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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

A REVIEW OF

CHILE'S TEN-YEAR NATIONAL DEVELOPMENT PROGRAM

Part II: Chapters 4-8

Agriculture

Industry

Mining

Fuel and Power

Building and Urban Development

April 9, 1962

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PART TWO
THE SECTOR PROGRAMS

CHAPTER 4

AGRICULTURE

I. THE GOVERNMENT PROGRAM

Targets

1. The 10-year agricultural development program is aimed at increasing agricultural incomes, obtaining more efficient use of available agricultural resources, and improving Chile's agricultural trade balance. The plan provides for greater self-sufficiency as well as a diversified production in line with Chile's natural advantages.

Table 4-1

Projected Increase in Agricultural Production, 1961-70
(1961 = 100)

<u>Year</u>	<u>Total Production</u>	<u>Crop Production</u>	<u>Livestock Production</u>	<u>Seafood Production</u>
1961	100.0	100.0	100.0	100.0
1962	101.8	102.5	100.7	108.0
1963	105.2	107.3	102.1	116.4
1964	109.9	113.5	104.7	125.9
1965	116.5	120.8	110.3	135.8
1966	123.4	126.9	118.0	146.1
1967	131.1	133.9	126.5	157.3
1968	140.6	141.3	138.5	169.6
1969	150.3	147.6	152.4	183.0
1970	162.0	155.0	169.5	198.9
<u>Annual Rate</u>	<u>5.5%</u>	<u>5.0%</u>	<u>6.0%</u>	<u>7.9%</u>

2. The plan target calls for increasing agricultural production at an average annual rate of 5.5% between 1961 and 1970 (Table 4-1). Within this overall increase, livestock production is expected to increase at a rate of 6.0%, crop production at 5.0%, and fisheries production at 7.9%. Livestock production would rise slowly at first but would increase rapidly toward the end of the program.

3. The projected increases in food production (Table 4-2) could bring per capita food availability much closer to minimum nutritional levels and would also improve the present adverse trade balances in food.

Table 4-2

Projected Production Increase in Some Basic Commodities
(1,000 tons)

<u>Years</u>	<u>Wheat</u>	<u>Edible Oils</u>	<u>Sugar</u>	<u>Fruits</u>	<u>Beef^{1/}</u>	<u>Mutton^{1/}</u>	<u>Milk^{1/}</u> (liters million)
1960-61	1,194	24.8	48.6	304.4	125	31	770
1964-65	1,235	43.3	91.8	365.4	147	38	971
1969-70	1,429	64.3	126.0	535.9	217	57	1,369

1/ Revised Livestock Program.

Increases in meat, sugar, wheat and edible oil production could provide annual foreign exchange savings estimated at \$88.6 million by 1970. The yearly average trade deficit in agricultural products, amounting to \$63.4 million in 1955-59, would be reduced to \$51.1 million by 1970.

Policies for Implementing the Plan

4. To achieve these increases in production, major emphasis is to be placed on increasing average yields per hectare through more intensive use of the land. Only 150,000 hectares of additional land would be brought into cultivation through improved drainage. On the other hand, 395,500 hectares of land are to be newly brought under irrigation, and present irrigation installations are to be improved on 607,800 hectares. There is to be a major shift in cropping pattern (Table 4-3) through improvements in water control, which will result from irrigation and drainage investments. Natural pastures are to be sharply reduced to provide for increased plantings of annual crops, garden produce, vineyards, orchards and cultivated pasture.

5. These changes in cropping, along with wider use of modern farming practices, are to be facilitated by a sharp expansion of the agricultural extension services and a major reorganization of the Ministry of Agriculture. To attract more trained personnel, efforts will be made to improve the terms and conditions of service for agricultural technicians. Agricultural credit -- medium-term and long-term development loans and short-term crop production loans -- is to be considerably expanded, particularly for smaller farmers who have had no access to credit on reasonable terms. Trade and pricing policies will be reviewed with a view toward greater incentives for expanding agricultural production. Transportation, marketing and storage facilities will also come in for attention, to give the farmer a larger share of the consumer dollar. In addition, Government intends to improve the economic and social conditions of the farm labor force, through such measures as adjusting and enforcing minimum wage levels, expanding the rural housing program, and establishing a program for land distribution.

Table 4-3

4. AGRICULTURE

Land Use Pattern of Arable Land
(1,000 hectares)

<u>Land Use</u>	<u>1960-61</u>	<u>1969-70</u>
Annual Crops ^{a/}	1,410.5	1,703.1
Garden Produce	61.3	83.5
Vineyards and Fruits ^{b/}	160.5	212.0
Cultivated Pastures ^{c/}	1,180.8	1,830.9
Natural Pastures ^{c/}	1,999.0	958.4
Fallow Land	705.0	852.0
<u>Total</u>	<u>5,517.2</u>	<u>5,639.8</u>

a/ Includes cereals, leguminous plants, potato, fodder beet, and industrial crops, except oil olives; garden produce, which is listed separately, is excluded.

b/ Includes oil olives.

c/ Irrigated and dry.

The Investment Program

6. The plan calls for gross investments in the agriculture sector of E° 938 million over the 10-year period, starting with E° 60 million in 1961 and increasing to E° 127 million in 1970. Over the 10-year period, about 11% of the total investments would represent direct public investments, about 21% publicly financed private investment, and about 68% privately financed private investment. The proportion of Government-financed investments, both public and private, is estimated at 60% in 1961, but declining to 25% in 1970.

7. Major emphasis is placed on investments aimed at stimulating agricultural production through improved irrigation facilities, expansion of research and extension activities, and development of the livestock industry (Tables 4-4, 4-5). Significant investments are also scheduled for improving marketing, processing and transportation facilities.

Recent Developments

8. Since the plan was prepared, there have been a number of developments that significantly affect both the scope and composition of the program. Growing political recognition of agrarian reform has focused attention on the need for action to carry out basic social and economic reforms aimed at improving the status of low-income farm workers and small

Table 4-4

4. AGRICULTURE

Programmed Investments in Agricultural Development, 1961-70

<u>Government Program</u>	<u>Foreign Expenditure</u> US \$	<u>Local Expenditure</u> EO	<u>Total EO (equiv- alent)</u> (millions)
<u>For Increasing Production</u>	<u>100.7</u>	<u>683.4</u>	<u>789.2</u>
Irrigation-Public Works Project	2.8	112.7	115.6
Irrigation-CORFO Project	1.5	17.1	18.7
Land Improvements	0.8	13.8	14.6
Planting Fruit Trees, Vineyards	-	10.2	10.2
Farm Mechanization	81.2	92.3	177.6
Fencing and Installations Livestock	-	255.7	255.7
Other Agricultural Improvements	1.6	126.1	127.8
Importing Breed Animals: Livestock	3.0	-	3.2
Importing Seed	5.5	-	5.8
Settlement	4.3	55.5	60.0
<u>For Improving Processing and Marketing Methods</u>	<u>10.8</u>	<u>16.2</u>	<u>27.5</u>
Dairy Plants	2.8	0.4	3.3
Cold Slaughterhouses	1.2	0.8	2.1
Cold Storage for Distribution	0.9	2.4	3.3
Mechanized Bakeries	4.0	2.8	7.0
Town Markets	1.2	6.3	7.6
Fruit Packing & Dehydrating	0.2	2.3	2.5
Drying and Storage of Grain	0.5	1.2	1.7
<u>For Improving Transportation of Farm Products</u>	<u>0.4</u>	<u>89.1</u>	<u>89.5</u>
Cold Storage Facilities	0.4	0.4	0.7
Maintenance of Replacement of Vehicles within Farms	-	48.8	48.8
Maintenance and Depreciation of Unspecified Public Works for Agricultural and Other Purposes	-	39.9	39.9
<u>Reconstruction</u>	-	<u>32.0</u>	<u>32.0</u>
<u>Total Investments</u>	<u>111.9</u>	<u>820.7</u>	<u>938.2</u>
Percent of Total	12.5	87.5	100.0

Table 4-5

4. AGRICULTURE

Schedule of Investments, 1961-70
 (in millions of U.S. \$ and E^o, 1960 prices)

