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Regional Expert Group Meeting  
on Production Complementarities  
in the Aluminium Industry  
in Latin America  
Kingston, Jamaica, 23-26 July 1990

INVESTIGATION OF THE PROSPECTS FOR DEVELOPMENT OF A SPECIFIC  
COMPLEMENTATION PROGRAMME IN THE ALUMINIUM INDUSTRY OF  
MEXICO AND THE CARIBBEAN AREA\*

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\*The views expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO). This document has not been edited.

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## 1. BACKGROUND

The Regional Expert Group Meeting on the "Development of the Non-Ferrous Metals Industry in Latin America and Possibilities for Complementarity" was organized by the United Nations Industrial Development Organization (UNIDO) and the Government of Argentina in Cordoba, Argentina during the period 27-30 March 1989. This meeting was a direct follow-up to the First Consultation on the Non-Ferrous Metals Industry held in Budapest, Hungary at the end of 1987, which had recommended that UNIDO should prepare studies for the identification of possibilities for production complementarity in non-ferrous metals production in the different regions.

The meeting addressed three broad areas:

- (i) Analysis of the situation and prospects of the non-ferrous metals industry in the region, particularly with regard to copper, aluminium, tin and nickel;
- (ii) Examination of the possibilities of complementarity of production in the areas of concentrates, refined products and semi-finished products between the countries in Latin America producing non-ferrous metals;
- (iii) Specific lines of action for increasing sub-regional and regional co-operation in the areas of production, research and technological development and information.

In respect of the aluminium industry the meeting adopted several recommendations:

- (a) A study should be made of the technical and economic feasibility of establishing a specific complementation programme in the areas of bauxite, alumina and primary aluminium between Venezuela, Mexico, Guyana, Jamaica and Argentina. In the case of semi-finished and finished products, a complementation programme for the whole region should be considered;
- (b) Investment programmes in the area of semi-finished products should be harmonized, particularly as between Venezuela, Brazil and Mexico, as well as in the other countries of the region, in order to avoid unnecessary duplication which would affect the rational use of the region's scarce financial resources;
- (c) The implementation of a set of medium-sized and/or small projects relating to semi-finished and finished products which will help establish a more coherent productive structure in the region should be promoted - for example, a pressure forging plant, a pigment and metallic powder plant and a plant to produce foil from coiled aluminium sheet.

The present study identifies the main elements of a complementation programme for Mexico and the Caribbean in the areas of bauxite, alumina, primary aluminium, semi-finished and finished products. It also examines specific possibilities for the substitution of imports from outside the region of inputs used in the aluminium industry such as caustic soda and petroleum coke.

## 2. OVERVIEW OF REGIONAL ALUMINIUM INDUSTRY

In line with the recovery of the worldwide industry the Latin American region has witnessed continued expansion in the output of bauxite, alumina and primary aluminium in the late 1980s.

### 2.1. Primary aluminium

Primary aluminium output in the five producing countries (Argentina, Brazil, Mexico, Suriname and Venezuela) has risen consistently since 1983 after declining in the two previous years. In the five year period 1985-89 production increased by 45.09% from 1,163,700 tonnes to 1,687,600 or an annual growth rate of 8.7% as against a 2.4% for the worldwide industry making the region the fastest growing one in the world industry (see Table I).

**TABLE I: LATIN AMERICAN PRODUCTION OF PRIMARY ALUMINIUM (TMT)**  
1985-1989

	1985	1986	1987	1988	1989
ARGENTINA	139.9	150.6	155.1	157.4	162.0
BRAZIL	549.2	757.4	843.5	873.5	887.9
MEXICO	42.7	37.0	60.2	68.3	71.0
SURINAME	28.8	28.7	1.9	9.8	28.0
VENEZUELA	403.1	423.0	439.6	443.4	538.7
	1163.7	1396.7	1500.3	1552.4	1687.6

Source: World Metal Statistics

Consumption of primary ingot, which increased by 22.3% during the period 1985-87 (see Table II), faltered in 1988 and 1989 due to the problems which have been stifling the Mexican, Brazilian and Argentinian economies.

**TABLE II: LATIN AMERICAN CONSUMPTION OF PRIMARY ALUMINIUM**

	1985	1986	1987	1988	1989
ARGENTINA	80.9	121.3	142.0	142.4	120.6
BRAZIL	347.5	423.7	430.3	393.0	393.0 p
MEXICO	73.9	53.0	73.8	79.6	79.6 p
VENEZUELA	147.0	135.0	138.6	164.2	184.1
CENTRAL AMERICA AND CARIBBEAN	40.0	52.0	58.6	42.6	42.6 p
	689.3	785.0	843.3	821.8	819.9

p - provisional

Source: World Metal Statistics

The net position is that the region has increased its exports of ingot from 352,400 tonnes in 1985 to 872,700 tonnes in 1989.

2.2. Alumina

Alumina production by regional countries has risen from 4,970,000 tonnes in 1985 to 6,820,000 tonnes in 1989 an increase of 37.2%, representing average annual growth of 7.4% and is surpassed in absolute terms by only Oceania (Australia) which grew at the slower rate of 23% or 4.6% annually. All the producing countries of the region (Brazil, Suriname, Venezuela and Jamaica) have experienced increases in the output of alumina in the period (see Table III). Brazil expanded production by 54.5% and Jamaica by 47.0%.

**TABLE III: LATIN AMERICAN ALUMINA PRODUCTION (MT)  
1985-1989**

	1985	1986	1987	1988	1989
BRAZIL	1.10	1.20	1.40	1.42	1.70 p
JAMAICA	1.51	1.58	1.61	1.51	2.22
SURINAME	1.24	1.47	1.36	1.63	1.60
VENEZUELA	1.12	1.27	1.36	1.28	1.30
	4.97	5.52	5.73	5.84	6.82

p - provisional

Source: IBA, JBI

Over the period the region's alumina consumption relative to its output of this product moved from 46.8% to 49.6%. Nonetheless, Argentina, Mexico and Brazil continued to import alumina from outside of Latin America. Both Argentina and Mexico are supplied by Alcoa from refineries in Australia and the USA respectively, under long-term contracts which will expire in the early 1990s. Brazil's shortfall of roughly 75,000 tonnes in 1989 was met mainly by intra-company transactions by Alcoa from its Jamaican and Surinamese operations.

2.3. Bauxite

Bauxite production has expanded from 18.04 million tonnes in 1985 to 23.43 million tonnes (see Table IV) in 1989 representing an increase of 29.9% or an annual growth rate of approximately 6.0%. The region is second to Oceania which, however, grew at a slower pace in the period.

Jamaica and Brazil are the major producers followed by Suriname and Guyana. Venezuela's production commenced in 1987. Over the period output in Jamaica increased by 50.6% and by 26.8% in 1989 alone, compared to 45.3% in Brazil which had about a 10% increase in 1989.

Present projections up to 1991 are for Jamaica's output to increase to 12.0 million tonnes with Brazil moving to 10 million tonnes. Venezuela is experiencing delays in the coming on stream of its mining capacity at Los Pijiguaos on stream and, therefore, is unlikely to achieve the target of 4 million tonnes by 1993. This target was an integral part of that country's expansion plan aimed at raising smelter capacity to 1 million tonnes and alumina refinery capacity to 2 million tonnes by 1993 thus developing a self-sufficient, integrated industry.

**TABLE IV: LATIN AMERICAN BAUXITE PRODUCTION (MT)  
1985-1989**

	1985	1986	1987	1988	1989
BRAZIL	5.85	6.45	6.57	7.73	8.50 p
DOMINICAN REPUBLIC	--	--	0.21	0.17	0.13
GUYANA	2.21	2.6	2.78	1.77	1.43
JAMAICA	6.24	6.96	7.66	4.41	9.39
SURINAME	3.74	3.73	2.58	3.43	3.43
VENEZUELA	--	--	0.22	0.55	0.55 p
	18.04	19.74	20.02	21.06	23.43

p - provisional

Source: JBI, IBA, World Metal Statistics, Mineracao Rio do Norte, Bauxiven.

