	PUTENTIAL ETHYLENE PRODUCTION	TOTAL POTENTIAL ETHYLENE PRODUCTION	
	6CF	BCF	MILL. TONS	HILL. BOL	MILL.CF	MILL.TONS	MILL TORS	
BAIRAIN	9010	394	15	240	120000	•	15	
TEMEN	•	•	•	•	•	. •	.:	
IRAG	27500	236	46	31000	15500000	17	63	
JUKDAN	•	•	. •	•		_•	.:	
KUHATT	31000	574	91	65400	32700000	36	87	
LEBANUN	•	•	•	•	<u>•</u>	•	:	
UMAN	2000	•	3	2400	1200000	1	5	
QATAR .	60000	224	101	316D	100000	2	103	
SAUDI ARABIA	♥3230	**	158	163350	#16750DO	89	241	
STRIAN ARAB						_	_	
KEPUBLIC	1500	76	ž	2006	100000	1	3	
TURKEY	500	•	1	125	62500	•	ı	
UNITED ARAB			_					
EMIRATES	27500	77	35	29411	14705500	16	51	
H. E A S T/								
	245230	1669	412	297686	140843000	162	574	
Wa A S I A	247230	1004	714	271000	140043000		, , , ,	
AFGIIAN ESTAN	•	44	•	•	•	•	. •	
BANGLADESH	0000	20	19	•	•	•	13	
PATURE	•	•	•	•	•	•	•	
BURMA	135	41	•	25	12500	•	•	
CYPAUS	•	•	•	•	•	•	•	
KAMPUCHEA	•	•	•	•	•	•	•	
FIJI	•	•	•	•	•	•	•	
HUNG KONG	•	•	•	•	•	•	. •	
INULA	9300	189	15	2600	1300000	1	17	
INDIMES IA	24000	755	39	9600	400000	5	45	
IRAN	490000	030	928	58000	29000000	32	859	
ISRAEL	•	•	•	•	•	•	•	
LAD ·	•	•	•	•	•	•		
MALAYSIA	17000	85	29	2000	1400000	2	30	
MALDIVES	•	•	•	•	•	•	•	
HONGOL I A	•	•	•	•	•	•	•	
NEPAL	•	•	•	•		•		
PAKISTAN	15600	405	26	500	500000	•	26	
PAPUA	•	•	•	•	•	•	•	
PHIL IPPINES	•	•	•	25	12500	•	•	
ROREA	•	•	•	•	•	•	•	
SINJAPORE	•	•	•	•	•	•	•	
SOLOMUN	•	•	•	•	•	•	•	
SRI LANKA	•	•		•	•	•	•	
THAILAND	8000	•	14	•	•	•	14	
VIETNAM	•	•	•	• .	•	•	•	
ASIA	572235	2615	764	73250	34625000	40	1004	

MATER OCTOBER 44,1982

ESTIMATED HAN MATERIAL FOR THE PETROCHEMICAL HOUSTNY IN LESS DEVELOPED COUNTRIES SOURCE! MATURAL GAS/ON WORLD ENERGY SUPPLIES CHIEDE UIL/OIL AND GAS JUNGMAL 1490

	PHOYED HESERVES MAT.GAS BCF	UDHESTIC DEMANO BCF	POTENTIAL EINVLEME PHODUCTION MILL. TOMS	MITT. BOT SERVES SERVES SERVED	ESTIMATED ASSOCIATED GAS MILL.CF	PUTE-ITTAL ETHYLENE PRODUCTION MILL. FONS	JATOL JATUMBEON BEBLYMEN MOSE JAMBEN ZMOE, JAIN
ANTILLES	•	•	•			*****************	***********
ARGENT INA	15200	296	23	2400	120000		.:
BAHAMAS	•	•	•	•		•	27
BAKBANGS BULIVIA	4.00	•	•	2	1000	-	:
MAZIL	5400 1500		Ÿ	150	75000	•	i i
CHILE	2500	134	3	1550	410000	1	Š
COLUMBIA	5000	50 <i>1</i>	2	400	200000	•	Ğ.
CUSTA HILA	7333	<i></i>	•	. 110	155000	•	
LUMA	•	ì		•	•	•	•
DUMINICAN REP.	•			•	•	•	•
ECUAINM	4000	•	j	1100	55000à	;	•
EL SALVADUR GRENADA	•	•	•	•		•	•
GUATENALA	•	•	•	•	· ·		•
GUYAHA	•	•	•	16	8000	•	
MAILI	•	•	•	•	•	•	
HONDUNAS	•	•	•	•	•	•	•
ASIAKAL		:	•	•	•	•	•
HEXIC7	59000	3379	••	31250	15425000	.: .	
NICAHAJUA	•	•	**	*****	12022400	17	4 8 2
PAIIANA	•	•	•		•	•	•
PAKAGJAY PEKI	•	.•	•			-	•
SUM I MAME	1100	12	2 .	455	327500	•	•
INTITIONAL TOURS	e 00 0				•	•	-
UNUGUAY	6000	277	13	790	350000	•	1)
VENEZULLA	52100	3829	4	17470	******	. •	•
				. 1010	4733000	10	76
LATIN							
ATERICA	144500	8405	230	54473	20234500	31	261
LUTAL							
DEAETTALING							
COUMINTES	1 180645	14241	1974	484401	242240590	264	5530
ALMANA ILUAZ	93230		144				
VENEZUEL A	42800	3429	158 64	143350 17470	E 1475000	89	247
IRAN	490000	850	426	58000	6135000	10	74
ALJERIA	132000	848	222	4440	2 9000 000 432000	32	451
MILLED ARA				2140	7:28000	5	221
EMIRATES	20500	11	15	29411	14705500	16	4.5
NUMES IA	2400C	755	39	9600	4800890	• • •	51 45
INAU	41490	. 72	70	17400	#700000	į.	is
KUAAII	21500 21500	234	46	31000	15500000	17	43
	24000	574 20J	\$1	65400	32160000	36	ăi
LALAN	00004	200	40 401	23500	11750000	13	53
GAmulia	500	26	141	3740 500	1480000	2	101
ECHAJUR	4600		÷	1100	250000 55000	i	i i
upil	£.44					•	•
ur i i	64C 93C	7742	1.64	454331	214665500	234	1498

