

Distr.  
RESTRICTED

LC/R.837(Sem.53/6)  
6 December 1989

ORIGINAL: ENGLISH

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E C L A C  
Economic Commission for Latin America and the Caribbean

**REPORT OF THE MEETING ON TECHNOLOGICAL OPTIONS AND OPPORTUNITIES  
FOR DEVELOPMENT: THE ALUMINIUM AND TIN INDUSTRIES IN LATIN  
AMERICA AND THE CARIBBEAN \*/**

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\*/ This meeting was carried-out within the framework of ECLAC/UNCTAD/PNUD Project - RLA/87/019, "Assistance for Commercial Development and Trade Negotiations", and was sponsored by the Economic Commission for Latin America and the Caribbean (ECLAC), the United Nations Conference on Trade and Development (UNCTAD), and the United Nations Development Programme (UNDP).

Document not subjected to editorial revision.

89-12-1936

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## I. INAUGURATION

The meeting was inaugurated by Mr. Horacio Santamaría, Director of Programme Planning and Coordination Office of ECLAC, on behalf of Mr. Gert Rosenthal, Executive Secretary. By way of introducing the subject matter, he first made comments on a significant downward trend in the real prices of primary commodities during the post World War II period. He argued that in addition to such factors conventionally discussed as low price- and income-elasticities, there are other structural elements gaining an increasing importance in recent years. He enumerated, among others: (i) the decreasing role of the manufacturing sector and the increasing share of the national income being spent on services; (ii) a shifting pattern of output in the developed countries away from energy- and materials-intensive techniques of production; and (iii) a reduction in or an eventual elimination of the amount of traditional raw materials consumed in the manufacture of existing or newly emerging products through substitution of other materials in those products, and through more economical use of the material, material saving or economization. He suggested that these observations on the demand side amount to the recently growing concern that raw materials demand in the developed market economies (DMECs) has been slowing down considerably and that the very factors responsible for this would soon begin to affect developing countries' demand. On the supply side, most remarkable have been the accelerated pace of production in a number of commodities and continuous improvements in productivity, both in developed and developing countries, through applications of new production methods and technologies.

He went on to comment that although it is interesting to grasp conceptually the complex nature of interaction between technological advance and the commodity demand and supply on a general level, analyzing this problem at a specific product or industry level would be more fruitful. With this understanding, this expert meeting was called, in order to examine implications of technological change for specific commodities (in this case aluminium and tin), trying to identify real possibilities of Latin American and Caribbean co-operation to counteract the main challenge of the technical revolution.

Regarding the selection of the two metals in question, he stated that these two industries will continue to be a major force of the mineral and metal development of the region and that Latin America and the Caribbean as a whole is expected to increase its participation in the world production and trade of these two metals. It was pointed out that there had been a markedly contrasting consumption performance between aluminium and tin in the last three decades, the former being one of the most impressive and the latter the most depressed among the major traditional metals. He reiterated the belief of the two Secretariats (ECLAC/UNCTAD) that it is very useful to analyze in depth the factors responsible for this differentiated demand behavior, not only for the two metals in question but also other commodities which might share similar concerns. He also expressed the conviction of the two Secretariats that some supply factors were contributing to this and were worthy of examination.

In closing, Mr. Santamaria touched on the Integrated Programme for Commodities (IPC). This Programme, which has been negotiated more than a decade under the UNCTAD auspices, has placed emphasis not only on price stabilization but also on such issues as higher participation of producers in the marketing, distribution and transport of commodities, expansion of processing activities, improved competitiveness of natural products with regard to synthetics and substitutes, better access to the markets of the developed countries, more fluid and efficient information and consultation procedures between producing and consuming countries, development of the industrial infrastructure and capacity of the developing countries, through a series of international measures such as R & D, cost reduction, increase in productivity, and vertical and horizontal diversification.