### 3. SPECIFIC AREAS FOR COMPLEMENTARY DEVELOPMENT IN PRIMARY PRODUCTS

#### 3.1. Bauxite (Venezuela, Suriname, Guyana)

Both Guyana and Suriname produce bauxite of the required mineralogical specification for processing by the Inter-Alumina refinery in Puerto Ordaz, Venezuela. Presently both countries are supplying bauxite to this plant in addition to Brazil.

Bauxiven's long-term development plan calls for the expansion of production at Los Pijiguaos to 4 million tonnes per annum by 1993. Assuming the expansion of Inter-Alumina to 2 million tonnes per annum by 1993 it means that Venezuela would no longer require imported bauxite. However, present indications are that technical problems have developed with the Los Pijiguaos bauxite reserves with large differences emerging between the technical specifications of the bauxite being mined and the original exploration data. The effect of these differences is that there are wide variations in the bauxite feed to refinery.

Also, the size of the reserves from this deposit have turned out to be significantly less than originally estimated. The low water level of the Orinoco River in the dry season is another complication associated with bauxite supply from Los Pijiguaos.

Given these factors it appears prudent for Venezuela to consider establishing medium- to long-term co-operation programmes with Guyana and Suriname to ensure bauxite supplies for the expanded Inter-Alumina refinery. In addition, cost data available indicates that both these countries enjoy significant comparative advantage in bauxite production vis a vis Bauxiven (Table V). This advantage is even greater when capital charges are taken into account.

This would in turn allow Venezuela greater latitude to invest in higher value-added downstream activities in smelting, fabricating etc. thus allowing for the optimization of the regional potential in both expansion/diversification and integration.

**TABLE V: OPERATION COST OF BAUXITE PRODUCTION**  
(US\$ per ton)

COUNTRY	MINING	TRANSPORTATION TO PORT OR REFINERY	LEVY/TAX	TOTAL COST PORT OR LOCAL REFINERY
BRAZIL	\$6.8	\$5.0	\$1.0	\$12.8
GUYANA	\$9.3	\$1.5	--	\$10.8
SURINAME	\$10.1	--	--	--
VENEZUELA	\$6.0	\$9.3	--	\$15.3

Source: The Aluminium Industry of Latin America and the Caribbean: Technological Options and Opportunities for Growth, Economic Commission for Latin America and the Caribbean, 26 September 1989.

It should be pointed out, however, that significant capital investment will be required in both Suriname and Guyana if these countries are to be the sources of long-term bauxite supply. Furthermore, in the case of Suriname the unstable political climate could represent a serious obstacle to the continued or expanded operation of the local bauxite-alumina industry.

### 3.2. Alumina

#### 3.2.1. Mexico - Jamaica

As was earlier pointed out, the Latin American region as a whole produces more than its required volume of alumina, regional usage representing 49.6% of output. In 1989, the Caribbean group, including Mexico, produced 3.82 million tonnes whereas it consumed only 208,000 tonnes (5.4% of output). But it imported 182,000 tonnes of this amount from the USA under long-term contractual arrangements with Alcoa, a substantial partner in Grupo Aluminio the owner of Mexico's single smelter. This contract is expected to run for another 5 years although at the moment the pricing arrangements are being renewed on a one year basis only.

It is likely that in the medium-term alumina production in the USA will be curtailed by environmental and other factors thus making it possible for Jamaica to supply at least a portion of the Mexican requirements. However, indications from senior executives in the Mexican alumina industry are that serious thought is being given to the option of closing the smelter and procuring ingot on a long-term basis through co-operation with Venezuela. The relative technical inefficiency of the Soderberg technology of the smelter and the comparatively high energy costs in Mexico are the factors behind the proposal of this option.

With aluminium prices in the 70-80 cents (US) per pound range the smelter can compete with imported metal but below that level the likelihood of its closure would increase. Of course, upward movements in energy would exert pressure in this direction as well.

In terms of the availability of alumina worldwide, it should be pointed out that significant changes have occurred in the 1988-90 period. Increased ingot production in the context of no new alumina plants since 1983, limited expansion of existing refineries and the closure of over 3.5 million tonnes of alumina capacity since 1985, has led to a very tight supply/demand balance in the alumina market. The situation in Jamaica has mirrored developments in the world industry with the reactivation of the closed ALPART refinery in 1989



(based on new ownership arrangements - Kaiser - 65%, Hydro Aluminium - 35%) and the refurbishing and upgrading of on-going operations to raise output. Idle capacity has disappeared and capacity utilization is expected to be over 90% in 1990. Thus, any new supply contracts could only be met by expanding existing plants (being actively pursued at the JAMALCO and ALPART plants), diverting supplies from existing customers and/or constructing new facilities (the Government of Jamaica and Alcan are presently undertaking a feasibility study for a new 1,000,000 tonnes plant on the North Coast of the island).

On balance, therefore, the prospects for Mexico - Jamaica co-operation in the alumina field do not appear likely in the short term either from the point of view of Mexico being willing to purchase or Jamaica being able to supply.

### 3.2.2. Argentina - Jamaica

Following the Cordoba meeting contacts were initiated between Aluar of Argentina and The Jamaica Bauxite Institute of Jamaica to examine the scope for beneficial arrangements on alumina supply. Aluar's long-term supply contract with Alcoa of Australia is due to expire by 1993. By this time it is anticipated that the JAMALCO expansion from 750,000 to 1 million tonnes per annum should be completed.

Alumina samples with technical specifications were provided to Aluar and after analysis the company indicated that the results in two areas exceed their usual specifications.

On the assumption that the discrepancies in the technical specifications can be rectified, it appears that commercial contacts should be initiated to explore the possibility of Jamaica supplying at least a portion of Aluar's alumina requirements which are projected to increase from 330,000 tonnes to 380,000 tonnes per annum based on the expansion of the smelter to 190,000 tonnes.

### 3.2.3. Venezuela - Jamaica

Venezuelan production of alumina in 1989 amounted to 1.30 million tonnes which exceeded its domestic requirement of 1.08 million tonnes. Long-term development plans for the country's aluminium industry envisage the expansion of the single alumina refinery, Inter-Alumina, to an ultimate capacity of 3 million tonnes with the first stage taking it to 2 million tonnes by 1993. These plans were linked to the various new smelter projects designed to raise ingot capacity to 1 million tonnes by 1993 and 2 million tonnes by the year 2000.

Present indications are that only three (ALDANCA, ALUSUR and ALUYANA) of the seven (7) projects already announced are likely to be implemented in the short term. The pace of Venezuela's plan for large-scale expansion of its aluminium industry has been set back by a number of factors, including:

- (i) The country's financial difficulties arising from significantly reduced oil reserves;
- (ii) The burden of its debt-servicing obligations;
- (iii) Slow progress in its debt conversion scheme which was expected to be a major source of financing for the smelter projects;
- (iv) The strong competition from Quebec as an alternative and perhaps 'more secure' investment location and cheaper source of energy.

Several companies which had earlier shown interest in Venezuela's projects have since 'migrated' to Quebec e.g. Austria Metall and Pechiney. Consequently, smelter capacity, which will reach 856,000 tonnes by 1991, may be only 1.341 million tonnes by the year 2000 (see Table VI). As a result, the alumina requirements would be significantly less than earlier anticipated i.e. 2.682 million instead of 4 million tonnes.

In the short term, that is by 1991, Venezuela's alumina demand of about 1.71 million tonnes will surpass its capacity of 1.3 million tonnes necessitating the importation of approximately 400,000 tonnes per annum. With there being no idle capacity in the region at this time, this increased demand can only be met by expanded production by Caribbean producers or from outside sources. The JAMALCO expansion is the only one being undertaken in the Caribbean as of now and the prospects for increased production in Suriname appear bleak in the face of political uncertainties which affect investment in new bauxite capacity and for expanding alumina plant capacity.

As against the 400,000 tonnes requirement, the JAMALCO expansion will generate only 250,000 tonnes of which 125,000 tonnes will be owned by ALCOA. Unless ALCOA would be willing to supply its share to Venezuela then there would still exist a shortfall of 275,000 tonnes.

Taking these factors into consideration, a clear basis exists for the negotiation of arrangements to further expand Jamaican alumina capacity and/or divert alumina supplies now going to other markets to meet this demand.