<u>Year</u>	<u>Public Sector</u>						<u>Private Sector</u>			<u>Total Public and Private^{a/}</u>			
	<u>Direct</u>		<u>Indirect</u>		<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	
	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	<u>US\$</u>	<u>E^o</u>	
1961	0.1	4.6	3.3	27.4	3.4	32.0	35.6	3.9	20.2	24.3	7.3	52.2	59.9
1962	0.2	6.0	1.1	20.4	1.3	26.4	27.8	6.4	32.7	39.4	7.7	59.1	67.2
1963	0.3	8.6	1.0	22.5	1.3	31.1	32.5	7.6	35.6	43.6	8.9	66.7	76.1
1964	0.4	8.2	1.0	13.2	1.4	21.4	22.8	8.9	42.8	52.1	10.3	64.2	74.9
1965	0.6	10.5	1.0	14.6	1.6	25.1	26.8	10.2	53.3	64.0	11.8	78.4	90.8
1966	0.7	12.1	1.1	16.4	1.8	28.5	30.4	11.0	57.3	68.9	12.8	85.8	99.3
1967	0.4	12.3	1.2	17.9	1.6	30.2	31.9	11.7	63.0	75.3	13.3	93.2	107.2
1968	0.4	12.0	1.4	16.5	1.8	28.5	30.4	11.3	72.5	84.3	13.1	101.0	114.7
1969	0.5	11.4	1.5	14.9	2.0	26.3	28.4	10.8	82.0	93.3	12.8	108.3	121.7
1970	0.5	12.6	1.6	15.2	2.1	27.8	30.0	11.1	85.0	96.6	13.2	112.8	126.0
<u>Total</u>	4.1	98.3	14.2	179.0	18.3	277.3	296.6	92.9	544.4	641.8	111.2	821.7	938.4

^{a/} Because of rounding, totals are slightly different from Table 4-4.

peasant proprietors. The Latin American Free Trade Association, with its promise of freer trade with Chile's neighbors, increases the importance of allocating resources on the basis of competitive advantage rather than considerations of self-sufficiency. The easing of inflationary pressures and the relaxation of controls have improved the climate for productive investments and have brought about changes in cost-price relationships which may significantly affect investment decisions. On the other hand, uncertainties relating to agrarian reform and the lagging adjustments of some prices have been deterrents to investment.

9. In addition to these developments, progress has been made in the planning and implementation of several programs included in the plan. For example, the irrigation program of the Irrigation Department has been stepped up considerably over the levels contemplated in the 10-year Plan. Budget allocations for 1959 and 1960 provided for investments of E^o 14.0 million and E^o 13.3 million, respectively, as compared to E^o 4.5 million provided for in the first year of the plan. Although part of this represents increased estimates of costs, it seems clear that the irrigation program is proceeding ahead of the 10-year plan; part of the investments envisaged for 1961-1970 have already been completed. To make effective use of the additional irrigation water that will become available, there will have to be a considerable acceleration in the rate of private on-the-farm investments. Similarly, proposed expenditures for resettlement have been stepped up sharply, and the revised livestock program calls for considerable increases in items such as milk plants, slaughterhouses, and imports of graded heifers. In addition, large expenditures will have to be added to cover the agrarian-reform program which is still in process of formulation.

II. THE PRESENT AGRICULTURAL SITUATION

Introduction

10. In general, agriculture is dominated by extensive use of land for livestock grazing and cereal production. However, because of the variety of climate and soils, favorable conditions are found for a wide range of crops with the northern river valleys, the coastal slopes, and the Central Valley producing excellent fruits, wines, and vegetables.

11. According to the 1955 Agricultural Census, Chile has a total arable land area of 5.5 million hectares of which 1.3 million hectares were in annual crops, 183,000 hectares in orchards and vineyards, 487,000 hectares in artificial pasture and 3.6 million hectares in natural pastures. Estimates since then, including those cited in 10-year plan, vary substantially but indicate a considerable area of arable land suitable for more intensive use.

12. The revised livestock program estimates that a total of 15 million hectares of arable and non-arable land are in pasture. The latest

crop estimates (Table 4-6) show somewhat more than 1.5 million hectares under cultivation in 1960-61, as compared to 1.3 million hectares in 1955, and 1.4 million hectares estimated in the 10-year plan.

Table 4-6

Latest Crop Estimate, 1960-61

<u>Crop</u>	<u>Hectares</u>
Wheat	853,900
Oats	122,200
Barley	67,300
Rye	9,200
Corn	82,000
Rice	38,000
Beans	97,000
Lentils	37,000
Peas	17,200
Chick Peas	9,700
Potatoes	90,900
Sugar Beets 1/	10,200
Sunflower	39,000
Rape	40,800
Onions	4,500
Garlic	1,900
<u>Total</u>	<u>1,520,800</u>

While there are no reliable estimates of the area under fruits and vegetables and artificial pastures, some increases seem to have taken place in recent years.

13. According to the Ministry of Public Works, about 1.4 million hectares of land are currently under irrigation, concentrated chiefly in the provinces between Coquimbo and Bio-Bio. Irrigation is important as far south as Malleco, however, because the distribution of rainfall is so uneven. (Rainfall varies from 1 to 4 inches in the semi-tropical deserts in the north, to 100 inches in the rainforests of Aisen and Chiloe, to 10 to 16 inches in the tundras of Magallanes.) A large part of the irrigation supply is from unregulated river diversion, which makes it risky to invest in intensive cropping. Moreover, more efficient use of available water has been prevented by the antiquated system of water rights and poor management of water resources. These factors have been responsible for the fact that about one-third of the irrigated land is still in natural grasses.

1/ This represents a 45% decline in acreage from the previous crop year and reflects failure of IANSA to pay prices announced at the beginning of the season.

14. Out of an estimated 124,000 farm enterprises, roughly 70,000 operate less than 20 hectares. Arable land per farm averages about 5 hectares. While some of these are intensive commercial fruit-and-vegetable farms, most of them do not have sufficient land and water to provide full-time employment and a decent level of living. At the other extreme (Table 4-7), 2,700 farm units of more than 1,000 hectares account for 42% of the arable land.

Table 4-7
Farm Units and Area Cultivated, by Size of Farm, 1955^{1/}

<u>Size of Enterprise (hectares)</u>	<u>Number of Units</u>	<u>Arable Area (hectares)</u>	<u>Average Area of Arable Land (hectares)</u>
.1 to 4.9	28,600	93,738	3.3
5 to 19.9	40,600	270,186	6.6
20 to 49.9	21,100	402,522	19.1
50 to 99.9	13,300	424,578	32.0
100 to 199.9	7,800	518,316	66.5
200 to 999.9	10,300	1,571,490	152.6
1,000 to 4,999.9	2,000	1,466,724	733.4
More Than 5,000	700	766,446	1,095.0
<u>Totals</u>	<u>124,400</u>	<u>5,514,000</u>	

1/ Census data.

15. About 300,000 farm families own no land and work as transient laborers (afuerinos), share croppers (medieros), or permanent laborers attached to the larger farms (inquilinos). While they are supposed to be protected by legislation covering minimum wages, social security, and working and housing standards, the laws have not been enforced. Most of these farm workers have little education and lack the managerial skill and the capital required to operate their own farms. Compared to most developing countries, Chile has a large number of competent agricultural technicians and farm managers. However, the low salaries paid by both Government agricultural services and private farm enterprises have encouraged many of the trained agriculturists to seek employment abroad or in other fields. Yet a sufficient number have remained to provide a nucleus of experienced technicians for Government service and to operate a number of modern efficient farms.

Factors Affecting Recent Production Trends

16. Agricultural production has failed to keep pace with rising domestic demand. Although agricultural output has increased at an annual rate of 1.8%, population has grown at a rate of 2.5%. Moreover, higher incomes resulting from industrialization have also increased effective demand for food, particularly meat and dairy products. The result has been a sharp reversal of the balance of trade in agricultural commodities from a net surplus position up to the early 1940's to a net deficit position of some \$63 million at present. The principal lag in agricultural expansion has been in the livestock sector which has increased at a rate of less than 3/4 of 1%. This slow rate of growth can be attributed largely to Government economic policies and to a number of institutional factors which have been major deterrents to agricultural investment.

17. A policy of protection and import restrictions aimed at easing balance of payments difficulties and encouraging industrial development has been in effect over most of the past decade. At the same time imports of agricultural commodities were permitted on a relatively liberal but unpredictable basis. These trade policies, with the objective of keeping the cost of living of the urban population low, kept agricultural prices lower than other prices; they also contributed to wide price fluctuations and risks for the farmer, and reduced incentives.