However, it was of general recognition that despite arduous negotiations, not only the results have been discouraging but also there is a tendency for the DMECs to press for solutions through the free play of market forces. As far as developing countries are concerned, very evident has been a lack of unity of producing countries' interests. In his view, in lieu of the traditional emphasis on North-South cooperation, companies and other organizations working in commodities now sincerely seek means to improve their international competitiveness via adoption and incorporation of new technologies in production and trade-related activities to insure their survival. He emphasized that though

the focus of the IPC was still valid from the Third World point of view, the changing conception of international co-operation in commodities is now calling for more pragmatic approaches. Finally, thanking each representative for his participation, Mr. Santamaría expressed his hope that this high-level expert meeting would lead to constructive discussions on these issues, identifying problems and possible forms and modalities of cooperative action and policies.

## II. PRESENTATION OF AND COMMENTS ON THE SECRETARIATS' DOCUMENTS

The presentation first dealt with annual growth rates of apparent consumption for non-ferrous metals over the last 25 years, which clearly pointed out a differentiated demand behavior between aluminium and tin. Aluminium demonstrated a growth rate substantially higher than any other metals in the DMECs and developing countries. Tin, on the other hand, has registered the lowest rate; this severely depressed demand performance has been a major concern of the tin industry.

However, it was recognized that in the 1970s and 1980s, a number of events led to a slower growth of demand for aluminium. The reduced rate of economic growth, particularly industrial production, and the slow-down of the substitution process of aluminium for other metals were major responsible factors. The major new market to appear in the last decade was the beverage-can sector, where aluminium has replaced tinfoil in several countries and where its market share is likely to expand further. In most other end-uses, aluminium has only been able to keep its market share or, in some cases, to increase it marginally. Technical advance, including the development of better alloys and design changes to use less aluminium in a given product, while enhancing the competitiveness of aluminium, has also in some cases had a demand-damping effect.

Regarding tin, in the 1960s and 1970s, world consumption grew at a rate appreciably lower than the world GDP or industrial production growth rates. The rate corresponding to the DMECs for the period of 1980-85 was negative -2.2%. In addition to being one of the earliest industrial metals to be introduced, substitution of tin by other materials, including aluminium and steel, has been

one of the major factors behind the decrease in world consumption. It was found that in the major DMECs tin consumption has decreased in almost all end-uses.

Nonetheless, the supply and demand estimates made in the aluminium and tin studies pointed to a cautious note of optimism, with market prospects substantially better for both metals up to the mid-1990's than the early 1980's. It was, however, pointed out by several experts that the recent recovery of the aluminium industry has not necessarily translated into a higher, remunerative price of bauxite. A concern was also expressed regarding the possibility of having over-investment in aluminium and under-investment in tin towards the year 2000, which might lead to lower prices of the former and higher ones for the latter. In any case, as far as aluminium is concerned, given the situation with regard to resource endowment and cost-effectiveness, the region as a whole should ascertain its status as a major exporter to the rest of the world at all stages of production. In the case of tin, Brazil will strengthen its position as a world leading producer while the status of Bolivia in world markets still remains to be confirmed.

It was observed that in contrast to what has happened with respect to the DMECs' consumption, developing countries have shown a much more dynamic demand for aluminium and tin. Between 1978 and 1987, despite deceleration in the GDP growth of these countries, coupled by mounting debt problems and depressed investments, consumption for both metals increased at a rate substantially higher than industrial production.

In relation to the intensity of use of these metals, a concept which was referred to by some participants, it was inferred that the future demand and the intensity of use in developing countries would not necessarily reach the levels achieved in the past by the DMECs at comparable levels of income. On the other hand, it was also suggested that any reduction in requirements due to miniaturization, economization and substitution could be offset by increasing demand, given the fast population growth and a need for infrastructure works. The situation of Argentine illustrated this case, pointing to a clearly increasing trend of aluminium intensity in this country in the 1980s. This argument is further strengthened when account is taken of the enormous differential in per capita consumption between the DMECs and developing countries. This points in turn to the importance of domestic, intra- and

interregional market expansion in the Third world. This is particularly important in the case of tin, as consumption increases are likely to come mainly from developing countries. The importance of increasing regional consumption by catering to local needs was also stressed by the aluminium experts.