In the longer term, assuming expansion of Inter-Alumina to 2 million tonnes and smelter capacity of 1.34 million tonnes, Venezuela will need to import 680,000 tonnes of alumina on a long-term basis. The exact timing of this market opportunity will depend on the implementation of the three smelter projects referred to earlier. During the last 12 months, several rounds of discussions have been held at the highest level between the Venezuelan and Jamaican governments involving President Carlos Andres Perez and Prime Minister Michael Manley. What is needed, however, is an on-going co-ordinating mechanism between the respective enterprises to plan and implement a co-operation programme for the industry.

**TABLE VI: PLANNED SMELTER PROJECTS IN THE VENEZUELAN INDUSTRY**  
1990-2000

SMELTER	CAPACITY (tonnes)	PARTNERS
1. ALISA	123,000	CVG (25%), Local Consortium (75%)
2. ALAMSA	180,000	Alcasa (30%), Austria Metall (40%), Pechiney (30%)
3. VEXXAL	180,000	CVG (20%), Asca Brown Boveri (80%)
4. ALUSUR	115,000	CVG (20%), ALCOA/SURAL (80%)
5. ALDANCA	190,000	CVG, Marc Rich, others
6. ALUYANA	180,000	CVG, FIV (40%), Italian Group (3%), Local (21%)
7. ALGUAY	180,000	CVG, JP Morgan, others

Source: Corporación Venezolana de Guayana, Commodity Research Unit Limited.

#### 3.2.4. Brazil - Jamaica

Due to delays in completion of the Alunorte project, Brazil now imports alumina which amounted to 280,000 tonnes in 1988. This is presently imported from the USA, Venezuela, Suriname and the Netherlands.

On the basis of Brazil's announced expansion plans (see Table VII), the shortfall of alumina could escalate in 1990-1992 when an additional 345,000 tonnes of smelter capacity is expected to come on stream.

**TABLE VII: PLANNED CAPACITY EXPANSIONS AT SELECTED SMELTERS**  
**IN THE BRAZILIAN INDUSTRY 1990-2000 (TONNES)**

<u>Smelter</u>	<u>Current Capacity</u>	<u>First Capacity</u> <u>Change</u>	<u>Second Capacity</u> <u>Change</u>
ALBRAS	160,000	+80,000 (end 1990)	+80,000 (end 1991)
ARATU	58,000	+30,000 (1993/4)	+30,000 (1997/8)
ALUMAR	245,000	+83,000 (end 1990)	+52,000 (1991)
SOROCABA	170,000	+50,000 (end 1991)	+120,000 (1995)

Source: CRU, Departamento Nacional da Producao Mineral

Account should, however, be taken of the fact that the present financial difficulties and tough measures being implemented to tackle them are likely to lead to a recession in the Brazilian economy thus compressing the demand for metal. In such a scenario the demand for alumina would be moderated. On the other hand the attractiveness of metal prices in the export market could lead to continued expansion of metal production geared for export.

Traditionally, Jamaica's alumina exports to Brazil have been handled as intra-company transactions by Alcan and Alcoa. Where shortfalls in alumina arise on the part of the Brazil state enterprise (CVRD) and Brazilian national private sector company (Votorantim) a basis perhaps exists for Jamaican state enterprises in the bauxite-alumina sector to initiate contacts to explore possible co-operation in the supply of alumina on a short- to medium-term basis in the first instance. This option will depend on the effect of present economic developments on the re-start of the Alumorte project.

### 3.2.5. Comparative alumina production cost

Except for Australia, the Latin American region is presently the most cost-competitive producer of alumina. Australia's competitive advantage derives mainly from the size of its alumina refineries which, in most cases, are based on the most up-to-date technology. Comparative data on alumina production costs are listed below (see Table VIII).

**TABLE VIII: ALUMINA PRODUCTION COST (US\$) - 1988**

<u>COUNTRY</u>	<u>COST</u>
CANADA	\$160
USA	\$155
BRAZIL	\$140
JAMAICA	\$133
SURINAME	\$140
VENEZUELA	\$145
AUSTRALIA	\$102
FRANCE	\$183

- Sources: (1) The Aluminium Industry of Latin America and the Caribbean: Technological Options and Opportunities for Growth, ECLAC, 1989  
 (2) Jamaica Bauxite Institute (JBI)  
 (3) Interviews

The scope for comparatively less expensive brownfield expansions in Jamaica and Venezuela suggests that the region should focus on these locations in addition to the stalled Alumorte project as the most cost effective in terms of increasing the region's alumina capacity and production. Jamaica's capacity can be increased by expanding JAMALCO to 2 million or possibly 3 million tonnes per annum and ALPART to 1.5-1.6 million tonnes. Venezuela's Inter-Alumina plant can be easily expanded to 2 million tonnes and it is anticipated that the Alumorte plant will achieve 1.1 million tonnes. Hence the future long-term alumina requirements of the region can be met from these sources on a competitive cost basis.

### 3.3. Aluminium

The aluminium smelting process is the second most energy-intensive chemical process and therefore the development of such an industry requires abundant and price competitive sources of energy. Of all the Caribbean countries, Trinidad and Tobago is the only one with a substantial energy source - natural gas. Taken together with Jamaica alumina, these two countries possess two of the strategic inputs for the development of a viable aluminium industry. The other inputs - finance, technology and markets can be secured by joint-venture arrangements. The labour rates and stable political climate of the countries are also favourable factors.

#### 3.3.1. Trinidad and Tobago - Jamaica

With the recovery in the worldwide industry, serious consideration is once again being given to the possible development of a smelter project with the following features:

- (a) 200,000 tonnes capacity;
- (b) Ownership stake by both governments but with significant participation by private interests able to contribute to - finance, technology and marketing;
- (c) Downstream fabrication facilities.

The proposed project would include power generation facilities based on natural gas and with its own anode plant or with the carbon anodes being imported from Venezuela. The rough estimate of cost is over US\$1.2 billion for the smelter including infrastructure such as port power plant and the development of gas fields.

Available data indicates that Trinidad and Tobago possesses  $17 \times 10^3$  billion cubic feet of natural gas reserves whereas it now uses  $410 \times 10^6$  million cubic feet per day. At this level of consumption its reserves will last for over 100 years. Plans are far advanced for the development of new gas fields to meet increased consumption by 1994. Power supplies for the smelter would require the installation of 400 MW of combined cycle gas turbine plants which would consume approximately  $75 \times 10^6$  million cubic feet per day of natural gas.

Alumina for the smelter would be supplied by Jamaica either from expanded capacity or by re-directing 400,000 tonnes per annum which is now being supplied to other markets under contracts that will expire in the mid-1990s.

Equity financing would be raised from the two governments as well as private partners from Japan, Europe and/or North America. These partners would be expected to secure debt-financing through suppliers' credits whereas the governments would seek development loans to cover infrastructure costs. Marketing of the output will be based on regional demand and also by the partners guaranteeing the off-take of their share of the product.

Downstream fabrication will be pursued as an activity that would increase the value-added content of the project and lay the basic foundation for both countries to establish light manufacturing industries. Those industries would serve regional markets as well as boosting exports to North America and Europe under various free trade arrangements.

As of now, serious steps are being taken to commence the preparation of feasibility studies for the project. UNIDO should consider providing technical assistance in the carrying out of these studies.

### 3.3.2. Venezuela - Mexico - Jamaica

As indicated earlier, Mexico's long-term production of primary aluminium is considered marginal due to the comparatively high cost of energy and the increasing uncompetitiveness of its smelter technology. In any case, it currently imports about 40,000 tonnes of primary metal per annum. Against this background discussions have been initiated by Grupo Aluminio with CVG of Venezuela to develop a co-operation programme for Venezuela to supply metal to the Mexicans to meet their import requirement.

These discussions are also to include possible tolling arrangements under which Venezuela would supply additional ingot to allow Mexican fabricators to utilize idle capacity. The increased output of semi-fabricated products would be geared to the regional and other markets. Mexico has effective semi-fabrication capacity of 130,600 tonnes but is now producing only 82,300 tonnes of such products, i.e. capacity utilization of 63%.

Jamaican participation in such a scheme would be through the supply of alumina to Venezuela on a tolling or metal exchange basis with the metal obtained being processed in Mexico into semi-fabricated products for the Caribbean market.

The attractiveness of such schemes between regional partners rests on the competitive base of smelters located in the region (see Table IX) and surplus fabrication capacity.