18. The impact of the rapid inflation of recent years on agriculture is difficult to assess. The fixed farm-production cycle, in the face of uneven increases in cost and product prices, introduced a considerable element of uncertainty and risk. Prices of most commodities were subject to arbitrary ceilings but in the absence of effective price supports could drop sharply with changes in import level. Because of the inflation, prices at harvest could be expected to be higher than at planting time, but there was no assurance that costs of the subsequent crop could be met out of proceeds from the current crop. To the extent that farmers had access to credit on favorable terms, this was not a problem and windfall profits were assured. However, credits and profits did not necessarily go into productive channels. A substantial part was probably diverted into short-term commodity speculation. Even investments in agricultural land and agricultural machinery were often of a speculative nature motivated more by a desire to hedge against inflation or to resell at a profit than by genuine production needs.

19. The pattern of ownership, characterized by a large number of small fragmented holdings with limited land and a small number of large-scale holdings controlling the bulk of the land, further aggravated this situation. The small farmers generally could not get credit on reasonable terms and had little capital of their own. The larger farms with capital and access to credits were usually able to find safer and more profitable investment outlets outside of agriculture. Productive investment in agriculture was limited, and generally consisted of labor-intensive developments utilizing underemployed labor already on the farm, or minimum capital outlays needed to justify a loan.

20. As inflationary conditions tapered off somewhat, and with changes in Government policies, the investment climate for agriculture also changed. Commercial interest rates still reflect the recent inflation and are excessive in relation to potential returns from agricultural investments; but government development loans at reasonable interest rate are being made available on an expanded scale. Price ceilings on most agricultural commodities have been abolished, imports of farm requisites are being liberalized, fertilizer subsidies have been introduced, the credit program is being expanded, and public investments in roads, irrigation, processing and marketing facilities are being accelerated. Plans have been made to strengthen agricultural extension and research activities but so far sufficient emphasis has not been given to this problem. Most of these changes have occurred too recently to have affected production. However, the mission members saw signs of recent investments in agricultural machinery, orchard plantings, pasture development, land improvement and irrigation facilities, and considerable interest in further investments in some areas.

III. MISSION RECOMMENDATIONS

Agrarian Reform

21. Government is currently reviewing the whole problem of agrarian reform and is preparing a new program calling for a much broader attack on all aspects of rural poverty. Details of the new program have not as yet been worked out, but it seems clear that increased expenditures for directly improving social overheads in rural areas through housing, education, and health programs will be necessary, as well as a new approach to the problems of agricultural development and land resettlement.

22. There are a number of low-income farm families who have sufficient management capacity and equipment to increase production if they get more land. Many of them have some land of their own and need small additional acreage to make their operations economic. Some are tenants who do not have enough land or who rent land under adverse terms. Others are agricultural laborers who would have to be settled in new areas. On the other hand, the bulk of the low-income farm families do not have the capacity to become efficient farm operators without substantial technical guidance and financial support. Different solutions will be required for each category.

23. The mission believes that a broad program combining a number of approaches will be necessary to help all of these groups. Such a program should be aimed at providing immediate relief of some kind to as large a group as possible, to increasing the productivity of the farm worker, and to improving generally the political, social and economic bargaining position of the farmer. The program should make it possible for a farm worker to move up the ladder from farm laborer, to tenant, to small farmer to commercial farmer. The most immediate problem is to improve conditions for the farm laborers who, after all, constitute the largest group at the bottom of the ladder.

24. In broad terms the program should cover the following items:

- a. Enforcement of farm labor legislation with respect to minimum standards of working conditions and wages, and adequate social security benefits.
- b. A resettlement and land-distribution program geared to the needs of the low income farm family; it should provide land for small farmers to expand their present holdings and to establish new farm units.
- c. Measures governing farm-tenancy rights to provide security of tenure and arbitration procedures.
- d. A supervised credit program and strengthening and expansion of agricultural extension services, particularly for small farmers.
- e. Improved enforcement of taxes on land and agricultural income.
- f. An expanded rural housing program and more adequate health and education facilities in rural areas.

25. Farm workers are covered by labor-standards legislation which provides for minimum wages, housing standards, health, retirement, and disability benefits, as well as a system for profit sharing where workers are organized into unions. In practice, however, enforcement has been lax. The traditional paternalistic relationships between the farm owner and the farm laborer involving a substantial proportion of payments in kind make it difficult for an outsider to determine whether minimum standards are being observed. Moreover, the economic and political position of the large land owners in the village leaves the individual farm laborer with relatively little recourse in disputes with management.

26. The level of minimum wages for farm workers (afuerinos) ranged from E^o 0.61 to E^o 0.79 per day in mid-1961. Because of the seasonal nature of agricultural employment, with two workers per family this would give a family income of about E^o 400 per year as compared to average family income for all groups of about E^o 900 per year. The inquilinos, or permanent workers attached to the farms, receive about E^o 70-100 per year per worker but are provided with food and housing as well as the use of a garden plot; hence they receive a total income somewhat better than that of the afuerino. The amount of income in kind varies considerably among the different farms. On some of the more progressive farms the inquilinos and afuerinos receive a fairly adequate level of pay, indicating that higher wages can be paid on farms with sufficient capital and good management. The highest wages and best working conditions were observed on the farm of the Sociedad Explotadora de Tierra del Fuego, a large-scale sheep farm near Punta Arenas, where the workers are organized. Since the above

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income data were gathered wages have been generally increased by 16.6% to offset increases in living costs, but this has not changed the relative income position of the farm workers.

27. The present social-security system covers farm workers. The benefits received by farm workers have not been commensurate with the contributions made by farm operators and laborers who together contribute about one-third of the total farm wage bill to the social-security system. Facilities for health services have been concentrated in urban areas and have generally not been available to the farm laborer to the same extent as to the urban worker. Government is currently considering an overall reform of the system aimed at providing more adequate benefits.

28. Considering the level of investments which Government will channel into farm enterprises under the 10-year plan, the mission believes that it is not unreasonable to expect these enterprises to share the returns from increased production with their workers. Compliance with minimum labor standards could be taken into consideration by the authorities as one of the conditions for obtaining Government agricultural development loans. The mission also believes that measures to establish a healthy bargaining position between farm labor and management are essential to the improvement of farm working conditions. A number of the small farmers (minifundistas) and permanent farm workers as well as share croppers (medieros) now rent some land. Some of these tenancy arrangements are written contracts with specific terms relating to rents, obligations, and tenure, but a large proportion are verbal with little protection for the tenant. With no assurance of tenure and with a high proportion of the crop going to the landowner, there is little incentive for land improvement or fertilizer use. Many of the tenant farmers can be taken care of under the proposed land-distribution program but there still remains ample scope for improving the economic conditions of the tenant farmer through land tenancy legislation. Moreover, with changes in supply of family labor, a certain amount of tenancy will be necessary to provide the flexibility necessary for efficient land use. The mission, therefore, feels that steps should be taken to provide minimum safeguards for tenants against unreasonable eviction, standard tenancy contracts, and procedures for arbitration of tenancy disputes.

Resettlement

29. Government has already given considerable emphasis to resettlement as a means of redistributing land and provided for E^o 60 million for this purpose in the 10-year plan. However, the program as carried out to date has been costly and has benefitted few families. Most of the families benefitted have not come from the low-income farm group. Past requirements for eligibility to purchase land from the Caja de Colonizacion called for a substantial down payment beyond the means of the farm laborer or small farmer. For example, in 1959-1960 settlers in the Magallanes were required

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to put up about E^o 8,000 per family as compared to annual incomes of less than E^o 400 among the bulk of the low-income farm families. Even if low-income farm families had received land under the program, it is doubtful whether most of them could have effectively utilized the land without considerable technical assistance and financial support over a prolonged period.

30. The mission believes that the agrarian reform program should provide for progressive developments aimed at establishing viable family farm units. However, with existing limitations on available resources of all kinds (land, capital, technical and administrative talent, and the farmer's own management skills), it is clearly impossible to carry out effectively a large scale land redistribution program within a short period. It is also clear that a large proportion of the farm laborers do not have the training, experience, nor the capital to become farm operators and will have to continue to be farm laborers. At the same time opportunities should be available for a farm laborer to become a farm operator once he has demonstrated his ability. With present low wages and poor living conditions, the laborer has no incentive to improve his efficiency and has no margin to accumulate savings. Better wages and living conditions for the farm laborer should help improve the economic level of the worker and also provide the worker an opportunity to develop skills and accumulate savings necessary for becoming an efficient farm operator. However, a program of vocational training for farm workers and their families is perhaps even more important in accelerating the transition of low paid farm worker to farm operator or skilled worker. The mission believes that provisions should be made for establishing vocational farm schools in rural areas to enable farm youth to acquire skills needed to take advantage of opportunities to be created under the agrarian reform program.