In relation to the possibility of increasing demand and raising the participation of developing countries in production and trade, it was thought important to take note of some differences in technical properties between aluminium and tin. Aluminium's highly valued conductive and structural properties relative to its weight permit a wide variety of applications --more so than any other major metal. Tin shares some but not all of these characteristics and therefore competes against aluminium in some industrial uses. Thanks to its specific nature, tin can be easily rolled or beaten into sheets or easily alloyed with other metals to create desirable properties. As a result the demand for tin is often a "derived demand" which is not usually the case for aluminium. The relatively low tin content in many end-use products for tin means that tin is neither a necessary nor significant input. Thus, the domestic availability of tin per se does not confer an important advantage to tin-producing developing countries in the production of intermediate or final goods which use tin. In addition, the high value of tin per weight facilitates international trade of this metal and while natural resource endowment is of course important, it is not a crucial factor in the location of fabricating plants.

The foregoing considerations explain the very high participation of developing countries in tin metal exports and their low share in semi-fabricated goods. These factors suggest that the processing of tin further downstream requires complementary metals, such as steel for timplate and various metals like lead, antimony, silver, etc. for tin alloys. This observation is exemplified by the Mexican case where there has developed a complex of tin refining and smelting capacities as well as fabrication of alloys and solders and tin chemicals, based largely on imported raw materials, especially secondary material from the United States.

The main developments in recent years of the aluminium industry were summarized as a major geographical redistribution of production capacity, a

decrease in the degree of industrial concentration, growth of the free market and increase in price instability, and a reduced capacity for aluminium to substitute for other materials. The structural changes in tin were, on the other hand, characterized by the consolidation of its industry following the 1985 tin crisis, which led to closure of several high-cost tin producers around the world, as well as by the emergence of some new tin producers such as Brazil and China. Coupled with the marked increase in smelting capacity in developing countries, these have resulted in significant changes in the pattern of world supply and trade for both tin-in-concentrates and primary metal.

It was pointed out that the restructuring of the aluminium industry has involved relocations of supply towards lower-cost countries, the reduction, in some cases, of backward integration, and diversification into new or advanced materials related or not to aluminium. In the case of tin, where the key element is mineral resource endowment, producers resorted mainly to reducing production costs through the closure of a number of high-cost tin mines, and measures such as selective mining, work force rationalization and stock reduction. In consequence, the market situation had become more transparent and competitive.

It was suggested that the lesser control exercised by the major aluminium producers, contrasted with the seemingly increasing industrial concentration in tin, point to some convergent areas of concern for both metals. They include the maturing process of the industry, the threat of material substitution, higher price volatility and consequently different price formation mechanisms at different stages of processing, the need for the producers to increase value-added by local processing and through the introduction of new products and development of advanced materials. A higher utilization of commodity exchanges by institutional investors, which in some experts' view has contributed to a higher level of price volatility in recent years, has made it essential but more difficult to manage price risks from the Third world producers' perspective.

Referring to the process of material substitution, the documents prepared by UNCTAD/ECLAC suggested that not only relative prices but also other costs (labor, maintenance, recycling) and specific properties (weight, durability, anti-corrosiveness, extendability, etc.) play an important role in facilitating/inhibiting substitution. Many new materials are priced higher than the conventional materials they replace. However, new materials may be preferred



because they offer the opportunity to reduce manufacturing costs sufficiently to offset their higher prices. For instance, the competitiveness of the aluminium can versus the tinfoil can, despite the higher price of aluminium relative to tinfoil, rests on low manufacturing costs and recyclability.

In the view of some participants, the nature of material substitution could modify the traditional view that the functional relationship between price and demand is necessarily reversible. Rather, if a material loses a particular market, even temporarily, that market might be lost forever. Also, for those materials which do not have diversified uses in their applications, prices may rise within certain limits, with little effect on demand, but once a particular threshold is passed, demand may fall drastically making the use of a competing substitute more attractive. In this connection, one representative noted a need of studies to examine the irreversibility and automaticity of substitution in relation to relative price changes.