TABLE IX: COMPARATIVE SMELTER OPERATING COSTS  
in US\$ (1987)

<u>COUNTRY</u>	<u>COST</u>
ARGENTINA	\$685
BRAZIL	\$800-1,000
MEXICO	\$915
SURINAME	\$800
VENEZUELA	\$680
GREECE	\$820
NORWAY	\$850
AUSTRALIA	\$865-880
CANADA	\$840
USA	\$1,115

Source: ECLAC 1989 Report, industry reports and interviews

The very competitive metal production costs place the region in an advantageous position to utilize its excess semi-fabrication capacity primarily in Mexico and Argentina. This area will be further discussed in Section 4.

### 3.3.3. Caustic Soda Production

The Caribbean alumina industry in 1989 consumed in the order of 350,000 tonnes of caustic soda. All of this demand was met by imports from outside the Latin American region. At present prices these imports are valued at US\$105 million. With Jamaica's alumina production poised to increase in 1990, the imports will move nearer to 400,000 tonnes.

The supply/demand balance for caustic soda has been very tight since late 1987 owing to the recovery of the alumina industry worldwide, increased demand for the material for other uses and the slowdown in expansion of capacity in North America and Europe for environmental reasons. Prices have responded to these factors by moving from US\$60 per tonne in early 1987 to \$400-\$600 in 1988 and are presently around \$300-\$350. These price movements have impacted significantly on alumina operating costs such that in one Jamaican plant, caustic soda now accounts for 38% of total alumina operating cost surpassing energy (17%) and bauxite (10%).

Preliminary studies have been undertaken by the Jamaican authorities to determine the viability of local production of caustic soda by the causticization of soda ash. Consideration has also been given to joint production with Venezuela and/or Trinidad and Tobago. Both of these countries possess substantial petro-chemical industries to which a caustic/chlorine plant could be linked. UNIDO representatives at the Cordoba meeting had indicated that a joint project request (Jamaica/Venezuela) for a pre-feasibility study would be favourably considered. The results of UNIDO programming missions to Venezuela should provide some indication of the interest in this project.

The region's long-term requirements for this product is an important basis for investigating the establishment of a caustic plant in the Caribbean area or Venezuela. The impact of the cost of this product on alumina costs points to the need to address supply arrangements if the alumina sector's competitiveness is to be protected.

### 3.3.4. Anode production

The expansion of aluminium production in Venezuela and the likely development of a smelter in the Caribbean will increase demand for carbon anodes and petroleum coke which is the main raw material for the production of anode and cathode materials. Venezuela has established local production at Puerto Ordaz by the CVG owned firm, Carbonoca.

Carbonoca's capacity is being increased to 386,000 tonnes and ultimately will reach 1.2 million tonnes per annum. This final capacity is designed to make Venezuela self-sufficient at smelter capacity of 2 million tonnes.

Due to the slowing down in the implementation of the smelter projects, the expansion may be curtailed. However, the proposed Caribbean smelter would generate demand for approximately 100,000 tonnes of petroleum coke. The savings in capital costs and minimum transportation costs are two potential advantages of co-operation between Venezuela and the proposed Caribbean smelter in the production of these materials.

### 3.3.5. Equipment supply for mining, refining and smelting

The Caribbean area's equipment requirements for the bauxite-alumina sector are supplied entirely from outside the Latin American region. This is dictated by the control of the sector by the transnationals. Furthermore, in those cases where state enterprises either own operations outright or participate in joint-venture arrangements the reliance on institutional financing and/or management control of the TNCs are barriers which will have to be overcome in any move to diversify supply sources.

In addition to these factors, the branch plant arrangements of North American, European and Japanese equipment manufacturers in Latin American countries often restrict exports to markets outside of the country in which the plants are located or at least limits the range of countries that can be served. These arrangements, by circumscribing the target market of the plants and hence the scale of operations, ultimately undermine their competitive position. Thus, it is nearly always possible for the parent companies to supply the same machinery or equipment more cheaply from home bases than from branch plants in the region. Quality considerations are also linked to this modus operandi as branch plants produce for their monopoly home markets with very little incentive to meet quality standards. Even where these conditions are relatively liberal, the low level of technical capabilities to service overseas customers affect the attitude of purchasers.

Brazil, Mexico, Argentina and Chile possess significant capacity for the manufacture of machinery and equipment (M&E). Brazil is in a position to engineer and manufacture over 90% of the M&E requirements for mining, refining and smelting. In spite of this, such items are generally imported into the region.

Future joint-venture projects which involve significant equity participation by regional partners could provide opportunities for co-operative efforts to establish greater linkages between regional capital goods manufacturers and enterprises in the mining field. Promotional events are important vehicles for motivating these efforts. In this respect trade fairs organized by the Chilean, Brazilian and Colombian mining associations seem to attract broad interest. LATINEQUIP and other such initiatives are needed to tackle the financing aspect of increased regional trade in capital goods.

## 4. AREAS FOR COMPLEMENTARY DEVELOPMENT IN SEMI-FINISHED AND FINISHED PRODUCTS

### 4.1. Semi-fabrication capacity and production in the Caribbean

As pointed out in earlier studies, the Latin American region as a whole is a net importer of semi-fabricated aluminium products although capacity utilization is just over 60%. The region, to a much more limited extent, is also an importer of ingot, although it is a large net exporter of this item. Previous studies showed that in 1985 net imports of semi-fabricated products stood at 212,260 MT whilst capacity utilization stood at 66%. The latest available data indicates that in 1987 imports fell to 130,100 MT without any increase in utilization rates. This reflects the fall in consumption of aluminium products as a result of the overall decline in economic activity in the region especially in those sectors that are the main users of aluminium - construction, consumer durables, transportation.

Conditions in Mexico and the Caribbean area have been more or less in keeping with the position of the overall Latin American region. The weak economic performance and especially the balance of payments problems impacted

negatively on the main sectors which consume aluminium - construction and transportation. As explained earlier, the Mexican aluminium industry was particularly hard hit by that country's economic difficulties. Trinidad and Tobago, the second largest consumer of aluminium products in this group, also experienced severe reversals in its economic situation. Aluminium consumption figures for Mexico, Jamaica, the Dominican Republic and Trinidad and Tobago are set out in Table X.

**TABLE X: CONSUMPTION OF PRIMARY AND SEMI-FABRICATED ALUMINIUM PRODUCTS  
IN MEXICO AND SELECTED COUNTRIES OF THE CARIBBEAN AREA  
(1984-88) (metric tonnes)**

	1984	1985	1986	1987	1988
Mexico	97,872	127,863	82,863	96,146	91,383
Trinidad & Tobago	10,698	15,056	3,639	3,302	5,146
Dominican Republic	3,100	3,500	3,500	4,100	4,500
Jamaica	3,803	4,015	2,769	2,514	5,381
	115,473	150,434	92,211	106,062	106,410

Source: UNCTAD Secretariat, World Metal Statistics, Instituto Mexicano del Aluminio, A.C., Statistical Institute of Jamaica, Direccion General de Aduanas y Oficina Nacional de Estadistica - Dominican Republic

These countries, except for Mexico which has the only smelter in the area, continued to import the bulk of their requirements of ingot and semi-fabricated products from outside of the region. Interviews with aluminium fabricators in Jamaica, Trinidad and Tobago, the Dominican Republic and Mexico revealed that the USA is the major source of ingot and various semi-fabricated products imported into the area. Profiles of the various enterprises interviewed in these countries are attached.

Based on data provided by the major enterprises in the respective countries, The Aluminium Institute of Mexico and published trade statistics, it is estimated that in 1988 the Caribbean and Mexico imported in the order of 45,000 tonnes of semi-fabricated products from outside of the Latin American region. Mexico alone accounted for 30,000 tonnes of this total (Mexico produced 82,300 tonnes of these products as against its effective capacity of 130,600 tonnes), followed by Trinidad and Tobago with 5,000 tonnes. Jamaica and the Dominican Republic, which both possess extrusion plants and a small rolling mill (in Jamaica) imported significant portions of their extruded products and sheets as the various plants operated at low levels. In the case of ALPROJAM (owned by Alcan) the only producer of semi-fabricated products in Jamaica, its extrusion plant produced at ca. 40% of capacity and the rolling plant at ca. 50%.