31. Since the beginning of 1960 the Caja de Colonizacion has acquired or is in the process of acquiring about 800,000 hectares. A large part of these lands have already been distributed in medium and large-scale holdings to persons with capital or professional training in agriculture. However, considerable amounts of lands are still held by the social security system and other institutional holders, some of which are being made available for distribution. Moreover, the Caja de Colonizacion has legal powers to expropriate lands which are not being efficiently farmed, provided full payment is made in cash. Some additional land will have to be obtained under this provision, particularly in the more densely populated areas. The mission believes that the existence of this power is essential to discourage gross mismanagement of land and to encourage voluntary co-operation of land owners in selling their lands on reasonable terms. On the other hand, the mission believes that, in view of the amount of land already in Government hands, and the other possibilities for acquiring additional land, there is no need for large-scale expropriation.

32. The mission believes that in general Government lands should be distributed in relatively small holdings suitable for the technology available to most of the families in need of land and with a view toward benefiting as many families as possible. Units for new settlement would probably be considerably smaller than the units distributed by the Caja de Colonizacion in the past, but they should be sufficiently large to utilize effectively the available family labor and provide the settler with a better living than he had before. The sizes should vary considerably from relatively small farms in the central area near Santiago where fruits and vegetables can be grown, to much larger units in Magallanes where extensive sheep grazing is the pattern. Titles should be made provisional for a period of, say, five years and should be made final on condition that the farmer has worked the land and has met certain minimum conditions. Adequate safeguards should be provided to prevent future fragmentation. Payments should be spread over a period of 25 or 30 years at low interest rates. The settler should be provided with housing loans under the rural-housing program as well as development and production loans under a supervised credit program.

33. Wherever possible, potential recipients of land should be employed in the development of new settlement areas. This would make it possible for workers to accumulate some savings toward farm purchase and at the same time provide a basis for screening out undesirable applicants. Where new communities are to be developed on substantial blocks of undeveloped lands a self-help approach might be useful in keeping down costs and obtaining maximum use of available technical and administrative personnel. For example, in Malaya, blocks of 1,000 to 1,500 hectares have been organized into development projects for 300 to 400 families each. Settlers were moved in at an early stage and construction of buildings, internal roads, land clearing, and initial planting of crops were organized on a group basis under a project manager. Settlers were paid a subsistence allowance and permitted to maintain garden plots with the understanding that they would receive title to their land after initial development.

34. When Government owns or acquires lands located in areas where there are small submarginal farms, part of the land should be allocated for augmenting the holdings of these small farms and making them into more productive units. In such cases housing assistance would be limited to home-improvement loans and the terms of land purchase could probably be perhaps 15 to 20 years. Supervised credit will be necessary for those who would not qualify for normal development and production credit.

35. In addition to these measures, a system of low-cost Government financing of private land purchases by small bona fide farmers should be provided to assist farmers interested in expanding their operations. With the higher land taxes proposed under the pending tax reform and the reduced speculative demand for land resulting from the economic stabilization program, land prices can be expected to decline from their present

inflated level. The mission believes that there should be considerable scope for private land transactions for farmers wishing to expand their holdings or for new farmers with some capital of their own, provided reasonable financing could be made available. This would make it possible for Government to avoid the need for large-scale acquisition of privately held land for redistribution and eliminate the fear of expropriation which has been one of the uncertainties discouraging private agricultural investments. The over-all problem of inequitable distribution of land and income can be alleviated considerably by enforcing existing tax laws and revising them where necessary. As indicated in Chapter 1, the amount of personal income and inheritance taxes now being collected is shockingly low. Moreover there is considerable scope for increasing land taxes from their present low levels.

36. Betterment taxes should be imposed on lands benefitted by Government investments in irrigation and other public works. At present land owners are required to amortize costs of such public works over a 15-year period. With the rate of inflation exceeding the interest rates prevailing in the recent past, large landowners have benefitted considerably from capital improvements to their lands financed by public funds and repaid in depreciated currency. With the sharp increase in public investments contemplated in the 10-year plan, the mission believes that legislation should be enacted to require payment of betterment taxes prior to construction of public works which would give any substantial windfall benefits to special groups. Provision should be made for optional payment of such taxes in the form of land. This would make it possible for Government to capture part of the windfall profits now accruing to some land holders and also provide land for later redistribution.

37. In summary, the most immediate problem of agrarian reform in Chile is a farm labor problem. The scope and need for expropriation and redistribution of land held in small tenancies involving only changes in ownership rights is limited. Possibilities for establishing new farm units would be limited by the various problems outlined above and could benefit at most 30,000 to 40,000 families over the next decade. Consequently the mission feels that major emphasis must be placed on immediate improvement of the workers' share of the produce and long-run increase in productive efficiency as well as substantial investments in social overheads in rural areas.

38. To take care of those who can benefit from it, a realistic program for land distribution should be drawn up. We estimate that much of the land for distribution is now in Government hands, can be purchased at low cost prior to development, or can be obtained through betterment taxes and that the direct costs may amount to about E\$ 150 million with about E\$ 100 million for land purchases and E\$ 50 million for land clearing, access roads, etc., not covered in the over-all investment program. These estimates are, however, extremely tentative and subject to considerable modification as more data becomes available on the detailed program. The costs of supervised credits, extension services, rural housing, and other developmental expenditures have been included in the over-all investment program recommended by the mission.

Irrigation and Intensive Cropping

39. The irrigation program now planned for the first four years of the plan period provides for a rate of investment substantially higher than the rate set forth in the original plan. This is due primarily to a sharp acceleration in the activities of the Irrigation Department, which has already completed some projects included in the plan and has proposed a number of new projects. The mission felt that many of these new projects have not been adequately studied from an economic point of view and that in some instances projects have been proposed in areas where soil conditions do not warrant the investment. Before these new projects are included in the plan adequate economic and agronomic studies should be carried out.

40. The Government's plans for ground-water development and financing on-the-farm improvements needed for better utilization of available water appear to be roughly of the same magnitude as originally contemplated. The mission felt that there is considerable scope for more effective use of irrigation water both of existing supplies and of additional supplies which would result from the projects under consideration. The limiting factors appear to fall into three categories: the existing system of allocation of water rights, the lack of capital for on-the-farm investments, and inefficient management practices. The accelerated rate of investments currently planned by the Irrigation Department cannot be expected to yield full benefits unless steps are taken to overcome these obstacles. Most of the irrigation systems now in existence are based on river diversion without storage and consequently do not provide sufficient water in years of low rainfall. Some of the wealthier farmers have bought up water rights in excess of normal requirements in order to provide an assured supply during drought years, thus leaving other lands with insufficient water. About one-third of the irrigated land is under natural grasses. A large part of the investment program during the next 10 years is aimed at providing reservoir control for lands now irrigated by run-of-the-river supplies. The mission believes that the additional water which will become available through this program should permit a substantial revision of the existing water rights so as to provide adequate water supplies to all areas even in drought years. The better supply of water and the reduced drought risk should make it possible for farmers to intensify their production and shift to higher income crops.

41. The plan provision for financing on-the-farm investments both for irrigation facilities and development of more intensive crops does not appear to be adequate. There is a substantial backlog of investment needed to utilize fully water made available as a result of the Government's investments during the past 10 years. Also, the accelerated rate of investments planned for the next 10 years will call for additional investments on the farm. These investments consist of small canals and control structures, land leveling, and operating capital to support the production of higher value crops. The development of improved water

management practices will call for a substantial expansion in agricultural extension services, particularly to provide specialist advice in laying out farm irrigation systems and in developing suitable cropping patterns. It will also call for a much higher degree of co-ordination between the Irrigation Department, CORFO, and the Ministry of Agriculture.

42. The plan allocation of E^o 115.6 million for Irrigation Department public investments appears to be reasonable. The present program calls for expenditures of the order of E^o 65 million in the first four years, the mission feels that expenditures during these years might be reduced somewhat and phased over a longer period in view of the progress already made. On the other hand, allocations for on-the-farm investments should be stepped up over the rate proposed in the plan. Even allowing for substantial farmer financing of the on-the-farm investments, the mission feels that Government financing of at least E^o 100 million will be required to take care of the backlog of investments as well as the investment needs brought about by the new irrigation developments.