In the above context, it was seen as essential to establish price stability at a low yet remunerative level. Stable price would also help to reduce possible over- and under-investment of the sectors in question, making investment programming easier. Price stability at a low and remunerative level should also reduce the growing concern of low-cost tin producers like Indonesia and Brazil that high prices could lead to the opening of old mines, which in turn could bring back the problem of oversupply. In this sense, some participants saw it pertinent to encourage and strengthen such efforts as those of the Association of Tin Producing Countries (ATPC) to manage supply, but without interfering with market fundamentals. Others noted the incompatibility between price regulation and international cooperation in the long-term perspective. It was also thought that only under a stable price regime, endeavors to discover and promote new uses can be sustained.

In this connection, it was recognized that under a long history of international commodity agreements, tin is the only major metal for which the price has increased in real terms for more than three decades. In contrast, the strategy of the major aluminium companies in the past was in part to keep their prices low and stable but the main thrust of their policy was to establish price differentials against the substituting competitors, such as tin, based on the high level of vertical integration.

In view of the high market potential in Latin America, the UNCTAD/ECLAC reports and some participants argued that a type of product differentiation now ongoing between the developed and developing economies would continue. While developing countries continue to exploit their comparative advantage specializing more in low-cost, low-quality, bulk products in these metals, developed countries intensify their efforts to concentrate more on products with higher value-added with more special qualities and specifications. The nature and scope of R & D activities of major aluminium producers, for instance, has increasingly become concentrated on development of new alloys and production processes for specific end-uses, with more stringent specifications, and general material research. Some participants raised the point that depending on the nature of product specialization, not only the technology required but also marketing and distribution capabilities needed should differ.

From an examination of the cost structure of the industry-chain it was clear that, for tin, mineral resource endowment and efficiency and productivity in mining was the fundamental cost variable, while for aluminium, the cost of mining usually accounted for a very small proportion of the total cost of metal production. Given the genesis of bauxite deposits, they usually lie at or close to the surface and as a consequence most bauxite mining is open pit. For this reason, the mining is a relatively easy and low cost operation. It was pointed out by that both bauxite and alumina have uses outside the aluminium sector (refractory, abrasive or chemical grade bauxite) which constitute an important income source for some countries.

In tin, mining costs are widely differentiated among and within different mining methods (e.g., underground, dredge, gravel pumping). In many ways, the geological characteristics of the deposit determines the scale of operation, mining method, grade of the deposit and availability of by-products. It was noted by the tin experts that as far as productivity improvements and efficiency were concerned, the mining stage was the most relevant one, in contrast to aluminium which has its key phase in the smelting end and further downstream activities. It was concluded, therefore, that efforts to improve the competitiveness of Latin American tin producers (notably Bolivia) must be directed to mining technologies. It was also noted by some representatives that certain underground tin mines such as of those in Australia and Canada are rated

as efficient operations and that in the recent period the mines of the Empresa Nacional de Fundiciones (ENAF) of Bolivia have been able to cut down costs substantially leading to an appreciable recovery in competitiveness and profitability. In assessing the competitiveness of different mines, it was recognized that recent production cost estimates were not currently available; it was expected that new estimates from the US Bureau of Mines would become available in the near future. Many participants argued that what is needed more in tin is capital, technology and a more clear and stable market prospect for the medium and long-term for investment planning.

Regarding processing technologies, producers tend to give priority to this kind of R & D only when they encounter a critical situation such as the one faced by Bolivia. However, by the time the crisis arises, the agenda for processing and productivity related R & D is already long and costly, and in the time-lag between the decision to undertake such R & D and actual results, production performance may worsen considerably. The necessity to modernize smelters has become even more evident recently given the increasing level of impurities in concentrates and the decline of ore grades in general. It was noted that progress made in dealing with poorer grades has been rather slow. This situation is due partly to the fact that until recently most tin has been derived from comparatively high-grade and clean ores, and partly to the lack of interest in international cooperation to support research efforts to improve metallurgical methods and the development of new techniques.