#### 4.2. Mexico - Venezuela - production of sheet

Both Mexico and Venezuela import significant quantities of rolled semi-fabricated products (sheet). In the case of Mexico the amount has been increasing over the four-year period 1985-88 whereas its production has been declining (see Table XI and XII).



**TABLE XI: MEXICO'S PRODUCTION OF SEMI-FABRICATED PRODUCTS  
(1985-88) MT**

YEAR	TOTAL	SHEET & PLATE	FOIL	EXTRUSIONS	POWDER & PLATE	BARS FOR ELECTRICAL CONDUCTORS
1985	129,767	19,755	9,945	27,237	935	23,230
1986	123,673	15,694	8,626	22,629	833	13,000
1987	97,271	15,462	8,478	20,029	1,180	14,733
1988	82,836	15,145	8,062	18,341	1,077	11,711

Source: Instituto Mexicano del Aluminio, A.C.

**TABLE XII: MEXICO'S IMPORTS OF SEMI-FABRICATED PRODUCTS  
(1985-88) MT**

YEAR	TOTAL	SHEET & PLATE	FOIL	EXTRUSIONS	POWDER & PLATE	BARS FOR ELECTRICAL CONDUCTORS
1985	25,717	15,556	976	1,871	326	5,043
1986	20,613	15,540	1,236	1,327	324	95
1987	35,219	19,120	1,255	1,057	356	141
1988	29,762	20,506	2,504	2,280	682	235

Source: Instituto Mexicano del Aluminio, A.C.

Venezuela's import-export data indicates (see Table XIII) that it is importing nearly 20,000 tonnes per annum of rolled products (sheet) to supplement its installed capacity of 50,000 tonnes. Investigations have revealed that the bulk of rolled products being imported by the two countries is in the form of sheet for making cans.

The sheet requirements of Venezuela and Mexico could be met by the rehabilitation of Nacobre's 12,400 MT capacity rolling plant and expansion of LASA and Grupo Aluminio's rolling plants. As indicated in the profiles of these companies, Nacobre is now implementing a programme of refurbishing the former Reynolds rolling and extruding plants. Co-operation with ALCASA in tolling arrangements would provide benefits to both enterprises, with ALCASA gaining access to additional rolling capacity and Nacobre securing guaranteed supplies of ingot to operate its plant at full capacity - 12,400 MT as against the present 900 MT per annum. LASA has also indicated its willingness to consider expansion of capacity on a joint-venture or tolling basis with Venezuelan partners able to supply raw material. Grupo Aluminio is already engaged in discussions with potential Venezuelan partners for joint-production projects. Its US\$70 million expansion programme for cold rolling and finishing could incorporate Venezuelan partners in joint production for the Venezuelan and Mexican domestic markets, Caribbean countries and for export outside the region.

**TABLE XIII: BREAKDOWN OF EXPORT-IMPORT STRUCTURE OF SEMIS OF VENEZUELA**  
(1984-86) (tmt)

Type of product	1984		1986	
	Export	Import	Export	Import
Rolled	3.0	24.2	4.2	17.5
Extruded	4.2	0.7	2.3	1.2
Drawn	52.8	-	63.1	0.2
Casting	-	0.1	-	-
Other	-	0.2	-	0.1

Source: Monografía industrial del aluminio,  
Venezuelan Investment Fund, November 1987

**4.3. Venezuela - Caribbean (Jamaica, Dominican Republic)**

Venezuela's planned expansion of primary aluminium production will generate the maximum returns possible for that country and the region if it is linked to downstream activities located in Venezuela itself and in regional countries including those with access to North America and European countries with large markets for finished products. This approach would also allow for investment in North America or Europe where in situ operations using national or regional inputs have direct access to vast markets. ALCASA has already taken steps to establish joint production in Costa Rica (ALUNASA) to serve export markets in Canada and the USA. It has also entered into a joint venture in Europe (ALEUROPE of Belgium) in order to gain access to the EEC market. However, scope for expansion does exist and should be exploited as described below.

**4.3.1. Rolling mill in Jamaica**

The Caribbean countries enjoy duty free access to Canada (CARIBCAN), USA (CBI) and EEC (LOME Convention). On this basis it is possible that joint-venture fabrication facilities in Jamaica, linked to alumina-ingot tolling arrangements with Venezuelan smelters, could gain market access to these three outlets. In addition, financing for such projects could be available to CBI countries from Puerto Rico 936 Programme\* (currently about US\$186 billion). These Funds are derived from tax concessions to US companies in Puerto Rico which have to be spent in Puerto Rico or CBI countries. The establishment of a sheet rolling facility in Jamaica has been considered over many years (1978-1989) but has been stalled by the lack of guaranteed ingot supplies and capital, especially foreign exchange, for machinery and equipment.

Such a project would allow Jamaica to diversify into downstream activities, and produce the Caribbean's sheet requirements which are presently imported from outside the region.

The capital cost for a 30,000 MT per annum casting and rolling mill is estimated at US\$60 million. This facility could produce flat sheet and coils.

**4.3.2. Extrusion facilities in the Dominican Republic**

Aluminio Dominicana is a locally-owned enterprise which produces extrusions for the domestic market. Given the poor state of Alcan's ALPROJAM plant which is unable to meet the Caribbean's requirements for these

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\*A programme sponsored by the United States Government through Puerto Rico for investments in the Caribbean.

products, joint production arrangements with VERALUM or ALCASA could expand ALDOM's capacity to supply extruded products to the regional market. The bulk of such products is now imported from outside the region.

5. ECONOMIC, FINANCIAL AND GEOPOLITICAL VIABILITY OF IDENTIFIED PRODUCTION COMPLEMENTARITIES

The Latin American region experienced overall economic decline in the 1980s. In nearly all the countries of the region, per capita GDP in 1988 was lower than in 1980. Intra-regional trade suffered a similar fate with LAIA (Latin American Integration Association) reciprocal trade in 1988 being 18 per cent below that of 1981, the peak year for intra-regional trade. Furthermore, the ratio of intra-regional to total exports was 10.6 per cent in 1988, practically the same as the 10.7 per cent recorded in 1987 and similar to the ratio for 1970, but well below the 13 per cent achieved in 1981.

There has, however, been a recovery in the volume of intra-regional trade since the mid-1980s. Exports within the LAIA amounted to US\$9.6 billion in 1988, 14 per cent above the 1987 level which was 3.5 per cent above that of 1986. Estimates of exports among Central American Common Market countries showed growth of 7 per cent in 1988 and among Caribbean Common Market members - 10 per cent. Exports among the countries of the Andean Group increased by 7 per cent in the same period.

In spite of the obvious difficulties, the promotion of regional co-operation in production and trade has been receiving increasing interest in a context of a conceptual and methodological renewal.

5.1. Economic and financial considerations

Mexico and the Caribbean area countries have been undergoing difficult economic adjustments. Mexico, Trinidad and Tobago and Jamaica have resorted to IMF loans during the 1980s in the face of severe balance of payments deficits. GDP growth in these countries (see Table XIV) has been unimpressive and Trinidad and Tobago experienced declines in GDP in four successive years.

TABLE XIV : GDP IN MEXICO AND SELECTED CARIBBEAN COUNTRIES  
(1985-88)

	1985	1986	1987	1988
Mexico	2.6	-3.8	1.5	1.1
Jamaica	-4.7	1.9	5.2	0.9
Trinidad & Tobago	-4.4	-3.3	-7.4	-4.0
Dominican Republic	-2.6	3.2	8.2	0.9

Source: Economic and Social Progress in Latin America, Inter-American Development Bank, 1989 Annual Report

Economic growth in the Latin American region generally and in Mexico and the Caribbean area is being hampered by the massive external debt (US\$426 billion for LA in 1988) and the outflow of capital to meet principal and interest payments. As a consequence, the estimated level of investment in 1988 was \$40 billion lower and only 81 per cent of that reached in 1980. In fact, since the external debt crisis began, regional investment declined from a high of 23.7 per cent of gross domestic product in 1980 to 15.6 per cent in 1984. It has slowly recovered to 17.4 per cent in 1988.

There is general recognition of the need to expand investment in productive processes if the region is to resume a steady growth path. The expansion of production for domestic and export markets is inevitable if the region is to emerge from the present crisis.