The Livestock Program

43. The revised livestock program calls for investment of E^o 143 million during the first five years of the plan. Major emphasis is to be placed on pasture improvement and herd development with E^o 121 million allocated for farm-level investments. E^o 19 million is for dairy plants and slaughterhouses, E^o 1.8 million for improved veterinary services, and E^o 1 million for breed improvement.

44. Livestock production has been relatively stagnant over the past 15 years. The annual average rate of growth has been only 0.74% as compared to a 2.8% growth rate in the other branches of agriculture. Dairy production has increased at a rate of 2.3% per year while meat production has shown no significant gain. Government has taken an active interest in dairy-plant construction since 1945, and purchases of powdered milk by the National Health Service for free distribution to schools and hospitals have been a significant factor in maintaining milk prices. Meat processing has not been modernized; with the exception of the Osorno Slaughter House, conditions have not changed during the past 15 years. Conflicting policies with regard to prices and imports, and outdated local regulations on slaughter, have resulted in considerable market fluctuations which have not been conducive to development of meat production. Furthermore, the spread between the live-weight prices at the producing centers and the wholesale level increased from 20.5% in the period 1947-51 to 33.4% in 1956. This reduction in the producers' share of the consumer price reflects not only inefficiencies in slaughterhouse operations but also rising freight costs and the monopolistic structure of the principal markets. Hence the meat producer was faced with not only greater marketing risks than the dairy producer, but also with declining terms of trade. Many of the larger commercially oriented farms have reacted rationally to this situation by shifting resources from beef-cattle production to milk production.

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45. The mission believes that these trends indicate that livestock production is responsive to market forces and that larger output can be brought about through better incentives. Under the livestock program, incentives to producers are to be increased by changing existing restrictive regulations, by building up processing facilities to reduce marketing costs and to provide a more stable market, as well as by providing low cost financing of development costs and an increased level of technical services.

46. The principal scope for increasing livestock production lies in improved feeding and management. A Ministry of Agriculture survey indicates that starvation and malnutrition cause 60% of the animal deaths. In addition, malnutrition produces a lower rate of fertility and a slower rate of weight increase. With better feeding and management, substantial increases in meat and dairy production would be possible without increasing animal population. The livestock program, therefore, gives strong emphasis to investments aimed at pasture development and improved feeding and management.

47. While herds and pastures are being built up, meat imports are expected to continue during the first five years of the program. The question of whether imports will be in the form of dressed meat, fattened cattle, or store cattle has not been decided. Historically, a certain number of store cattle have been regularly brought into Chile from the Argentine side where conditions are favorable for extensive breeding. In recent years there have also been imports of fattened cattle and dressed meat for the Santiago market. Of the three alternatives, from the foreign exchange point of view it would be desirable to import store cattle for fattening and slaughter in Chile. This would, however, depend on the availability of fattening pastures, the effect of such imports on store cattle prices in Chile, and the effects on incentives for breeding and rearing of cattle. A temporary drop in store cattle prices need not necessarily discourage breeders -- provided that long-run expectations are good and attractive financing is provided for herd expansion. Moreover, the livestock program provides a subsidy for raising calves in order to eliminate the premature slaughtering of bull calves on dairy farms. A calf-rearing subsidy is in effect in the United Kingdom where the subsidy is limited to non-dairy type heifers and bull calves of suitable types. The U.K. subsidy has been relatively effective but involves considerable administrative overhead. The mission believes that such a subsidy will probably be necessary in Chile as a transitional measure, particularly during the period while store cattle imports are being permitted on a liberal basis^{1/}. However, premature slaughter of bull calves has been related to the lack of incentives for beef production in the past and a stronger market for beef animals in the future will be necessary to provide the stimulus needed for higher levels of output.

^{1/} Presumably such imports would be made at the preferential exchange rate allowed for official imports and would hold down domestic store cattle prices. As domestic supplies of meat increase permitting a shift from the preferential exchange rate to the free market rate for cattle imports, the basis for the subsidy would disappear.

48. Improved processing and marketing facilities provided in the plan should permit more effective utilization of by-products, reduce waste, increase the marketable meat per animal slaughtered, and provide a more stable market for livestock products. For these reasons, high priority should be given to the programs for improving processing and marketing facilities. Moreover, the outdated municipal regulations on meat processing and marketing must be modified and steps must be taken to eliminate the monopolistic practices which now dominate most of the principal meat and livestock markets.

49. The planned investments in barns, sheds, and silos may be somewhat too high in view of the mild climate prevailing through much of the Central Valley. Many of the installations seen by the mission in these areas appeared to be too elaborate and costly; they probably do not contribute materially to increased production. On the other hand, planned investment in dairy equipment and agricultural machinery appears to be on the low side. In total, the proposed level of investment for livestock development appears reasonable.

Fruit and Vegetable Production

50. Chile has excellent conditions for production of temperate fruits and vegetables. With the advantage of being in the Southern Hemisphere, Chilean products can be shipped to major European and North American markets during seasons when prices are highest and local production is not available. So far only a small export trade has been developed for some fresh fruits and vegetables.

51. The 10-year plan provides for a modest investment program of about E^o 8.5 million to increase fruit acreage by 43,000 hectares at an average cost of about E^o 200 per hectare, with no specific investments for increasing vegetable production. In addition, E^o 2.5 million is provided for fruit-packing and dehydrating plants. The mission feels that the proposed increase in fruit acreage of 43,000 hectares over the present estimated acreage of about 65,000 hectares is feasible in view of the 15 to 20% increase which has occurred during the past five years. Moreover, even with such an increase Chile's surplus for export would be a relatively insignificant proportion of world trade in fruits. The fact that Chile's production is off season should make it relatively easy to develop markets for additional output. However, the estimated investment per hectare appears to be considerably understated. A more realistic estimate would be of the order of E^o 500 per hectare which would bring total investments to about E^o 25 million for achieving the planned increase in acreage.

Wine Production

52. Chile's climate and soils are extremely favorable for wine production. All classes of wine can be produced, but more than nine-tenths of the production is red and white table wines. More than 80% of the white wine and 30% of the red wine originate from fine varieties of European wine grapes. Year to year variations in climate are less marked than in Europe and consequently most years produce a good vintage. Wine acreage and production have been controlled through licensing and taxation. Annual production at present is about 400 million liters, but production could be increased many times if export markets could be developed and restrictions on production were relaxed.

53. The mission believes that prospects for developing wine export markets are good in view of the excellent quality of Chilean wines. To date the Chilean wine industry has been oriented to the domestic market and very little effort has gone into the development of export markets. Although export volumes have fluctuated considerably from year to year as a result of fluctuations in demand and the unstable Chilean prices, Chilean production has been relatively stable with year-to-year fluctuations of under 10%. The principal export market has been the European demand for bulk wines to be used in blending. This market varies considerably with

conditions of the European wine crop. In 1958 Chile exported a record volume of bulk wine to France. Shipments were made in tankers equipped with plastic liners; this greatly reduces the landed costs of Chilean wines. In normal years, however, France imports no wine from Chile because Algerian supplies are usually sufficient for domestic blending. The principal customers have been Germany and Belgium. Prospects for any large increase in the European bulk-wine market are not very bright in view of surplus production already available in some European countries and the development of Common Market arrangements in Europe. Moreover, since most major wine-consuming countries produce their own wine, demand for foreign bulk wines tends to be limited to the residual amounts needed for supplementing domestic supplies in years of low production. Nevertheless, with prospects for lower costs through bulk tanker shipments and more stable economic conditions, Chile should be able to retain a major share of her existing market and develop new markets in the U.S. and Latin America. But a determined effort must be made.

Table 4-8: Chilean Wine Production and Exports

<u>Year</u>	<u>Production</u> (million liters)	<u>Exports</u>	<u>Value of Exports</u> (US\$ millions)	<u>Average Price</u> <u>per Liter</u> (US\$)
1950	342.2	3.8	1.5	0.40
1951	329.4	8.4	1.5	0.18
1952	320.0	3.7	0.8	0.22
1953	355.3	2.8	0.6	0.21
1954	345.2	9.7	1.7	0.18
1955	359.2	7.7	1.6	0.21
1956	392.7	5.5	1.0	0.18
1957	375.7	2.0	0.5	0.25
1958	372.1	34.3	4.3	0.13
1959	n.a.	0.7	0.4	0.51
1960	n.a.	1.9	0.4	0.20

54. Bottled wines for direct consumption represent only about 15% of the total export volume in a normal year, but they account for about one-third of the wine export proceeds because of the higher value per unit. The principal market has been the U.S., which took 78.3% of bottled wine exports by volume and 71.8% by value during 1952-56. As Table 4-9 shows, U.S. wine imports from Chile have dropped during the past several years despite a continuing increase in total U.S. table-wine imports.