It was generally known that refining and smelting technologies in aluminium have on the whole remained largely unchanged since the beginning of the century. In this context, it was pointed out that technology per se is not a problem. The bottleneck lies in financing and also in the maintenance of the technology in place. Due to the fact that the majority of technologies used in developing countries are developed by leading transnational firms, their subsidiaries in these countries tend to adopt new technologies relatively easily. As a result, production costs tend to converge across countries although some country-specific features (labor and energy costs, etc.) play an important role in cost differentiation. The aluminium study supported the view that Latin American smelters are still far from the "best practice" regarding labor productivity, although low productivity in some cases tend to be offset by

substantially lower labor costs. It was suggested that the factors contributing to low productivity should be identified. It was also noted that there exists a dual structure in aluminium in which the domestic sector is more labor-intensive while the export sector is more capital-intensive.

The comparative aluminium/tin study attributed a contrasted demand performance between aluminium and tin, especially during the period 1960-1979, to the high degree of industrial integration still prevailing in the aluminium industry. The most marked features of the aluminium industry have been: the stable pricing regime, at least up until recently; the orderly development of production capacity; a high degree of direction and concentration in R & D aimed at expanding consumption; and the ability of major transnationals to invest in manufacturing facilities to bring new products to markets. In contrast to this, efforts to discover, develop and promote new uses for tin have been insufficient, and emphasis was placed on the survival of uncompetitive mines protected by artificially high prices. It was suggested that the orderly development of production capacity and the more expeditious stock adjustments which had taken place for aluminium in the 1980s could be partly explained by the special industry structure of this commodity.

The bauxite/alumina/aluminium industry, in spite of recent changes, has been characterized by its tightly controlled marketing system. Most bauxite and alumina continue to be traded between affiliated firms of the same companies and these companies still control a high percentage of fabricating capacities world-wide. In contrast, tin (ore, metal, tinplate) is channelled to final markets through trading agents and semi-fabricators, who are many in number, and whose interests are not necessarily only in tin. The market structure in tinplate, as an example, is largely dominated by bigger companies on the both supply and demand side, but there is rarely either forward or backward integration between tinplate manufacture and canmaking. The tinplate manufacturers often offer both tinplate and tin-free steel while canmakers operate a number of dual-production lines, and thus have the flexibility necessary to switch production to either tinplate or aluminium cans. One particular aspect of the packaging market was, in some participants' view, its notorious lack of product loyalty, a situation which can easily lead to the substitution of tin by other materials. The aluminium companies are willing to

devote much larger resources to R & D and publicity since the gains accruing are more directly visible to them. It was also noted that in tin the lack of market information-feedback prevents the producers from assessing the actual and potential needs and requirements of final consumers. The change towards a lower degree of vertical integration in aluminium and the emergence of new entrants to the industry will call for greater efforts on the part of these new participants for marketing and promotion.

It was stated that funds designated to basic research and applications for tin were clearly deficient when compared to the case of aluminium. A company like Alcoa or Alcan allocates to research and promotion more than US\$ 100 million annually, although it was observed by a representative that in the last ten years or so, R & D efforts by the aluminium producers have been decreasing, due partly to the control exercised in these companies by other financial investors. Recent efforts have been concentrated more on end-product research. For tin, on the other hand, research on new and traditional uses has been undertaken mostly by the International Tin Research Institute (ITRI). Although the Institute has represented a seminal initiative and a major joint effort, its annual budget is less than US\$ 5 million. The ability to remain competitive in the mining and smelting stages of production and to market new/improved products is heavily correlated with the scope and nature of R & D, which is in large part determined by the availability of finance. In this context, it was crucial to strengthen the financial basis of the existing institutions through intergovernmental actions at the international and regional level and by seeking support from various sources. Due to the "public-good" nature of R & D and product promotion, unless efforts are undertaken jointly by all producers, the presence of "free riders" will continue to cause problems.

The aluminium study maintained that intergovernmental support for R & D would have a modest impact, taking into consideration the activities of the major producers, who undertake these efforts efficiently with ample funds. Nonetheless, the aluminium experts argued that measures specifically oriented towards increasing regional consumption, promoting products more suited for local needs and solving the problems of the industries of the region could bring about significant benefits to the regional producers.