Given the massive external debt and the shortage of capital, it is generally agreed that the most rational option available is for regional industries to utilize idle capacity on a regional basis in order to increase production. This approach requires a greater degree of co-operation between producing countries in planning production so as to benefit from complementarities.

Joint production schemes should also be seen in the context of satisfying the region's demands for aluminium products. The expansion of regional production to meet demand can be pursued by extending existing capacity rather than installing new capacity which is considerably more expensive. This approach would contribute to a more efficient use of capital resources and would allow enterprises to benefit from the comparative advantages of the region in the aluminium industry.

The major obstacles to the realisation of such schemes include:

- (a) The differences in legal systems in the various countries;
- (b) Low level of acceptance of counter-trade and other payment mechanisms which avoid hard currency;
- (c) Traditional disagreements on pricing mechanisms;
- (d) Transportation and communication difficulties.

Increasingly, the legal problems surrounding the creation of joint production enterprises and other forms of investment are being overcome by harmonization of tax and other laws as well as by the greater willingness to rely on independent arbitrators as a means of settling disputes. Hence, there are signs of increasing intra-regional investment as in the cases of Brazil - Argentina, Venezuela - Costa Rica (Alumasa), and the moves to create a regional stock market in the CARICOM countries.

In collaboration with the Mining Association of Argentina, Brazil, Peru and Chile, ECLAC has developed proposals for the establishment of a regional marketing company for various minerals. These steps reflect a growing interest and commitment by producers to greater regional co-operation.

Interviews with various producers in the region revealed that counter-trade and tolling arrangements have become quite common place in the industry. Available data shows that toll smelting of alumina has been increasing steadily (see Table XV).

**TABLE XV: TOLLING OF ALUMINA VIS-A-VIS TOTAL TRANSACTIONS  
(1983-1988)**

	<u>Tolling</u>	<u>Total Transactions</u>
1983	783,000 (3.7)	21,243,000
1984	896,000 (3.6)	24,591,000
1985	530,000 (2.2)	23,855,000
1986	1,136,000 (4.8)	23,711,000
1987	1,312,000 (5.2)	25,314,000
1988	1,574,000 (5.8)	27,040,000

Figures in brackets are percentages of total transactions.

Source: JBI, IBA

Traditionally, a high percentage of such transactions has been conducted between related parties thus avoiding disputes on prices. However, in recent years the majority of such tolling arrangements has been conducted between unrelated parties (see Table XVI).

**TABLE XVI: NATURE OF ALUMINA TOLLING**  
(1983-1988) (metric tonnes)

	Between Related Parties	Between Unrelated Parties	Total Tolling
1983	583,000 (74)	200,000 (26)	783,000
1984	656,000 (73)	240,000 (27)	986,000
1985	290,000 (55)	240,000 (45)	530,000
1986	686,000 (60)	450,000 (40)	1,136,000
1987	358,000 (27)	954,000 (73)	1,312,000
1988	503,000 (32)	1,071,000 (68)	1,574,000

Figures in brackets are percentages

Source: IBA, JBI

It is understood that similar arrangements are being applied in respect of the tolling of ingot for semi-fabricated and fabricated products. Generally, it has been possible to determine suitable reference prices for various commodities including alumina and aluminium.

Regional trade was conducted on the basis of the increasing use of the LAIA reciprocal payments and credits system in 1987 and 1988. In 1987 LAIA transactions channeled through the system amounted to US\$7.6 billion or 89.8 per cent of intra-regional imports. The degree of compensation was 82 per cent (\$6.2 billion), with a net debit and credit balance of 18 per cent (\$1.4 billion), to be settled with the transfer of foreign exchange. In 1988 the ratio of payments clearing was 76 per cent, with 24 per cent of total payment transactions requiring settlement by transfer of foreign exchange. Additionally, bilateral lines of reciprocal credit amounted to US\$2.55 billion in 1988 and \$2.50 billion in 1987.

It is envisaged that the various co-operation projects would generate two-way trade flows which are necessary for the operation of a reciprocal payments system. Existing trade flows between the countries (Mexico, Venezuela, Brazil, Jamaica, the Dominican Republic, Trinidad and Tobago) are dominated by petroleum and to a lesser extent manufactured goods (mainly from Brazil).

### 5.2. Geo-political considerations

In spite of the problems affecting the region such as the drop in investment, high interest and inflation rates, and sudden shifts in exchange parities, there has been an increased drive towards regional co-operation in economic ventures. The dominant features of this drive have been the following:

- (a) Strong and reiterated political backing, evident in high-level meetings such as those of the chief of states of the Group of Eight of the Central American countries, and of CARICOM;

- (b) More active participation of the business community in the various bilateral and multilateral integration mechanisms, as reflected, inter-alia, by the creation of the Business Advisory Council of LAIA and the active agenda of regional and sub-regional business organizations;
- (c) The simultaneous use of multiple levels of government action to promote intraregional trade and economic co-operation, manifested by a dense network of multilateral agreements and mechanisms such as LAIA, LAES, and OLADE or the various subregional agreements, simultaneously with bilateral agreements and mechanisms such as those of the Southern Cone;
- (d) The intensification of the search for pragmatic integration and co-operation mechanisms facilitating gradual progress in those economic sectors where conditions are most propitious.

The major stumbling block to greater regional co-operation in the aluminium industry is the high degree of TNC ownership and control in the various countries, especially in Jamaica and Suriname. This factor is less important in Argentina, Venezuela, Guyana, and Mexico where state and national private interests are in control. In Brazil there is also strong state and national private interest in the industry.

For this reason, it appears that the best results may be achieved in the joint production schemes between Venezuela and Mexico in downstream activities. Venezuela - Jamaica co-operation in alumina production and the Jamaica - Trinidad and Tobago efforts to develop a smelter project are also good prospects given the positive relationships being forged at the political and business levels.

## 6. SUPPORT POLICIES AND INSTITUTIONAL FRAMEWORK FOR IMPLEMENTATION OF COMPLEMENTATION PROGRAMME

The implementation of the various joint production projects which have been identified will require sustained policy support at the highest levels of the respective governments. Policy support is especially important in terms of the reform of trading practices including tariff measures, import procedures as well as the establishment of adequate payments mechanisms. The setting up of the institutional framework for the development and operation of the projects will also require policy action on the part of the governments.

### 6.1. Reform of trade practices

The severe payments problems faced by the region in the 1980s led to the institution of import quota systems and other measures to contain import levels. Discussions with enterprises in various countries revealed that these payments and import procedures are major obstacles to the development of regional trade.

It should be pointed out, however, that in spite of these difficulties the relative importance of the Latin American region as a supplier of imports to itself has increased, as reflected by the trend in imports of regional origin: 11.2 per cent in 1970, 13.3 per cent in 1981, 14.7 per cent in 1987 and 15.5 per cent in 1988. Also of importance is the fact that between 1981 and 1986, trade in goods marketed under the various terms of preferential agreements increased from 25.8 per cent of total intra-LAIA trade to 40 per cent. These figures would seem to indicate the effectiveness of the tariff incentives granted in LAIA negotiations, or that the relative deterioration of intraregional trade has had more impact on products not covered by these agreements.

It is, therefore, recommended that negotiations be initiated between the relevant countries for the inclusion of the complementation programme, once it has been agreed, in the LAIA payments clearing system and the preferential tariff arrangements. These negotiations would have to deal with terms and conditions for CARICOM states to participate in the LAIA arrangements. An alternative approach could be the establishment of clearing and most favoured nation schemes between the respective countries. The new trade agreements and regional tariff preference agreement of the LAIA and the relevant CARICOM trade agreements are useful bases for the construction of suitable mechanisms.

#### 6.2. Promotion of industrial complementarity agreements

It is envisaged that where new enterprises have to be created to implement industrial complementarity agreements involving business activity of two or more countries, then legal instruments governing foreign investment, ceilings on reinvestment of profits and matters pertaining to the use of domestic credit would be applied to give preference to such enterprises. This is anticipated under recent reforms carried out by the Andean Group. Similar conditions also apply to multi-national enterprises established in CARICOM countries.

The promotion of the projects identified in this study will, in most cases, involve the widening of ownership structures but may in some instances involve the establishment of new ventures. It is recommended that in these cases promotion companies be established to develop the projects. These would be succeeded by more permanent joint-venture companies to manage the operations on completion of the projects.