SUPPLY-DEMAND

ESTIMATED RAW NATERIAL AND AMNONIA PRODUCTION FROM NATURAL GAS

IN DEVELOPING COUNTRIES

. 1980

Column	(1)	(2)	(3)	(4)	(5)	(6)
REGION	bewand (a) Tons 10 ⁶	Ammonia Production (b) for Pertilizers	Capability (c) Tons 10 ⁶	Capability Sucess/ (Defic1t) Tons 106	Sustained Prod- uction Based on (Years) Demand - Plants Capacity	Potential Ammonia Production Tons 10 ⁶
AFRICA	0.60	0.02	, 0.08	(0.58)	127-	3,445
L. AHERICA	2.96	2.47	2.78	(0.49)	112-112	2,908
HEAR EAST	1.83	1.78	1.97	(0.05)	151-167	15,965
FAR EAST	6.55	5.03	5.66	(1.52)	85-130	1,600
TOTAL LOC'S	11.94	9.30	10.49	(2.64)	119-122	23,918
орис	-	<u>-</u>	6.31	-	-	20,403
WORLD	60.63	60.73	76.96	0.10	-	-

Elaboration: OPEC Downstream Operations Unit, April 1982.

Sources: Columns (3), (4), (5) and (6): OPEC Secretariat's estimations* taken from tables 23, 24 and 25.

Columns (1) and (2): FAO "Current World Fertiliser Situation and Outlook 1980-86. Table 12, page 31, Rome 1981

- (a) Demand for fertilizers
- (b) Ammonia available for fertilizer
- (c) Ammonia supply capability

Column (4) = (2) - (1) that is: Ammonia available for fertilizers (-) Pertilizers Demand. This is the methodology applied by FAO to estimate the balance. However if we consider demand via a vis plant's capacity as we applied in the case of ethylene and methanol the LDCs deficit of capacity for 1980 is only 1.45 Mill. Tons; while the world's capacity under utilisation was such higher, 16.3 Mill. Tons.

These figures differ with those Zrom tables 23, 24 and 35 due to rounding and countries grouping under the above regional groups.

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Table 21

SUPPLY - DEMAND

ESTIMATED RAW MATERIAL AND AMMONIA PRODUCTION FROM MATURAL GAS

IN DEVELOPING COUNTRIES

1984/85

Column	(1)	(2)	(3)	(4)	(5)	(6)
REGION	Domand (a) Tune 10 ⁶	Ammonia Production (b) for Partilizars	Capability (c) Tone 10 ⁵	Capability Excess/ (Deficit) Tons 10	Sustained Prod- uction Based on (Years) Demand - Plants Capacity	Potential Ammonia Production * Tons 10 ⁶
AFRICA	0.79	0.44	0.54	(0.35)	123-	3,441
L. AMERICA	3.01	4.19	4.67	0.38	108-108	2,873
NEAR EAST	2.35	2.74	3.02	0.39	147-163	15,955
PAR EAST	B. 56	7.21	8.00	(1.35)	81-125	1,592
TOTAL LDC's	15.51	14.58	16.23	(0.93)	115-118	23,861
OPDC	-	-	8.80	-		20,403
MORLD	28.43	71.13	91.65	(0.30)	-	-

Elaboration: OPEC Downstream Operations Unit, April 1982.

Sources: Columns (3), (4), (5) and (6):OPEC Socretariat's estimations' taken from tables 26, 27 and 28.

Columns (1) and (2): FAO "Current World Fortilizer Situation and Outlook 1980-86. Table 12, page 31, Rome 1981.

- (a) Demand for fertilizers
- (b) Ammonia available for fertilizer
- (c) Ammonia supply capability

Column (4) = (2) - (1) that is: Ammonia available for fertilizers (-) Pertilizer Demand,

Those figures differ slightly with those from table 15 due to rounding and countries grouping under the above regional groups.

SUPPLY - DRHAND

SSTIMATED RAW MATERIAL AND AMMONIA PRODUCTION FROM HATURAL GAS

IN DEALFOOTING COUNTETER

1990

Column	(1)	(2)	(3)	रवा	(5)	(6)
REG TW	Demand (a) Tons 10 ⁶	Production (b) for Fertilisers	Capability 1905/86 (c) Tone 19 ⁶	Capability Excess/ (Deficit) Tons 10 ⁶	Bustained Prod- uction Resed on (Years) Demand - Plants Capacity	Potential Ammonia Production Tons 10 ⁶
AFRICA	1,18	0.48	0.54	(0.70)	117-	3,432
L. AMERICA	5.40	4.58	5,15	(0.90)	102-102	2,798
HEAR EAST	3.34	3.00	3. 38	(0.34)	141-157	15,929
FAR BAST	12.50	7.76	8.72	(4,74)	75-119	1,429
TOTAL LDC's	22.50	15.03	17.79	(6.68)	109-112	23,588
OPEC			9.1 ¹			20,334
WORLD	90.83	89.05	94.69	(1.78)		

Elaboration: OPEC Downstreams Operations Unit, April 1982

Sources: Columns (3), (4), (5) and (6): OPEC Secretariat's estimations* taken from tables 29, 30 and 31.

Column (1): Is our estimation based on FAO's demand figures from 1980 up to 1985. The annual growth varies according to the regions, but for LDCs is 6.5%.

Column (2): FAO "Current World Pertilizer Situation and Outlook 1980-85. Table 12, Page 31, Rome 1981. This column is estimated considering the percentage average of capacity utilization duized 1980-85, that is 89%. (Only in LDCs).

- (a) Demand for fertilizers
- (b) Ammonia available for fertilizer
- (c) Ammonia supply capability
 - Column (4) = (2) (1)
- 1 OPEC capacity in 1985: 9.1 million tons; see table 39.

Note: In the case of the year 1990, Column (3) refers to the capacity estimated up to 1985/86, therefore when this capacity is compared with our estimations of 1990 demand, we figure out what capacity still is needed for that year column (4). This procedure is adopted since at present there is no figures on future projects published beyond 1985-86. This is an exercise

to get an idea on probable balances.

These figures differ slightly with those from tables 29 - 31 due to rounding and countries grouping under the above regional groups.