Table 4-9

U.S. Duty Paid Imports of Still Wines
(1,000 gallons)

<u>Year</u>	<u>All Countries</u>	<u>Chile</u>
1950	1,780	175
1951	2,219	174
1952	2,430	196
1953	2,839	142
1954	3,005	133
1955	3,401	275
1956	3,777	140
1957	4,193	112
1958	4,452	34
1959	5,052	95
1960	5,487	49

55. The sharp drop in the position of Chilean wines in the U. S. market can be attributed to a number of factors. The relatively small quantities available for exports and the random nature of bulk exports has made it difficult to develop any program for volume distribution in the U. S. Added to this have been the uncertainties introduced by the effects of inflation and ad hoc trade controls in the past. The sharp drop in U. S. imports in 1958 coincided with the one-time record export of bulk wines to France and followed a sharp rise in Chilean prices in 1957. U. S. wine importers have also complained about irregular standards. In contrast to this situation, other wine-exporting countries have made efforts to tighten export quality controls and have embarked on considerable educational and promotional work to increase U. S. sales. Total U. S. imports of table wines have been increasing at an average annual rate of 11.8% over the past decade.

56. The present plan targets for increasing wine-grape acreage by 15% appear to provide for a 28% increase in output. This would take care of anticipated population growth but would not take care of projected increases in exports without reducing per capita domestic consumption. Moreover, to the extent that exports of finer qualities are to be encouraged, per hectare yield can be expected to decline and consequently larger acreages would be necessary. In view of the large areas of land suitable for wine production, the mission believes that acreage targets should be raised to provide for a 30 to 50% increase in wine acreage over the next decade -- to allow for expansion of higher quality production and to build up a reserve export stock which would be necessary for development of a volume export market.

57. The plan export target of \$4 to \$5 million of annual wine exports is not unreasonable. This would represent an insignificant percentage of world trade in wine. The mission believes that the targets can be achieved and even exceeded if the measures now being considered by Government to promote exports and to provide greater incentives for wine production are effectively carried out. This will call for a drastic reorientation of the industry from the domestic to the foreign market. Sufficient volumes of high quality export grades will have to be reserved for exports in order to justify an intensive market-development program. The proposed change of the taxes on wine plantings and production into a tax on wine consumption should provide for higher domestic taxes on export grades so as to discourage local consumption of the finer qualities. Government assistance in financing wine stocks in process of aging is necessary to help producers obtain a larger share of the final price and to permit more competitive export pricing. More stringent export grading and inspection is necessary to develop a better reputation for Chilean wines abroad. In addition the mission would urge that Government credits be extended for new plantings of high quality wine grapes as well as processing and storage facilities for export wines.

Field Crops

58. About 80% of the area in field crops is in cereals and 10% in beans and pulses. Potatoes, oil seeds, and sugar beets are the other principal crops. Planted acreage during the past several years has been about 15% larger than indicated in the 1955 census. With the exception of the very rapid increase in rape and sugar beet acreage, there does not appear to have been any significant shift in the pattern of production. The increase in rape and sugar beets indicates that producers are responsive to attractive prices, special credits, and supply of seeds; and with proper incentives production can be increased rapidly.

59. The 10-year plan provides for an increase of about 20% in the acreage under annual crops with the bulk of the increases to be in feed grains, pulses, oil seeds, and sugar beets. Recent crop estimates indicate that part of this projected increase has already been achieved. In the case of wheat, planted area has exceeded the 1970 targets every year since 1957-58. Other crops have also been running well ahead of the plan projections. The mission believes that this can be attributed in part to public investments in irrigation and transportation, but also to the improvements in extension and research activities centering around the work of various technical assistance agencies such as FAO, ICA, and the Rockefeller Foundation. The mission is convinced that sufficient ground work has now been done to provide the basis for an accelerated development during the next decade. Planned improvements in irrigation and increased mechanization will reduce weather risks, which are an important factor holding down average yields. Increased use of fertilizers, improved seed and other inputs, as well as further development of disease-resistant and high-yielding varieties already in preliminary stages of

development, should be possible over the next decade. The emphasis being given to development of livestock enterprises and pasture development should improve soil fertility and crop yields and stimulate expansion of field crops, particularly in the southern areas where climate and rainfall are favorable for intensive mixed farming.

60. Wheat production has ranged from 1.10 to 1.25 million tons over the past several years with yields averaging between 1.25 to 1.50 tons per hectare. The plan provides for roughly a 20% increase over the base year estimate of 1.20 million tons. This would represent a rate of growth slightly lower than that achieved during the past decade. The mission believes that acreage under wheat may decline somewhat as marginal areas are withdrawn from production but that higher yields per acre should permit achievement of the production goals. The 25% increase in yields per hectare postulated in the plan appears quite reasonable if not somewhat conservative in terms of the present state of technological development.

61. Sugar-beet production has increased rapidly under the program of IANSA (National Industrial Sugar Co.), increasing from 27,000 tons in 1953-54 to 477,000 tons in 1959-60. Acreage increased from 2,400 hectares in 1953-54 to 18,400 hectares in 1959-60, and per hectare yield increased from about 13 tons to present yields of about 25 to 30 tons. Under the program three sugar mills were constructed at Los Angeles, Llanquihue, and Linares. Farmers produce sugar beets under contract with the factories, receiving seed and technical guidance. The increase in beet production has been stimulated by the high prices paid to growers (\$14.30 to \$20 per ton ex-factory) as compared to prices paid producers in most other countries (\$14.00 in U.S.A., \$12.50 in Denmark) and by the heavy subsidization of the industry. The supply of beets is, however, still not sufficient to operate existing factories at full capacity.

62. From an agricultural point of view the production of sugar beets has many advantages. The deep cultivation and heavy fertilization required for beet production make it a useful crop in soil-building rotations. The tops, pulp, and molasses furnish valuable feed supplements. On the other hand, beet production requires a large amount of labor inputs, which even at Chilean wage rates tends to make the cost of production high. European and U.S. beet producers have overcome this handicap in part through mechanization, but the sugar-beet industry has been able to survive only as a result of various forms of protection and subsidization. Chilean beet production was started on a commercial scale only eight years ago and as yet production is not efficient. Yields per hectare are approaching European standards and can be expected to increase further. Mechanization has been only partially carried out since production has not been on a large scale. This in turn has forced the factories to procure beets from relatively distant points over poor roads, adding further to production costs. The mission believes that at this time sugar beet production should not be

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encouraged beyond the level needed to utilize existing processing facilities fully. A full-scale study should be made of the economics of the industry before investing in further processing facilities.^{1/}

63. Oilseed production has been encouraged through efforts of the Chilean Association of Vegetable Processors (COMARSA) which has carried on an active promotional campaign over recent years. The Association arranges for contract production at guaranteed prices, providing seed and liberal advances as well as technical guidances and supervision. Acreage under sunflower increased sharply during the past two decades, rising from about 1,000 hectares to 50,000 hectares in 1959-60. Rape production, which was introduced in 1954-55, has shot up at an even faster rate to about 40,000 hectares in 1960-61.

Agricultural Credit

64. The agricultural credit system in Chile is oriented to the needs of the commercial farmer. The principal source of credit has been the Banco del Estado, supplemented by CORFO, the Central Bank and the commercial banks. About 85% of the institutional credit to agriculture originates from the Banco del Estado, 5% from CORFO, and the remainder from the Central Bank and commercial banks. The activities of these institutions have been dominated by inflationary conditions during the past decade. The Banco del Estado has restricted its lending to farmers to short-term credits at interest rates which now range from 12% to 19%; rates have been as high as 24% in order to cover the rapid depreciation of Chilean currency during the recent inflation. These high rates were not sufficient to cover the inflationary risk of some years and the Banco del Estado has restricted its lending to short-term production loans.

65. CORFO has been concerned primarily with medium-term development loans. Agriculture has been a sporadic field of activity for CORFO; only about one-third of CORFO's resources have gone into agricultural projects such as irrigation and drainage, land clearing, farm mechanization, livestock improvement, and reforestation. In 1948, the International Bank granted CORFO a loan of \$2.5 million for farm-machinery imports. However, in 1956 CORFO's lending activities in agriculture were partially curtailed because of the shortage of resources and risks from inflation. During the second half of 1960 it started a program of reconstruction loans to farmers affected by the 1960 earthquake. Loans for livestock development and farm machinery purchases were also started toward the end of 1960. During 1961 CORFO had made 582 livestock development loans amounting to E^o 7.4 million, farm machinery loans estimated at E^o 3.5 million and other agricultural loans of about E^o 4 millions.