It was generally agreed that the promotion and marketing areas contain some of the fundamental issues for further work. Information is lacking with regard to the operation of, and conditions in, spot or short-term markets, including premiums and penalties and the volume of material being sought or available for sale. Other valuable information deals with the identification of buyers and sellers at each stage of processing, such as product specification, annual requirements or volume available for sale on the free market, investment plans and the structure of consumption up to and including semi-fabricated products in world and regional markets.

In spite of the progress made over the years, producers are facing a number of market forces which continue to hinder their participation in marketing activities. In some developing countries, where processing facilities already exist, problems affecting their participation in downstream activities do not lie in processing per se, but rather in the marketing of the processed products. This view, also shared by those involved in the aluminium industry, highlights the importance of marketing if efforts towards industrialization, based on raw materials, are to make headway in the Third World. It was recognized that the areas of marketing and processing are intricately related, since the possibilities for processing before export depend on the ability to secure beforehand market outlets for the processed product. In this regard, the development of marketing infrastructure, for example, through joint ventures with foreign companies in the region or elsewhere, should help diversify not only product range and market outlets but also transaction arrangements such as product sharing and buy-back deals. It was, however, noted that a higher level of processing does not always guarantee a higher profitability.

A substantial amount of discussion was devoted to the issues related to intraregional trade involving these two metals. It was argued that while the present market environment and the global production structure condition the producers of the region to be principally export-oriented to extraregional markets, there are opportunities, at least in theoretical terms, for increasing intraregional trade flows and expanding co-operation efforts in both metals. This point was stressed by one aluminium expert, arguing that market access to the developed countries' markets was a major problem and that expanding the regional market was a viable alternative to this. Undoubtedly, to make a higher

level of regional trade possible, in-depth economic and technical feasibility studies are called for. Furthermore, such constraints as tariff and non-tariff barriers, transportation difficulties, insufficient financing, lack of marketing abilities should be removed or reduced.

Several representatives maintained that there is a high potential for regional co-operation in aluminium. They argued that it was necessary to reduce the cost disadvantages of the regional producers arising from small-scale operations and to take advantage of under-utilized capacities rather than to invest in new green-field plants: bauxite and aluminium production capacity in the Caribbean coinciding with the expansion of smelter capacity in Venezuela and Brazil and the availability of idle fabricating facilities in Argentina, Mexico, and Venezuela. Thus, with minor modifications, it may be possible to raise the degree of downstream activities in the region. Furthermore, the comparative advantages enjoyed by the Caribbean countries in bauxite and alumina production and by Venezuela and Brazil in aluminium should be exploited. The dilution of ownership and control by the major producers at the primary stages of the industry and the consequential increase in downstream activities on the one hand, and the increasing role of the State sector of the various regional producers should also work in favor of regional co-operation. Also, the comparative advantages of the region in the production of raw materials inputs for the alumina and aluminium sectors (e.g., caustic soda, petroleum coke), fostered by the declining level of investment by extraregional producers of these products, are other favorable elements. The Caribbean producers enjoy tariff preference in the EEC and the US as well. Considering the highly developed capital goods industries required by the aluminium sector especially in Brazil and Mexico, promoting intraregional trade in some range of capital goods might be also considered. It was, however, emphasized by some representatives that it was equally important to achieve self-sufficiency at all stages of production and to take advantage of vertical integration at the national level, as in the case of Venezuela.

For tin as well, it was argued that there was scope to utilize and harmonize better existing capacities at the regional level, as had been demonstrated in the agreement between two Peruvian and Mexican firms to treat concentrates of the former in the smelter in the latter. There are also

opportunities to expand trade in the area of tin chemicals. Brazil and Mexico are well equipped to establish and expand this sector.

### III. RECOMMENDATIONS

During the course of debate, certain points relating to the future investment needs and opportunities were raised: some mentioned the scarcity of investment funds, while others pointed out the scarcity of good projects in spite of fund availability. Some participants also raised a concern over the possible over- or under-investment in the two industries in relation to future demand and supply prospects. These observations taken together point to the need of in-depth analysis of project financing by an institution such as the World Bank.