Д Л DATE: OCTUBER 14,1982

ESTIMATED HAM MATERIAL FOR THE PETRUCHENICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SOURCE: NATURAL GASJOM MORLO ENERGY SUPPLIES CRUDE DILYOL AND GAS JOHRMAL 1974

	PRUVEO RESERVES MAT.GAS	DEMAND	POTENTIAL AMM./METH. PRODUCTION	PROVED PROVED	ESTIMATED ASSUCTATED GAS	POTENTIAL AMM./METH. PRODUCTION	FOTAL POTENTIAL AMM. / METM. PRODUCTICA
	wi.	uc f	MILL. TUNS	MILL. OUL	MILL.CF	AILL . JUNS	MILL. TOWS
ANGULA	1175	3	22	1200	6000CQ	5	27
BEN14	•	•	•	•	• •	•	•
BOTSHAHA	•	•	, •	•	•	•	•
ICATAMI	•	•	•	•	•	•	•
CAPE VERDE CEMINAL AFRICA	•	•	•	•	•	•	•
CHAD	•	•	•	•	•	•	•
CONGRUS	•	•	•	•	Ţ.	-	
LONGU	2200		41	400	200000	ž	43
וזנענונט		•	V-	,,,,	•	•	•
ÉJU. "UINEA	•		•	•	•	•	•
EFILLIP IA	•	•	•	•		•	•
GABUN	509	•	•	500	250000	2	411
GANULA	•	•	•	•		•	•
AKAMÜ	•	•	•	7	3500	•	•
GUINEA	•	•	•	•	•	•	•
CULINEA-BISSAU	•	•	•	•	•	•	•
IVONY COAST	•	•	•	•	•	•	•
KENTA LESUTIO	•	•	•	•	•	•	•
LIBÉRIA	•	•	•	•		•	
MADAGASC AN	-	•	:	· ·	ĭ	-	•
MALANI	I	•	· ·				•
MAUR LEAN IA	·	•	•	•	•	•	•
MURITIO	•	•	•	•	•	•	•
MUZANBLE JE	•	•	•	•	•	•	•
HIJEK	•	. •	•			_•	•
NIJERIA	41400	53	776	17400	#700 000	17	453
RHAIDA	•	•	•	•	•	•	•
SAU TORE	•	•	•	•	•	•	•
SEMEGAL	•	•	•	•	•	•	•
SEVUHELLES SIERNA LEGNE	•	•	•	•	•	•	•
SOMALIA	<u>•</u>	•	•	•	•	-	•
SUDAN		_					,
SWALILAND		•	·	•	•	•	
1007	•	•	•	•	•	•	•
UGA:4UA	•	•	•	•	•	•	•
CAMER-RIM	•	•	•	140	70000	1	1
TANEANIA .	•	•	•	•	•	•	•
UPPER VULTA	. •	•	•			•	•
ZAJAE	50	•	· ·	135	47500	ı	2
ZAMULA	•	•	•	•	•	•	. •
AFRICA	45325	35	349	19702	4841000	8.0	997
ALJERIA	132660	231	2471	8440	4220000	37	2508
EUTPI	3000	43	55	3100	1550000	14	49
LIUYA	24000	41	449	23500	11756000	154	553
MONUCCU	25	` i	•	•	•	•	•
TOHESTA	6000	11	112	2250	1125000	10	122
N. L A 5 5/							
H. A. F. R. L. C. A.	165025	- 340	3046	31500	18645000	165	3253

- 46

.

Table 24

DATE: OCTOBER 14.1982

ESTEMATEG HAW MATERIAL FOR THE PETROCHEMICAL INDUSTRY IN LESS DEVELOPED COUMTRIES SOURCE: NATURAL GAS/UN WORLD ENERGY SUPPLIES CRUDE DIL/DIL AND GAS MOURNAL 1979

	PROVED RESERVES NAT.GAS	DOMEST EC DEMAND	PUTENTIAL AMM./METH. PRODUCTION	PROVED RESERVES CRUDE UIL	ESTIMATED ASSUGIATED GAS	POTENTIAL AMM./METH. PRODUCTION	TOTAL POTENTIAL AMM./METH. PRODUCTION	
	BCF	BCF	MELL. TONS	MILL.BBL	MILL.CF	MILL.TONS	HILL TONS	
BAHRALN	9000	125	166	240	120000	1	167	
YEMEN		_•	•			•	:	
IRAQ	27500	75	514	31000	15500000	137	651	
JORDAN					•		• •	
KUMAIT	31006	182 .	576	45400	32700000	289	867	
LEBAMIN	2000	•	38	2400	1200000	ıi	48	
OMAN QATAR	60000	7 i	1124	3760	1880000	17	114C	
SAUDI ARABIA	73230	28	8748	163350	61675000	723	2470	
SYRIAN ARAB	73230	2.	4.40	143370	01013000	123	2410	
REPUBLIC	1500	24	20	2000	1000008	9	37	
TURKET	500		`;	125	62500	í	ic	
UNITED ARAS	300	•	•	•	00,500		••	
EMIRATES	20500	17	384	29411	14705500	130	514	
2.72	2000							
M. E A S T/								1
W. A S I A	245230	522	4568	297686	148843000	1317	5906	
				•				d×.
AFGHAN1ST AN	•	12	•	•	47	•	•	~.)
BANJL ADE SH	80CO	•	150	•	•	•	150	
BHUTAN	•	. •	•	_•		•	:	
AKNUF	135	13	2	25	12500	•	5	•
CYPRUS	•	•	•	• •	•	•	•	
KAMPUCHEA	•	•	•	•	•	•	•	
FIJI	•	•		•	•	•	•	
HORG KUNG INDIA	•	40	•	2600	1300000	12	185	
INDUNES I A	9300 24000	214	1.	\$600	4#00000	42	486	
IRAN	490000	249	71,43	58000	29000000	257	9439	
ISRAEL	490000			30000	24000000		•	
LAS	•	•	•	•	•	•	_	
MALAYSIA	17000	27	319	2800	1400000	15	331	
MALDIVES		•	-			-	•	
MONGOL LA		•		•	•	•	•	
NEPAL	•	•	•	•	•	•	•	
PAKISTAN '	15800	192	293	200	10000	1	294	
PAPUA	•		•	•	•	•	•	
PHIL IPP INES	•	•	•	25	12500	•	•	
KOREA	•		•	•	•	•	•	
SINGAPORE	•	•	•	•	•	•	•	
SDL DAUN	•	•	•	•	•	•	•	
SRI LANKA	•	•	•	•	•	•	•	
THAILAND	8000	•	150	۰	•	•	150	
VIETKAM	•	•	•	0	o	•	•	
ASIA ,	572235	775	10715	73250	36625000	324	L 10 37	
						-		