#### 7. PROGRAMME OF ACTION FOR EFFECTIVE IMPLEMENTATION

The Regional Expert Group Meeting should seek to identify those projects which are attractive to the various parties - enterprises and governments. Follow-up action should include:

- (a) Initiation of feasibility studies with assistance from regional and international agencies such as UNIDO;
- (b) Bilateral or regional meetings of relevant private and state bodies to assess the areas requiring policy and institutional measures;
- (c) Mobilisation of technical expertise for negotiation of commercial arrangements and trade agreements related to the projects, with the assistance of UNIDO, etc. where necessary;
- (d) Review meetings of expert groups to assess progress on the complementation programme and identify potential new projects.

8. ANNEX

DATA ON ENTERPRISES IN MEXICO AND  
SELECTED CARIBBEAN COUNTRIES

JAMAICA

I. ALPROJAM subsidiary of Alcan-Sprostons Limited

- (a) The company is 100 per cent owned by Alcan of Canada;
- (b) Operates a 3,000 MTa extrusion plant and 2,500 MTa rolling mill;
- (c) Extrusion plant started in 1960;
- (d) Supplies extrusions for windows, doors, frames for commercial buildings, pipes; sheets for roofing and siding;
- (e) Building and construction sector accounts for 80 per cent of its output;
- (f) Raw materials, ingot and coil, are supplied by Alcan Canada;
- (g) Employs 100 persons;
- (h) Headed by Sherwin Brown, President.

II. CMP Metal Products Limited subsidiary of CMP Industries

- (a) The company is 100 per cent Jamaican owned;
- (b) Established in 1958 but commenced production of aluminium products in 1961;
- (c) Produces louvre windows, store fronts, sliding doors and miscellaneous items;
- (d) Supplies only the domestic market;
- (e) Raw materials, sheet and extrusions, are supplied by ALPROJAM;
- (f) Employs 30 persons;
- (g) Operating at 70 per cent of capacity;
- (h) Headed by Bradley Mahfood, Divisional Manager for Building Products Division.

III. B&H Structures

- (a) The company is 100 per cent Jamaican owned;
- (b) Established in 1975;
- (c) Produces windows (including jalousies, sliding windows and frames), glass entrance doors, roofing and guttering;
- (d) Supplies only the domestic market;
- (e) Raw materials are coil and extrusions. Coil is imported from UK, USA and Ghana; extrusions supplied by ALPROJAM;
- (f) Employs 70 persons;
- (g) Headed by Stafford Hyde, Managing Director.



DOMINICAN REPUBLIC

I. Aluminio Rohmer, privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established in 1963 (with European technology);
- (c) Produces kitchenware (pots, pans, dutchpots, pressure cookers, tea pots, percolators and tableware);
- (d) 90 per cent of output is for the domestic market;  
The balance is exported to Western Europe (Holland, Germany and Switzerland), Puerto Rico, Curacao and Haiti;
- (e) Raw materials, coil, sheet and ingot, are imported from USA and Europe. Purchased coil from Brazil in 1988. Engaged in a co-operation programme with enterprise from Holland which supplies raw materials such as coil and strips in return for finished tableware products. Uses approximately 800 tonnes of semi-fabricated products and 200 tonnes of stainless steel;
- (f) Employs 400 persons;
- (g) Presently expanding range and volume of products and interested in extending production co-operation arrangements involving supply of raw materials and conversion to finished products;
- (h) Approached by ALCASA, VENALUM and MM International of Venezuela to buy coil and ingot. Prices quoted not competitive with Europe;
- (i) Headed by Carlos Lubrano, General Manager.

II. Industrial Constructora C por A (INDUCA), privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established in 1958;
- (c) Produces windows, doors, frames and shutters;
- (d) Supplies only the domestic market;
- (e) Raw material is extruded profiles; 70 per cent of which is supplied by local extruder ALDOM, 30 per cent imported from ALUMAX, USA;
- (f) Building and construction sector accounts for over 90 per cent of output;
- (g) Employs 200 persons;
- (h) Annual sales of US\$5 million;
- (i) Headed by Hans Meyer, Managing Director who visited Venezuela at the end of 1989 to explore purchasing from that source.

III. TALLERES C por A (CIMA)

- (a) The company is 100 per cent locally owned. Owners of this company also control ALDOM;
- (b) Established in 1950 and is the largest aluminium fabricator;
- (c) Produces windows, doors, frames, awnings, sliding doors, jalousie windows, storm shutters, hand rails, garage doors;
- (d) Raw material is extruded profiles. Total purchases of profiles amounted to US\$1 million in 1988. 90 per cent supplied by ALDOM, local extruder, 10 per cent from ALUMAX of USA (Kawneer);
- (e) Building and construction sector accounts for 100 per cent of output. Now considering expansion into furniture, ladders and french windows;
- (f) Supplies only the domestic market;
- (g) Employs 167 persons;
- (h) Annual sales of US\$4 million;
- (i) Headed by Manuel Martinez, General Manager.

MEXICO

I. Consortio Industrial Valsa, S.A., privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established extrusion plant in 1976 with two (2) extrusion presses;
- (c) Produces architectural profiles for: windows, doors, metal ladders, electrical conduits. Also produces industrial profiles for: irrigation pipes, siphons, tubes for furniture;
- (d) Annual capacity is 6,000 tonnes, annual production is approximately 4,200 tonnes;
- (e) Supplies only the domestic market;
- (f) Main raw material is billet supplied mainly by Grupo Aluminio (Alumsa), the rest is imported from the USA;
- (g) Venezuelan sources have shown interest in supplying billet;
- (h) Employs 49 persons;
- (i) Headed by Cesar Garza Garza, Managing Director.

II. LASA, privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established sheet rolling mill in 1981;
- (c) Produces circles for utensils; coil for washing machines, refrigerators and transportation sector; and flat sheet for construction, panels for transportation sector, parts for industrial products;
- (d) Annual capacity is 7,200 tonnes, production is 6,000 tonnes;
- (e) Ingot is supplied by Grupo Aluminio (60 per cent), and Venezuela (DIPRO-INDUCA) and USA (40 per cent). LASA also uses scrap;
- (f) 75-80 per cent of production is for domestic market, 20-25 per cent for export (USA, Canada and Central America);
- (g) Actively considering expansion, present production can be doubled based on the capacity of the coil mill. Production of downstream products such as die-castings for local automotive industry (gas pumps, brake cylinders etc.), pots and pans and pressure cookers being considered;
- (h) Very interested in tolling arrangements, joint production or other expansion projects;
- (i) Contact person Carlos R. Sanchez, former President of Instituto Mexicano del Aluminio, A.C.

III. CUPRUM, privately owned company

- (a) The company is 100 per cent locally owned, by Valores Finamex, Mexican investment and industrial conglomerate;
- (b) Established in 1948;
- (c) Produces extrusion profiles for construction industry, also ladders for residential, industrial and construction sectors as well as electrical conduits pipes, irrigation pipes and louvre windows;
- (d) Annual capacity is 19,000 MT, production is 13,300 MT;
- (e) Ingot and billet are supplied by Grupo Aluminio and by imports from Doce, Alcan;
- (f) 60 per cent of output is for the domestic market, 40 per cent exported to USA and Central America;
- (g) Employs 1,502 persons;
- (h) Headed by Lic. Felipe Muzquiz Ballesteros.