In view of the changing technological and market conditions, the most important task facing the aluminium and tin industry is to take measures to increase demand, especially in the Third World markets. The measures would require the strengthening of both R & D and promotional efforts to maintain and subsequently increase the share of these metals' consumption. The measures for tin should include two areas: (i) development of new uses; and (ii) the reversal or the containment of the tide of substitution of other materials for tin. In the first area, the ITRI is the only existing institution but its financial capabilities are limited and need to be strengthened. With respect to the second area, the tin industry needs to make continuous efforts to reduce production costs and to set prices competitive to other materials. Taking into account limited funds designated in tin for these purposes, it is important to strengthen the financial bases of the organizations concerned through intergovernmental actions, both at the international and regional level. Seeking support from such entities as the Second Account of the Common Fund might deserve examination. The Asian example of a regional organization (SEATRAD) could also be contemplated in Latin America. In aluminium as well, for promotional and informational purposes, creation of a regional producers' association, including fabricators, was recommended. The forthcoming International Tin Study Group will have to be utilized creatively. A similar study group might be also created for the aluminium industry. To enhance the attractiveness of the two metals, the development of marketing infrastructure



through joint ventures with foreign companies in the region or elsewhere should help diversify market outlets and transaction arrangements. Also, taking into account the increasing importance of the commodity exchanges for pricing and risk management, international or regional action may be sought to assist the countries of the region to participate more actively in the operations of these markets existing in the DMECs.

Regarding extractive and processing technologies in tin, there is an obvious need to modernize mining and smelting activities and to deal with the recently increasing level of impurities and the decline of ore grade. Insufficient progress made in dealing with poorer and complex ore grades is attributed partly to the lack of interest in international cooperation to support research efforts to improve metallurgical methods and the development of new techniques. Improvements in these areas should alleviate the problems facing high-cost producing mines, especially of small- and medium-size firms. In this sense, foreign technology and expertise could become a key factor determining the future competitiveness. Also, undertaking of R & D on processing, in addition to those on new uses and products, should assume equally important part in the ITRI agenda.

It was recognized that price stability constitutes an important policy area, affecting not only earnings stability of those concerned but also promoting/inhibiting materials substitution. It is important to assure stable, competitive, yet remunerative price levels which serve as a good investment guide for the long term basis. In this view, producers' co-operation, as in the case of the ATPC, to stabilize world output should be exploited further, however without delving into actions which might violate the market forces of supply and demand.

There exists a high potential for increasing intraregional trade in both metals, without affecting adversely trade flows towards the markets outside the region and without calling for new, large-scale investment capital. To this end, the existing obstacles such as the incidence of tariff and non-tariff barriers, the inadequacy of foreign exchange and export credit and systems of payments, and transportation difficulties should be lessened.

Regional cooperation could assume different forms. Joint efforts might be called for to enhance R & D, market analysis, product development and promotion

of consumption on these products, in order to identify needs specific to the region, possibly through creation of regional associations of producers and fabricators. There also exist a number of possible joint-venture prospects. In aluminium, the existence of unutilized capacity especially at the semi-fabricating stage in several countries and the planned expansion of primary metal production in others might call for a serious feasibility study. The construction of a joint caustic soda and petroleum coke plant could be also examined. In tin as well, a better utilization of existing installed capacities at the regional level should deserve in-depth analysis. Given its nature that it constitutes one of the many inputs in the manufacture of tin-contained products, greater progress towards regional development and synchronization of complementary metal sectors will have a positive effect on its consumption and the establishment of more integrated industries.

Issues concerning market access are being negotiated in the Committee of Natural Resource-Based Products under the Uruguay Round and aluminium and tin comprise part of the ongoing negotiations of this Committee. In view of the participation by some industrialized countries regarding the products in question, it is important for the countries in the region to participate actively in Uruguay Round. With regard to the expansion of Third World markets, countries in the region which have not already done so should consider joining the Global System of Trade Preferences (GSTP).