DATE: UCTUBER 14,1462

ESTIMATED HAW MAJERIAL FUR THE PETRUCHURICAL JAPUSTAY IN LESS BEVELOPED CHAMTRIES SUMBLE MATURAL GAS/UN MURLO ENERGY SUPPLIES CHAME WIL/OIL AND GAS JOURNAL 1979

	PRÚVED RESERVES NAT.GAS	DEMAND	PUTENTIAL AMA./METH. PRODUCTION	CUNDE MIT VEZEVAEZ SUMED	ESTIMATED ASSULTATED BAS	POTENTIAL ANN. / METH. PRUDUCTION	POIAL POIEMITAL AMM/METH.
	u C#	#C#	MILL-TONS	MILL-BOL	MILL.CF	MACL. FORS	PRODUCTION MILL. TGMS
ANT ILLES	•	•	•	•	•	•	•
ARGERS INA	12500	94	2.83	2400	1 500000	7.7	284
BAHANAS	•	•	•	:		•	•
BARBADOS	4.00	•	• • •		1000	:	
BUL IVIA	5400	4.	101 27	150 5220	75000 61 0 000	•	192
BRAZIL	1500 2500	43 20	46	400	200000	3	33
CHILE	5000	161	91	110	355000	i	33
COLOMBIA COLOMBIA		•••	**	1.0	22200		•
CUMA	•	i			Ĭ	Š	•
. DUNLISICAN REP.		· ·	·		•	•	•
ELUADOR	4000	j	75	1100	550000	5	80
EL SALVADUR	•	•	•	•	•	•	•
GRENADA	•	•	•	•	•	•	•
GJATE YAL A	•	•	•	16	8060	•	•
GUYANA	•	•	•	•	•	•	•
FALLE	•	•	•	•	•	•	•
147447442	•	•	• *	•	•	•	•
JAMAICA					4.54.55000		
MEXIC)	>9000	1015	1094	31250	15425004	136	1224
NICARRUUA	•	₹	•	•	•	•	•
PANAHA	•	•	*	•	•	•	•
PAKAGJAY PEKU	1100	zi	70	455	32 750 0	i	23
SURINANE	,,,,,		• • •		32,122		•
IN INTO A COMPANY	8000	88	148	706	350000	3	151
UNUJUAY		•	•	•	•	•	•
VENEZUELA	42800	1512	740	17070	8935008	79	859
LAIIA AIERICA	144500	2720	2458	56473	2023-500	250	2908
IUTAL							
DEVELOPING							
COUNTRIES	1180665	4400	22055	404401	242240500	2144	24199
SAUDI AKABIA	93230	28	0654	143350	81475000	723	2470
VENEZJELA	42800	1215	Ìúo	17470	8135000	79	459
1440	490000	249	9) 83	\$8000	29000000	251	9438
ALGERIA	132000	231	2471	8440	4220000	37	2508
UHITED ANAD							
ENIRALES	20500	17	384	29411	14705500	130	514
INDIRESTA	24000	214	444	9600	4800060	42	488
Mutala	41400	23	776	17400	#300000	17	457
IRAJ	2 7500	75	514	31000	15560606	111	451
KUWATI	31000	193	574	45400	32700600	219	443
LIBYA	24000	47	449	23500	11750000	194	553
CATAR	63000	71	1156	3360	1440600	17	1140
GAB HI	560	9	. 9	500	\$20000	2	11
ECHADAR	4060	3	75	1100	3500(0	5	•0
UPLL .	590630	2344	1 45 3 4	424731	214465500	1 400	20435

DATES (K.TudER 14.1982

ESTINATED AAW MATERIAL FOR THE PETROCHEMICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SUURCE: MATURAL GAS/UN MURED ENERGY SUPPLIES CRUJE OIL/OIL AND GAS JUURMAL 1984

	PROVED RESERVES NAT.GAS	DEMAND	POTENTIAL ANN-/METH. PRODUCTION	PROYED RESERVES CRUDE DIL	ESTIMATED ASSOCIATED GAS	POTENTIAL AMM./METH. PRODUCTION	TOTAL POTENTIAL ANN./HETH. PRODUCTION
	R. F	BCF	MILL. TONS	MILL.BOL	MILL.CF	MILL.TONS	MILL.TONS
ANGUL A	1175	5	22	1200	490000	5	27
DENIN	•	•	•	•	•	•	•
BOI SWANA	•	•	•	•	•	•	•
SURUNUI	•	•	•	•	•	•	•
AFE VERDE	•	•	•	•	•	•	•
ENTRAL AFRECA HAD	•	•	•	•	•	•	•
ON-JK-1S	•	•	•	•	•	•	•
UNGU	2200	•	41	400	200000	ž	43
1100611	•			•		-	•
QU. GUINEA	•	•	•	•	•	•	•
THUPIA	•	•	•	•	•	•	•
HUBA	500	13	•	500	250000	2	11
Atura	•	•	•	•	•	•	•
HAMA	•	•	•	7	3500	•	•
UINEA	•	•	•	•	•	•	•
FUINEA-BISSAU Wury Coast	•	•	•	•	•	•	•
ENYA	•	•	•	•	•	•	•
ESUTIO	•	•	•	•	•	•	•
IDERIA	-	•	•	•	•	•	•
ADAGASCAR	-			:			
ALAWI	•	·	•	•	•	•	•
AURSTANIA	•	•	•	•	•	•	•
AUHITIUS	•	•	•	•	•	•	•
WZ ANB EQUE	•	•	•	•	•		•
i i jek		. •	•		•	_•	
ISERIA	41460	39	776	17400	4700000	11	053
HANDA	•	•	•	•	•	•	•
AO IOME ENEGAL		•	•	•	•	•	•
EYCHELLES		•	•	•	•	•	•
TERRA LEDNE	•	•	•	•	•	•	•
OTAL IA	-	•	•	•	•	<u> </u>	•
JDAN				-	•		
#AZ ILAND	•	•	•	•		•	•
บริง	•	•	•	•	•	•	•
ga:Iua	•	•	•	•	•	•	•
AMERION	•	•	•	140	70000	1	1
ANZAHTA	•	•	•	•	•	•	•
PPER VOLTA	-:	•	:		4.7.7.	•	•
ALRE AASIA	50	•	· ·	135	47500		Z
AUSTA	•	•	•	•	. •	•	•
FRICA	45325	59	849	19702	7871000	**	936
LGERIA	132000	419	2467	8440	4220000	37	2564
GYPT	3000	79	55	3100	1550000	14	69
LBTA	24000	92	448	23500	11750000	104	552
URJCCU	25	5	•	. •	•	•	•
UNISTA	0000	t•	112	2250	1125000	10	122
. E 4 5 T/							
N. A FRICA	165025	616	3083	37290	18645000	145	3240