^{1/} See discussion of beet-sugar processing in Chapter 5, Industry, page 32.

66. The role of the Central Bank and commercial banks has been limited to short-term operations for marketing agricultural produce. Commercial bank loans are now available at 17 to 20% interest. Another Government agency, CONFIN, attached to the Ministry of Agriculture, provides financing for construction of processing plants such as dairy plants and slaughterhouses.

67. At present there are no facilities for providing credits to small farmers in need of supervised credits, except for pilot operations. The Banco del Estado started a small program in Chillan in May 1959 with the help of United States Government financing to provide four- to five-year development loans at 10% interest. This program was initiated in connection with the Plan Chillan, an effort to concentrate investment, extension services and credits in a relatively small area to develop and demonstrate possibilities for regional development on an integrated basis. Under this program about 500 loans were made to small and medium-sized farms. The record of development as well as repayment of the loans has been excellent. As a result of the success in Chillan, a second project was started in the Santiago area about a year ago. CONFIN, with the assistance of the extension service, started another small pilot project, involving 150 farmers, for supervised credit near Santiago. Under this program farmers are provided with seed and fertilizer on credit. In an effort to keep down costs of supervision, the detailed supervision and farm planning featured in the Plan Chillan have not been adopted. The first year's loans have been fully repaid, indicating that there may be considerable scope for expanding this type of lending. The mission fully supports current plans to expand these pilot projects into other areas as rapidly as possible.

68. The mission believes that CORFO, with its staff of 60 agricultural technicians, has worked out reasonably adequate procedures for technical, financial and economical appraisals of development loans. The Banco del Estado, with its large number of local offices, has been operated as a sound financial institution and would be capable of handling the banking aspects of an expanded credit program. The mission believes that a reasonably efficient channel for expanded development financing can be worked out with CORFO handling the technical and economic appraisals and the Banco del Estado the financial appraisals and banking operations.

Farm Mechanization

69. Farm machinery imports increased rapidly from 1940 to 1955 reaching a peak of \$17.8 million in 1955. During the period of rapid growth, farm machinery could be purchased with 20% to 30% cash payment and three-year credits at 5% to 10% interest. Beginning in 1956, farmers were required to pay 60% in cash and the balance in two years at 12% interest. The volume of Government loans for agricultural machinery purchase dropped sharply until 1960, when a new program of farm-machinery loans was initiated. Imports in 1960 amounted to \$11.6 million and are expected to increase further in 1961.

70. The 10-year plan calls for imports of 20,600 tractors, or an average of 2,060 tractors per year. Imports during the last five years before credit restrictions averaged 2,274 per year, increasing from 1,950 in 1951 to 3,555 in 1955. Tractors purchased during that period will probably have to be replaced during 1961-65. In addition there is a backlog of unsatisfied demand resulting from the limited imports during the period 1956-59. Imports now included in the plan will not be sufficient to meet the replacement demand, and there would be an increasing backlog of unsatisfied demand. With Government now contemplating a sharp increase in agricultural investments, it seems clear that the expansion in the use of agricultural machinery which was well underway in the early 1950's should continue. The mission believes that there is considerable scope for use of additional agricultural machinery in pasture development, sugar-beet production, and the general program of agricultural intensification. The allocation for agricultural mechanization has therefore been increased to E^o 260 million, with Government financing of E^o 130 million. During the first five years, about 80% of the investments would be Government financed, but the proportion would be sharply reduced in the second five years.

Fertilizer Subsidies

71. Fertilizer consumption in Chile had increased steadily from the 1920's, when annual consumption was estimated at about 30,000 tons, to 254,000 tons in 1955. Reduced to plant nutrients, this consisted of 36,000 tons of phosphoric acid units, 15,000 tons of nitrogen units, and 5,600 tons of potash units. During the past five years, however, there has been no increase. In fact, as a result of the generally unfavorable environment for agricultural investment, fertilizer use during 1956 to 1959 was lower than the average levels achieved during the previous five years. In 1960, with the assistance of more liberal credits and a 30% subsidy, fertilizer use has again roughly reached the 1955 level. An increase in the subsidy to 50% of the retail cost to the farmer is currently under consideration. The plan targets call for almost a three-fold increase in the use of phosphates, a fourfold increase in nitrogen and a doubling in potash. Considering the increase achieved during the decade prior to 1955 when usage was more than doubled, the targets appear to be reasonable, particularly in view of Government's agricultural development program and its intentions to improve the terms of trade for agriculture.

72. The mission believes that the present fertilizer subsidy can be justified as a transitional measure to hold down input costs during a period of adjustment from the recent inflation, but can see little justification for it over an extended period of time. Fertilizer usage is already well established for high-value commercial crops such as fruits and vegetables, and in the mixed farming regions the increased emphasis on pasture development and livestock production will assure a steady improvement in soil fertility once proper rotations are established. The mission, therefore, feels that present fertilizer subsidies should not be increased at this time and should be gradually reduced as the development program progresses.

Agricultural Extension and Research

73. With the help of FAO, ICA, and the Rockefeller Foundation, Chile has developed the nucleus of a sound agricultural-extension and research program. Pilot operations of the past five years or so are in process of expansion and Government is now thinking in terms of a substantial increase in extension activities over the levels originally contemplated in the plan.

74. Chile has a substantial number of trained agriculturists and has plans for further accelerating training programs at all levels. The principal problem to date has been the relatively low salaries paid by the Ministry of Agriculture. Many agronomists have been forced to seek employment in other more remunerative fields. CORFO has been able to pay higher salaries for its agricultural personnel and has been more successful in finding personnel. At present the Ministry of Agriculture is trying to overcome the problem of low salaries by providing housing for its employees. The mission believes that Government will have to increase its pay scales for agricultural technicians as well as to provide for a larger program of employee housing particularly in rural areas. In addition there will be a need for more transportation and other facilities to take care of the currently planned expansion in extension services.

IV. SUMMARY OF CONCLUSIONS

75. The mission is in general agreement with the plan target of achieving a 5.5% annual rate of growth in agricultural output. Given the projected population growth of 2.5 percent per annum and the current deficit in agricultural trade, a lower rate of growth could result in a continuing drain on foreign exchange resources and perpetuation of the low level of agricultural incomes, particularly among the 300,000 landless farm families. Considering that the agriculture sector has maintained a 1.8% annual growth rate over the past 15 years in spite of generally adverse economic policies and a lack of any major organized effort to increase agricultural output, the target rate of 5.5% appears to be quite reasonable. Sufficient knowledge and experience about pasture development, improved seed, mechanization, and fertilizer use have been developed to provide the basis for a sharp increase in output, provided farmers are given adequate incentives.

76. Past policies of relying primarily on short-term credits without other incentives were doomed to failure so long as more profitable outlets existed and adequate supervision could not be provided. Recent relaxation of price controls and proposed increases in the supply of medium and long-term development credits should go a long way toward stimulating the investments needed to achieve a more rapid rate of growth. CORFO, the agency through which most of these credits would be channelled, is planning to provide technical appraisal and supervision of such loans; the Banco del Estado is well equipped to handle the banking aspects.

77. In addition, however, import policies will have to be reviewed with a view toward coordinating them with production policies. A number of agricultural input items such as farm machinery, fertilizer and seed, can now be imported on a fairly liberal basis and this has already resulted in some increased use during the past year. There are some items such as trucks and spare parts for farm machinery which are still subject to excessive tariffs. Supplies of seed, pesticides, and fertilizer are not always available when needed. On the product side, imports of foodstuffs and agricultural raw materials have been made on an ad hoc basis -- to relieve temporary shortages or for advantages in negotiating trade agreements without proper regard for possible damage to domestic production. In view of prospective discussions on the Latin American Free Trade Association, it is extremely important that the adjustments bring domestic production closer into line with Chile's natural advantages. There must also be longer-range planning of trade policies with adequate consideration to the interests of the domestic farm producer.