**IV. Grupo Aluminio, privately owned company**

- (a) 57 per cent owned by Mexican private sector and 43 per cent by ALCOA;
- (b) Established in 1984, operates Mexico's only smelter (ALUMSA) as well as five (5) fabricating plants:
  - (i) ALUMSA - 30-40,000 MT re-roll plant (2 continuous casters) producing coil;
  - (ii) ALMEXA - 25,000 MT sheet plant (operating at 80 per cent capacity) formerly owned by ALCAN
    - 8,700 MT ) plain foil (operating at converter foil 100 per cent capacity)
    - 1,500 MT paste & powder (operating at 80 per cent capacity)
  - (iii) ALUMEX - 6,000 MT sheet (operating at 90 per cent)
    - 7,500 MT extrusion (operating at 70 per cent)
  - (iv) ALUPACK - 1,200 MT household foil
  - (v) ALUVAN - 2,000 truck and van bodies in kit form
- (c) Produces extrusions for architectural profiles (70 per cent) for construction sector, industrial profiles (30 per cent) for electrical, motor vehicle. Corrugated sheet supplied for roofing and siding, painted sheet for transportation and construction sectors, flat sheet for general purposes and circles supplied for utensils, washing machines. Various other products supplied for air conditioners, refrigerators, gas and petroleum containers. Paste and powder supplied for automotive paints, explosives and deoxidisers. Plain and converted foil for packaging;
- (d) 10-15 per cent of semi-fabricated products exported to USA, Canada, Caribbean and Central America including coil for bottle caps to Trinidad and Tobago, Guatemala, Costa Rica, Peru, Ecuador. 85-90 per cent is for the domestic market.
- (e) Recently completed expansion projects involving installation of 2 new casters at ALUMSA for US\$15 million. Now planning US\$70 million modernization and expansion programme to be implemented over 1992-93 period to involve cold rolling and finishing equipment at various locations;
- (f) Actively engaged in exploring joint production of ingot and semi-fabricated products with Venezuela;
- (g) Employs 2,800 persons (including smelter);
- (h) Contact person Vice-President Souza who is responsible for co-operation programmes.

**V. ALCOMEX, privately owned company**

- (a) Now 100 per cent locally owned, formerly an ALCOA subsidiary for 35 years. Acquired in 1988;
- (b) Established in 1954;
- (c) Produces industrial extrusions for automobiles (brake piston, condenser tubing), electrical sector and irrigation piping; architectural profiles for construction sector; Qualified to export to Chrysler plants;
- (d) 75 per cent of output is for the domestic market and 25 per cent for export to the USA;
- (e) Annual capacity of 15,000 tonnes (5 presses), annual production is 5,000 tonnes;
- (f) 50 per cent of ingot is brought from Grupo Aluminio, 50 per cent purchased from Venezuela through brokers;
- (g) Main immediate objective is to achieve capacity;
- (h) Employs 350 persons;
- (i) Headed by Richard Cornew.

VI. Servicios Industriales Nacobre S.A. de C.V., publicly quoted company

- (a) Now 100 per cent locally owned, formerly owned by Anaconda then ARCO. Produces copper and brass products. Acquired Reynolds operations at end of 1987;
- (b) Established in 1953;
- (c) Produces extrusions for construction and automobile sectors; sheet for automobile sector and utensils; and foil for cigarette and other packaging;
- (d) 95 per cent of output is for the domestic market; 5 per cent exported to Cuba and other Latin American countries;
- (e) Annual capacity is 19,300 tonnes, present production is 6-7,000 tonnes (1,200 MT extrusions, 900 MT sheet, 3,900 MT foil), projected to increase to 14,000 tonnes. Low production rate due to rundown state of facilities at time of acquisition. Need for investment, new technology and general rationalization;
- (f) 85 per cent of ingot requirements purchased from Grupo Aluminio, some from Canada and scrap purchased locally and overseas. Attempted to buy from Venezuela, discouraged by import duty and uninteresting price;
- (g) Present emphasis is on rehabilitation which is expected to be completed in 1990 and will include establishment of quality control laboratory, automation of rolling mills and improvements to caster and remelt furnaces;
- (h) Employs 450 persons;
- (i) Contact person Jorge Barrera Pliego, Corporate Manager.

VII. INDALUM S.A., privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established extrusion plant in Monterrey in 1980;
- (c) Produces profiles for fascia, windows, and doors;
- (d) Supplies only the domestic market;
- (e) Annual capacity is 7,000 tonnes, production is 5,000 tonnes;
- (f) Ingot requirements are supplied by Grupo Aluminio (90 per cent). Also uses local and imported scrap (10 per cent);
- (g) Considering expansion involving installation of new press and introduction of new products such as ladders for export and interested in joint production for export utilizing ingot from Venezuela;
- (h) Employs 130 persons;
- (i) Headed by Lauro Martínez García, major shareholder.

VIII. Aluminio Laminado, S.A. de C.V., privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established extrusion plant in 1978;
- (c) Produces extrusions for doors, windows, refrigerators, heat exchanges, pipes for industry, vacuum machines, electrical trays, electrical conduits;
- (d) Supplies only the domestic market;
- (e) Annual capacity is 3,600 tonnes, production is 3,000 tonnes;
- (f) Ingot is supplied by Grupo Aluminio, with occasional supplies also coming from the USA and Venezuela (Dipro-Induca);
- (g) Employs 400 persons;
- (h) Sales Manager is Carlos Aguilera Marquez.

TRINIDAD AND TOBAGO

I. Geddes Grant Sproston Industries

- (a) The company is wholly owned by T. Geddes Grant, a Caribbean enterprise;
- (b) Established in 1955;
- (c) Produces windows, doors and roofing. Only producer of roofing and second largest producer of windows and doors;
- (d) Annual capacity is 3,000 MT, production in 1989 was 1,000 MT;
- (e) Extrusions are imported from ALPROJAM and coil from British Alcan (UK);
- (f) 80 per cent of output is for the domestic market, 20 per cent exported to Eastern Caribbean (Barbados, St. Kitts, Grenada etc.); construction sector main user;
- (g) Annual turnover TT\$12 million;
- (h) Considering expansion into production of aluminium wheels for local vehicle assembly plants;
- (i) Employs 60 persons;
- (j) Contact person is Gabriel Faria, Chairman of Manufacturing Operations.

II. Interior Exterior Aluminium Decorators Ltd., privately owned company, formerly subsidiary of Kirpalani Group

- (a) The company is 100 per cent locally owned;
- (b) Established in 1981;
- (c) Produces doors, windows, commercial shop fronts, guttering, awnings, trolleys, clothes hangers;
- (d) Peak turnover of TT\$4 million;
- (e) Imports approximately 75-100 tonnes of extrusions from USA and Puerto Rico;
- (f) Production for domestic market with occasional export to St. Lucia, Guyana. Supplies the construction sector;
- (g) No expansion plans, construction activity at a low level;
- (h) Employs 18 persons;
- (i) Contact person is Andrew O'Brien, Production Manager.

III. Crown Cork & Steel (W.I.) Ltd.

- (a) The company is a subsidiary of US enterprise;
- (b) Established in 1964;
- (c) Produces bottle caps for soft drinks and beer;
- (d) Capacity of 400,000 caps per day. Caps made from steel and aluminium. Ceased production of aluminium caps in June 1989 due to high aluminium prices and slump in demand for soft drinks and beer. Cost of aluminium caps about double price of steel cap;
- (e) Sheet is raw material for aluminium caps. Imported from Grupo Aluminio of Mexico;
- (f) Supplies caps to all Caribbean countries except Haiti and the Dominican Republic;
- (g) Employs 34 persons;
- (h) Contact person is Ronald McIntosh, Plant Manager.

IV. B. H. Rose, privately owned company

- (a) The company is 100 per cent locally owned;
- (b) Established aluminium fabrication operations in 1959;
- (c) Produces windows, doors, shop fronts, awnings; supplies the construction sector which is now operating at a low level;
- (d) Annual capacity is 100 tonnes, production now 40 tonnes;
- (e) Imports extrusions from USA and ALPROJAM (delivery performance has deteriorated significantly);
- (f) 80 per cent of output is for the domestic market;
- (g) No plans for expansion;
- (h) Employs 25 persons. At peak employed 100;
- (i) Contact person is Eric Voss, Manager.

V. Metal Industries Company, jointly owned by T&T Government, UNIDO, UNDP and local private sector

- (a) Established in 1976;
- (b) Produces machine components, gears, shaftings, plastic working moulds as well as contract manufacturing of aluminium roof tiles for Aluminium Products Limited;
- (c) Services the industrial sector in T&T (80 per cent) and also Barbados, St. Lucia, Grenada;
- (d) Imports ingot and billet from USA, small quantities only;
- (e) Annual turnover in the region of TT\$5-6 million; Operating at 60 per cent of capacity;
- (f) Employs 120 persons;
- (g) Negotiating joint-venture project with Monogram Products of USA to produce plastic moulded products (such as picture frames) for export using aluminium moulds;
- (g) Contact person is Gerard Charles, Marketing Manager.