DATE: OCTUBER 14,1982

ESTIMATED RAW MATERIAL FOR THE PETRUCHEMICAL 1.. DUSTRY IN LESS DEVELOPED COUNTRIES SOURCE: MATURAL GAS/UN MORLD ENERGY SUPPLIES CRUDE GIL/UIL AND GAS JOURNAL 1984

	PROVED RESERVES MAT.GAS	UDHESTIC DEMAND	PATENTIAL AM./METH. PRODUCTSON	PROYED RESERVES CRUDE OIL	ESTIMATED ASSUCIATED GAS	POTENTIAL AMAZMETHA PRODUCTION	FUTAL PUTENTIAL ANN. / HE III. PRODUCTICA	
	BCF	BCF	MILL. TONS	MILL. BOL	MILL.CF	MILL. TONS	MILL. TOUS	
BAHAAIN	9000	211	145	240	120000	1	144	
YEMEH	•	•	•	•		•		
IRAQ	27500	124	913	31300	15500000	137	450	
MAUAH	•	306		444		:	•	
KUAAIT	31000		575	45400	32700000	249	845	
LEBANON	2000	•	36	2400	1200000	ıi	,i	
OMAH OATAR	6906	120	1153	3760	1880006	ii	1139	
SAUGI ARABIA	13530	47	1747	143350	81675000	723	2470	
SYXIAM ARAB	17230	**	****		0.0012000			
REPUBLIC	1500	40	27	2098	·1000000	•	34	
TURKEY	500	•	- ;	125	42500	i	10	
UNITED ARAB		•	•	•			-	
EMIRATES	20500	34	384	29411	14765500	130	514	
H. E A S T/								•
W. A S I A	245230	645	458L	297646	148843000	1317	5899	10
AFGHAN ISTAN	•	27	. 1	•	•	•		50
BAHJL ADE SH	6000	15	150	•	•	•	150	
KATUEE	•	•	•	•	•	•	•	
AMRUG	135	22	2	25	12500	•	2	•
CYPRUS	•	•	•	•	•	•	•	
KAMPUCHEA	•	•	•	•	•	•	•	
FIJI	•	•	•	•	•	•	•	
HONG KONG	•	•		•	•	.:		
IHDIA	9300	101	112	2600	1300000	12 42	184 465	
INDONE S I A	24000	361	443	9600	4800000	251	5434	
IRAN	490600	436	9179	58000	29000000			
ISRAEL	•	•	•	•	•	•	•	
LAO	1700	45	21.	2800	1400000	12	330	
MAL AYSIA MAL DIVES	17000			2000			•	
MONGOLIA	•	•	•		-	•	•	
NEPAL	Ĭ.				·	•	•	
PAKISIAN	15000	324	290	200	100000	1	291	
PAPJA	•	•	•	•	•	•	•	
PILLIPPINES	•	•	•	25	12500	•	•	
KOREA	•	•	•	•	•	•	•	
SINGAPORE	•	•	•	•	•	•	•	
SOLUMIN .	•	•	•	•	•		•	
SRI LAHKA	· · · •	•		•	•	•		
THALLAND	\$000	•	150	•	•	•	150	
VIETNAN	•	•	•	•	•	•	•	
ASIA	572235	1349	16704	73250	36625000	324	11020	

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DATE: OCTOBER 14,1982

ESTINATED RAW MATERIAL FOR THE PETRUCHEMICAL INDUSTRY IN LESS BEYELWED COUNTRIES SHURCE: NATURAL GASJUM WORLD EMERGY SUPPLIES CRUDE OIL/OIL AND GAS JUURNAL 1984

	PRUVED RESERVES MAI-GAS	DEMANU DEMANU	PUTENTIAL ANN./MLTH. PADDUCTION	PRUYED CAUDE DIL	ESTIMATED ASSUCTATED GAS	POTENTIAL AMM./HETH. PRODUCTION	FOTAL POTENTIAL ANN./METH. PRODUCTION
	BCF	BCF	MILL. TOMS	MILL.BOL	MILL.CF	MILL.INHS	MILL. TOMS
ANTILLES		•	•			.:	:
ARGENTINA	15200	158	202	2400	1200000	11	293
ZAKAHAB	•	•	•	•	•	•	•
BARBADUS	•	•	•		1000	•	• •
EULIVIA	5400	_•	101	150	75000	Ţ	102
MAZ IL	1500	72	27	1550	\$10000	2	35
CHILE	2500	49	46	400	200000	Z	41
COLUMBIA	5000	271	41	710	355000	3	72
COSTA RICA	•	•	•	•	•	•	•
CUBA	•	2	•	•	•	•	•
DUYIHILAN REP.	•	•	_•	•		•	
ECUADUR	4000	5	75	1100	550000	5	•0
EL SALVADOR	•	•	•	•	•	•	•
GRE SAUA	•	•	•	. •	•	•	•
GUATE MALA	•	•	•	16	9000	•	•
GUYANA	•	•	•	• '	•	•	•
HAITI	•	•	•	•	•	•	•
HONDURAS	•	•	•	•	•	•	•
JAMATCA	•	•	, •	•	.	•	•
MEXECII	59000	1404	1072	31250	15425000	136	1211
NECARAGUA	•	•	•	•	•	•	•
PANANA	•	•	•	•	•	•	•
Pak aguay	•	•	•	•	•	•	•
FERU	1100	31	20	455	327500	3	23
SUNTHANE	•	•	•	•	•	•	•
TRIAI JAD/TOBAGU	8000	148	147	700	350070	3	150
UR USUAY	•	•	•	•	•	•	•
VENEZJELA	42 000	2047	764	17470	8935000	79	843
LATIN							
AAERICA	14450G	4598	2623	, \$6473	20236500	250	2673
TUTAL							
DEAELALING	*****						
COUNTRIES	1140665	7508	21997	404481	242240500	2144	24141
SAUJI ARABIA	93230	47	1747	143350	01675000	723	2470
VEHEZUELA	42800	2047	764	17070	8935000	79	843
IRAM	490000	436	9179	50000	29000000	257	9434
ALGERIA	132000	419	2467	8448	4220000	- śi	2504
UNITED ARAB		***	2007		122000	•	1301
EMIRATES	20500	34	364	29411	14705500	1 30	514
INUDITESTA	24000	361	443	9400	4800000	142	483
NIGERIA	41400	39	116	17400	6700000	iī	953
IRAJ	27500	126	513	31000	15500000	าว่า	450
KUJALF	31000	307	575	45400	32100000	289	935
LIDYA	34000	92	446	23500	11750000	104	552
DATAR	95000	120	1123	3760	1130010	17	1139
GABON	500	15	*****	500	250000	'	11
ECUAIKIK	4000	•	15	1160	550000	5	åċ
υρει	990930	4069	10504	429331	214665500	1900	20403

DATE: UCTUBER 14,1982

ESTIMATED MAY MATERIAL FOR THE PETROCHEMICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SUURCLI MATURAL GAS/UN MORLU ENERGY SUPPLIES CRUDE UIL/GIL AND GAS JOURNAL 1490

	PRLYED RESERVES MAI.GAS	DENAND DENAND	PUTENTIAL AMA-/NETM. PRODUCTION	PAGYED RESERVES CRUDE UIL	ESTIMATED ASSUCIATED GAS	PUTENTIAL AMA./METH. PHODUCTION	POTAL POTENTIAL ANN./METH.
	nc:	ac F	MILL. IONS	MILL.MAL	MILL-CF	ALL.IONS	Prioultica Mill.Toks
MGJLA	1175	•	22	1200	49900 0	5	2)
BEHIN	•	•	•	•	•	•	•
MD I SWAHA	•	•	•	•	•	•	•
MUNUMU!	•	•	•	•	•	•	•
CAPE VERDE	•	•	•	•	•	•	•
CENTRAL AFRICA LIIAJ	•	•	•	•	•	•	•
COMUNAS	•	•	•	•	•	•	•
Cuttin	2200	•	4.5	4.00	******	:	.:
11130111	1100	•	*1	100	200000	Z	43
EQU. GJINEA	•	•	•	•	•	•	•
E1:021A		•	•	•	•	•	•
GANAI	590	28	i i	500	250000	;	ıi.
GAAJIA	•			•	122000	-	•
GHAYA	·	•		j	3500		• •
ώJ1.4€ A	•	•			•	-	
JUINEA-UISSAU	•		•	•			· ·
IADKA FOYZI	•	•	•	•	•	•	•
KENYA	•	•	•	•	•	•	•
TE201.10	•	•	•	•	•	•	•
LIMERIA	•	•	•	•	•	•	
MAURUASCAN	•	•	•	•	•	•	•
MALAHI	•	•	•	•	g	•	•
ALMATINUAN	•	•	•	•	•	•	•
AAURITIUS	•	•	•	•	•	•	•
MOZAMBIQUE	•	•	•	•	•	•	•
NI JER NI JERIA	4440	.:			•	•	. •
Hakida Hakida	41400	72	775	17400	8700000	7.	452
3hCT LAZ	•	•	•	•	•	•	•
SENEGAL	•	•	•	•	•	•	•
SETURELLES	•	•	•	•	3	•	•
SIERRA LEGNE	Ĭ		<u> </u>	•	•	•	•
SUMAL I A			·		•	•	•
SUDAN		•		•	•	•	•
SHAZILAND	•	•	•	•	Ĭ		•
1033	•	•	•	•	ž		-
UJ AHDA	•	•	•	•	•	·	
CAMER JUN	•	•	•	140	70000	i i	ì
ANLASHA	•	•	•	• ,	•	•	•
UPPER VULIA	•	•	•	•	•	•	•
ZATRE	50	•	1	135	47500	L L	2
ZAMUTA	•	•	•	•	•	•	•
AFRICA	45325	110	844	19782	1011000	4#	945
ALJERIA	112000	014	2459	8440	4220000	11	2496
LUYPI	3600	140	53	3100	1530000	ii	41
LLUTA	24030	200	446	23500	. 1750000	104	550
MONGCEU	25	•	•				_
TUHISTA	6000	35	112	2250	112>000	10	122
4. C A S I/							
ALAFRICA	165625	1243	3671	37290	14645000	165	15.10

Table 30

DATE: OCTOBER 14,1982

ESTIMATED RAW MATERIAL FOR THE PETROCHEMICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SOURCE: NATURAL GASJON WORLD ENERGY SUPPLIES CRUDE DILJOIL AND #AS JOURNAL 1990

	PROVED RESERVES NAT-GAS	DUMESTIC DEMANU	FUTERTIAL AMM./METH. PRODUCTION	PROVED RESERVES CRUDE UIL	EŠTIMATED ASSUGIATED GAS	POTENTIAL ANN./METH. PROCUCTION	TOTAL POTENTIFL AHM. FME (H. PRODUCTION	
	BC F	BCF	MILL.TONS	MILL.BRL	HILL.CF	MILL-TONS	MILL TENS	
BAHRAEN	9000	394	161	240	120000)	162	
YENEN	•	•	•	•	•	•	•	
IRA3	27500	236	911	31000	15500000	137	648	
JURDAN	•	•	•		•	•		
KUAATT	31000	574	570	65407	32700000	289	860	
LEBANUN OMA:	2000	•	30	3400	130000	.:	4:	
QATAR	6000	224	1121	2400 3760	1260000 1880000	11	48	
SAUUI ARABIA	93236	88	1746	163350	81675000	17 723	1137	
STREAM ARAB	77234	••	10,70	142330	61612000	123	2469	
REPUBLIC	1500	76	27	2000	1000000	9	36	
URKET	500	•		25.5	62500	ĭ	10	
SMITED ARAB	χ	•	•	167	62,000	•	10	
EMERATES	20500	77	303	29411	14705500	1 30	513	
M. E A S T/								
W. A S 1 A	245230	1669	4567	297666	148843000	1317	5884	1
W. W. J. L. W.	247230	4004	4701	277000	140043000	1317	7007	
AF GHAN ESTAN	•	64	l l	•	•	•	1	יט
BANGLAVESH	8000	28	149	•	•	•	149	w
ONUTAN	•	•	•	•	•	•	•	
BURMA	135	41	2	25	12500	•	2	
CYPRUS	•	•	•	•	•	•	•	
KAMPUCHEA	•	•	•	•	•	•	•	
FIJI	•	•	•	•	•	• ,	•	
HONG KONG INDIA	•		:	•	•	• •	•	
INDONES LA	9300	109	171	2600	1300000	12	182	
IRAN	24000 49000	755 65 0	436 9172	9600 ·	4800000	42 257	418	
ISRAEL	490000			3000	2900000		9428	
LAU	•	•	•	•	•	•	•	
MALAYSIA	17000	. ;	317	2800	1400000	12	330	
MALUTYES	11000	•,	741	2000	140000	**	•	
MUNGUL 1A			Ž	•	-	-		
NEPAL	ž.		*	•				
PAKESTAN	15800	605	205	200	100000	i	286	
PAPUA	•	•	•	•	•	-	•	
PHILLIPPINES	•	•	•	25	12500	. •	•	
TUREA	• .	•	•	•	•	•	•	
SINGAPURE	•	•	•	•	0	9	•	
SOLOHUN	• .	•	•	•	•	•	•	
SRE LAHKA	•	•	•	٥	•	•	•	
THAILAND	8000	•	150	•	•	•	150	
VIETMAN :	•	•	•	•	•	•	•	
ASIA	972239	2615	10600	73250	36425000	324	11005	

DATE: OCTOBER 15,1982

LSTIMATED RAW MATERIAL FOR THE PETRUCHENICAL INDUSTRY IN LESS DEVELOPED COUNTRIES SOURCE! NATURAL GASJUM MORLO ÉRERGY SUPPLIES CRUDE DILIZON AND GAS JOURNAL 1990

	pruved reserves mat.gas	UUHR STIC DE MANU	PUTENTIAL AML/MEIN. PRUDUCTION	PROVED MESERVES CAUDE WILL	ESTAMATED ASSUCIATED GAS	PUTENTIAL AMA-/METH. PRODUCTION	TOTAL PUTENTIAL ANN./NETH. PAGOUCTION
	m. f	o CF	MILL. TOUS	MILL.BOL	MILL.CF	MILL.TONS	MILL.TOKS
ANTILLES						.:	
ANGENT INA	15200	294	514	2490	1500000	11	214
MAILAMAS	•	•	•	į	1000	•	•
Baraads Bulivia	5400	•	ι o i	เรอ็	75000	:	
POLITIA	1500	134	24	1220	41960	<u>:</u>	162 . 31
Culte	2500	195	45	100	200560	3	- 3
LULÚHALA	5000	507	34	710	355000	į	ii
CUSTA RICA	2.00		•	•••		.	••
CUBA		š	•		<u> </u>	•	•
DUSTRICAN REF.	ž		Ĭ		Ξ	Ĭ	•
ECUAUJH	4000	ě	75	1100	550000	į	44
EL SALVADUR	•	·	•		-		
CHEMAJA			·	·	ĭ	<u> </u>	
GUATEMALA	•	•	·	16	4000		
CUYAIM	•	•	•	•	•	•	•
MAIII	•	•	•	•	•	•	•
ZANUCHUH	•	•	•	•	•	•	
JANAICA	•	•	•	•	•	•	•
MEXICU	59000	1379	1043	\$1250	156250 00	8.18	1141
ni cakagua	•	•	•	•	•	•	•
PANAMA	•	•	•	•	•	•	•
PARAGUAY	•	_•	.•	•	· ·	•	•
PEKJ	1100	72	14	455	327500	3	33
SUNTWAME			2	:	•	•	•
TH INIDAD/TOBAGO	8000	277	145	700	350000	3	146
URUGUAY VENEZJELA	42800		· 13i			_:	
ACHETZEEN	12600	3029	191	17070	4135006	79	. 410
LAIIA							
Aderica	144500	8605	2548	\$4473	26234500	250	2796
1 0 1 A L							
DL VELOP I No							
CJUHTKIES	1146445	14241	21870	484481	342240 500	2144	24014
SAUUI ARABIA	43230	••	1746	143350	01475000	721	2460
VENEZULLA	42800	3824	731	17870	8935000	79	810
1 RAH	490000	450	9172	58000	29360000	257	4424
ALJERIA	135000	848	2459	8440	4226000	37	2496
UNITED ANAM							
EMINATES	20200	77	363	29411	14705500	1 10	513
IND RIES IA	24000	755	434	9400	4860000	42	474
NIGHIA	41400	12	775	17400	#700000	11	452
IAAJ	27500	234	511	31000	11500000	137	440
KUHALI	31600	574	\$70	45403	32700000	289	1.0
LINTA	24600	300	444	23500	11150000	104	550
JA FAN	40000	224	1157	3740	1440000	11	1133
GARGIA	500	26	9	500	250000	2	!!
FUGGOR	4000	4	75	1100	>50000	5	10
u P (C	99-3 93C	1192	14+3+	424131	21466>>CO	1 900	20114

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SUPPLY-DENAND

ESTIMATED RAW MATERIAL AND PETHANOL PRODUCTION FROM HATURAL GAS

IN DEVELOPING COUNTRIES

1979

Column	[1]	(2)	(3)	[4]	(5)	(6)
RPGTON	Demand for Methanol	Production Methanol	Existing Capacity	Capacity Eccess/ (Deficit)	Sustained Prod- uction Based on (Years) Demand - Plants	Methanol Potential Production
	Tons 10'	Tone 10'	Tons 10°	'/ons 10'	Capacity	Tons 10 ⁶
AFRICA	-	<u>.</u>	-	-		937
N. APRICA	50	400	450	400	62-186	3,253
W. ASIA /HIDDLE EAST	50	-	430 ⁵	3 8 0	185-78	5,906
ASIA /HIDOLE EAST	300	400	500	200	03-115	11,039
C. TNA	240	210	260	20	-	n.a.
LATIN AMERICA	. 300	310	350	50	66-57	2,908
TOTAL LDC's	940	1,320	1,990	1,050	84-88	24,199
OPEC	-	-	4304	-	-	20,435
WORLD E	11,740	11,720	13,035'	2,0956	<u>-</u> ·	-

Blaboration: OPEC Downstream Operations Unit, April 1982.

Bource: Columns (4), (5) and (6) are OPEC Secretariat's estimations. Column (4) = (3) - (1).

Columns (1), (2) and (3) are UNIDO estimations, "Second Moridwide Cody on the Petrochemical Industry", Annexe page 11, July 1981.

- 1- Includes CPE's.
- 2- UNIDO-GOIC joint study in April 1981 (The Industrial Uses of Associated Gas), estimates 13,466 mill.tons.
- 3- UNIDO-GOIC joint study in April 1981 (The Industrial Uses of Associated Gas), estimates 10,994 mill.tons.
- 4- See table 7, OPEC Secretariat's records; some differences could exist due to latest updating.
- 5- Added to UNIDO estimations. Sources: OPEC Secretariat and GOIC (Industrial Uses of Associated Gas April 1981, page 69).
- . 6- According to the above referred Goic study, the world demanded for methanol in 1978/79
 10.2 million tons therefore, the excess world capacity is even greater i.e. 3.3 million tons.

SUPPLY-DENAND

ESTIMATED RAW MATERIAL AND METHANOL PRODUCTION FROM NATURAL GAS

IN DEVELOPING COUNTRIES

1984

Column		(2)	(3)	(4)	(5)	(6)
REGION	Demand for Hechanol Tons 10°	Production Methanol Tons 10 ³	Existing Capacity Tons 10°	Capacity Excess/ (Deficit) Tons 10	Sustained Prod- uction Based on (Years) Demand - Plants Capacity	Methanol Potential Production Tons 10 ⁶
AFRICA	-	-	-		•	936
N. AFRICA	75	400	450	375	57-181	3,248
W. ASIA /MIDDLE BAST	75	600	660	585	180-73	5,899
ASIA / MIDDLE EAST	600	550	600	0	78-110	11,028
CILINA	350	350	400	50	-	n.a.
LATIN AMERICA	700	1,090	1,200	500	61-52	2,873
TOTAL LEC'S	1,800	2,900	3,310	1,510	79-83	24,141
OPEC	-	-	2,620	-		20,403
HORLD ¹	18,400°	18,900	23,810	5,410	-	-

Elaboration: OPEC Downstream Operations Unit

Sources

Columns (4), (5) and (6) are OPEC Secretariat's estimations

Columns (1), (2) and (3) are UNIDO estimations, "Second Worldwide Study on the Petrochemical Industry", July 1981.

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¹⁻ Includes CPE's

²⁻ GOIC, estimates for 1983; World demand for Mothanol, 14.1 million tons, and as the World Production of Mehanol, 14.9 million tons. "The Industrial Uses of Associated Gas", April 1981.

BUPPLY - DEMAND

ESTIMATED RAW MATERIAL AND METHANOL PRODUCTION FROM MATURAL GAS

IN DEVELOPING COUNTRIES

1990

Column	(1)	(2)	(3)	_(4)	(5)	(6)
REGION	Demand for Methanol Tons 10 ³	Production Methenol Tons 10°	Existing Capacity 1987 Tons 10°	Capacity Rxcess/ (Deficit) Tons 10'	Sustained Prod- uction Based on (Years) Tomand - Plants Capacity	Methanol Potential Production Tons 10 ⁵
APRICA	50		<u>-</u>	(50)		935
R. AFRICA	100	n.a.	. 760	660	51-175	3,236
W. Asia /Middle rast	100	n.e.	1,630	1,530	175-60	5,884
asia /Hiddle fast	1,200	n.a.	1,300	100	72-104	11,005
CHINA	700	n.a.	800	100	-	n.a.
LATIN AMERICA	1,400	1,641	2,000	600	55-46	2,798
TOTAL LDC's	3,550	3,600	6,490¹	2,940	73-77	24,014
OPEC			2,620		-	20,334
WORLD 1	27,550 ⁴	n.a.	29,690'	2,140	-	~

Elaboration: OPEC Downstream Operations Unit

Source:

Columns (4), (5) and (6) are CPEC Secretariat's estimations

Columns (1) and (3) are UNIDO estimations, "Second Moridwide Study on the Petroleum Industry Process of Restruction". July 1981. Same INTIN's figures for OPEC Countries were corrected according to our records.

- PEC figures corrected based on our more recent records appears in Table 7.
- The LDCs figure includes what has been published until now, i.e. capacity expansions up to 1987.
- !- Includes CPB's Source: GOIC
- 4- GOIC, estimates for 1990: World demand for Methanol, 23.4 million tons.

Murid production for Methanol, 23.1 million tons.

Africa Middle East Methanol Production, 2.6 million tons,

"The Industrial Uses of Associated Gas - April 1981, page 74".

Table 35
OPEC DOMESTIC CONSUMPTION OF NATURAL GAS

(According to Different Sources)

Country	OPEC Statistical Bulletin 1981 10 ⁹ CF (1)	UN Tape 1979 10 ⁹ CF (2)	UN Publication 1979 10 ⁹ CF (3)	OPEC Statistical Bulletin 1979 10 ⁹ CF (4)
Algeria	239	231	105	503
Ecuador	2	3	1.8	1.3
Gabon	5	9	7.2	5.3
Indonesia	196	214	141.5	252
Iran	254	249	388.0	515
Iraq	23	75	78.7	78.7
Kuwait	188	182	165.7	124
Libya	115	47	27.1	124
Nigeria	76	23	18.1	49
Qatar	156	71	154.1	154
Sawli Arabia	896	28	22.6	412
UAE	194	. 17	16.3	127
Venezuea	588	1215	477.5	575

Elaboration: OPEC Downstream Operations Unit OPEC Statistics Unit

0130 000020103 01110

Sources: Columns 1 & 4: a) OPEC Statistical Bulletins, 1979;1981.

Column 3: b) Yearbook of the World Energy Statistics, UN 1980.

Column 2: c) United Nations' Tape: Natural Gas/World Energy Supplies, 1979.

Note:

After cross-checking and investigating the differences among columns (2), (3) and (4) for some countries we came to the following conclusions:

- a) Different reporting and computing systems on domestic consumption of natural gas probably exist. OPEC and UN questionnaires are not necessarily the same.
- b) It seems that stocks, in some cases, are included in domestic consumption.
- c) The gross production of natural gas, as the starting point to calculate domestic consumption, in some cases, changes drastically from one year to another, while exports remain about the same, therefore determining the level of domestic consumption.
- d) In some cases, discrepancies might be due to the errors in computer entries.
- e) The treatment of gas exports in the whole calculation of domestic consumption may differ.