78. Another important factor which has contributed to the lack of incentives for agricultural investments has been the high cost of transportation and marketing which has kept farm prices excessively low in relation

to prices paid by consumers. Measures proposed for reducing transportation costs are discussed separately in this report in the transport chapter, but we should like to re-emphasize the major importance of cheaper trucks and better access roads, particularly for the more intensive development of the southern area from Temuco to Puerto Montt. Improved processing, marketing, and storage facilities proposed in the plan -- discussed in the commodity sections of this chapter -- should reduce marketing margins and give farmers a better price. In addition, however, the selling practices in some of the major markets should be thoroughly investigated to permit a freer flow of goods from the farm to the consumer.

79. The existing land-tenure system has also been a factor holding back agricultural production. The popular concept of the latifundia, owned by the large landowner who lives in Santiago and has no interest in his lands other than prestige and traditional rents and profits, is by no means without basis. On the other hand, there is no question that a number of large holdings are operated on an efficient businesslike basis and have contributed materially to increased output as well as the development of better management techniques. With the passing of time and the break-up of estates, a number of larger farms have gone through a natural process of division, have been passed down as communal property, or have been organized into corporate farms. Many landowners have responded to changing social, economic and political pressures by taking a more direct interest in management.

80. The growing awareness of the needs of the workers, the increased interest in increasing production through better management and the numerous examples of large-scale, modern, efficiently run farm enterprises indicate considerable hope for further development along these lines. The mission feels that every encouragement should be given toward stimulating more active management, higher investments, and increased output from these large farms. They can produce the quickest increases in output. This will call for positive assurances against expropriation of lands which are being efficiently farmed, as well as credits and technical advice under the development program. At the same time, however, Government should insist on equal attention to the problems of improving the general conditions of the laborers on these farms. This means enforcing legislation on minimum wages and working conditions, financing investments in workers' housing and improving rural health and educational facilities, as well as more liberal legislation to assure workers' participation in bargaining for better working conditions.

81. For many of the smaller farmers and some of the agricultural laborers the shortage of land or lack of water rights has been the limiting factor. For these people, Government should provide a program for land distribution on a liberal long-term credit basis and a reform of the existing system of water rights. The Government owns a fairly considerable acreage of land and can acquire additional unimproved land in connection with proposed irrigation and reclamation projects. This should be sufficient

4. AGRICULTURE

to take care of the number of families which the Government can expect to resettle effectively without resorting to large-scale expropriation of land.

82. The Government organization for agricultural development needs considerable strengthening and expansion. If the planned intensification of agricultural production is to be achieved, a series of important measures are necessary. Agricultural extension and research staffs will have to be increased and sufficient transportation, housing and other facilities will have to be provided. CORFO will have to expand its technical and administrative staff considerably in order to process the increased number and volume of loans proposed in the development plan. The staffing and orientation of the Caja de Colonización will have to be radically changed to carry out an expanded land distribution program. CONFIN's functions should be reviewed with a view toward transferring some of its responsibilities for financing processing industries to some other agency in view of its expanded program for providing facilities for extension and research. Closer relations will have to be developed between the Irrigation Department, CORFO, and the Ministry of Agriculture to ensure rapid development of on-the-farm investments needed to make effective use of the new water resulting from the Irrigation Department's program. The co-ordination of all of these agencies in their programming, detailed planning and implementation will be a crucial factor in the success of the development plan.

Investment Plans

83. Table 4-10 below summarizes the mission's view on the investments required to reach the production targets outlined in the Ten-Year Plan.

Table 4-10

Gross Agricultural Investments, 1961-70
(in millions)

<u>Agricultural Investments</u>	<u>Government Program</u>			<u>Mission Recommendations</u>		
	(E ^o)	(\$)	Total (E ^o)	(E ^o)	(\$)	Total (E ^o)
Irrigation (Public Works)	112.7	2.8	115.6	82.0	17.1	100.0
Land Development	30.9	2.3	33.3	137.8	21.2	160.0
Orchards & Vineyards	10.2		10.2	50.0		50.0
Farm Mechanization	92.3	81.2	177.6	96.5	150.0	260.0
Livestock (cattle, pasture fencing, etc.)	255.7	3.0	258.9	182.5	50.0	235.0
Other Agricultural Improvements (research & seed farms, fertilizer)	126.1	7.1	133.6	147.5	50.0	200.0
Resettlement	55.5	4.3	60.0	144.8	5.0	150.0
Processing & Marketing	16.2	10.8	27.5	40.1	38.0	80.0
Transportation Equipment	49.2	.4	49.5	46.1	108.5	160.0
Other Public Works	39.9		39.9			
Reconstruction	<u>32.0</u>	—	<u>32.0</u>	—	—	—
	820.7	111.9	938.1	927.3	439.8	1,395.0
Less Transfer Payments	—	—	—	<u>100.0</u>	—	<u>100.0</u>
GRAND TOTAL	820.7	111.9	938.1	827.3	439.8	1,295.0
Less transport equipment included in transport sector	<u>49.2</u>	<u>.5</u>	<u>49.5</u>	<u>46.1</u>	<u>108.5</u>	<u>160.0</u>
	771.5	111.4	888.6	781.2	331.3	1,135.0

Total investments recommended by the mission are considerably higher than originally provided in the 10-year plan. As indicated earlier, the 1961 and 1962 budgets already provide for a higher rate of expenditures than provided in the plan. Moreover, the present Government thinking with regard to agrarian reform and the implementation of some of the policies set forth in the plan implies a need for further increases, and is more or less consistent with the higher level of investments recommended by the mission.

84. The main differences between the mission recommendations and the original investment program are as follows:

- a. A considerable increase has been provided for CORFO financing of private on-the-farm investments required to make more effective use of available irrigation water.
- b. The investments for developing orchards and vineyards have been increased considerably and provision has been made for liberal government financing of such investments.
- c. The investments for farm mechanization have been increased to provide for a more adequate level of replacements and to allow for machinery and equipment needed for the livestock program. A much higher proportion of Government financing is provided during the first five years in line with current CORFO policies in relation to financing purchases of farm machinery.
- d. Investments in cattle, fencing, pastures, and installations over the life of the program are more or less in line with the plan. However, the annual schedule of expenditures has been changed to provide for a more realistic build-up of expenditures.
- e. Estimated expenditures for other agricultural improvements such as research and extension facilities, seed farms, and breeding stock have been increased considerably over the plan provisions, particularly during the first five years of the plan. The purpose of this change is to provide for housing and other facilities needed to support the much faster build-up of agricultural extension and research activities now contemplated by the Government and already reflected in budgetary provisions for 1961 and 1962.
- f. Some provisions for the cost of the agrarian-reform program not covered elsewhere has been made. The amount (about E^o 150 million) may need to be much increased if the program is more fully developed. Rural housing expenditures to support agrarian reform have been included in the housing sector.

85. Leaving out transfer payments for purchase of agricultural land under agrarian reform, the mission program calls for total investments of E^o 1,135 million as compared to the Ten-Year Plan provision of E^o 838 million. The mission's projection calls for Government financing of roughly 60% of these investments, whereas the Government plan provides financing for only about one-third of the total expenditures. The total amount of privately financed investments would be considerably less than provided in the plan, about E^o 425 million. Direct public investments would amount to about E^o 270 millions and publicly financed private investments would amount to E^o 440 millions. Transfer payments for agrarian reform would amount to E^o 100 millions.

86. Table 4-11 compares these estimates with the rate of investments in the period 1955-1960. Direct public investments would rise from E^o 14.1 million in 1960 to an estimated E^o 40 in 1964 and then drop off after that time. The annual rate of publicly financed private investments would rise sharply from an estimated E^o 8.5 million in 1960 to E^o 17.0 million in 1961, E^o 43.4 million in 1962, and E^o 58.9 in 1963. From that point on the rate of investment tapers off and falls off rapidly in the last five years. In view of the rapid rate of increase which has been achieved by CORFO in 1960 and 1961, the mission believes that there is a reasonable expectation that CORFO's operations could be expanded at the projected rate. The mission further believes that if Government lending is held to a lower level, private investments in agriculture would probably not be forthcoming on a sufficient scale to meet investment targets. Privately financed investments would rise slowly at first and increase rapidly as the initial investments begin to raise agricultural production.

Table 4-11

Gross Agricultural Investments, 1955-70 a/

<u>Year</u>	<u>Public Investments (actuals)</u>	<u>Private Investments</u>			<u>Grand Total</u>
		<u>Publicly Financed</u>	<u>Privately Financed</u>	<u>Total</u>	
1955	1.0			5.2	6.2
1956	1.9			10.9	12.8
1957	1.8			18.0	19.8
1958	3.2			23.9	27.1
1959	4.2			29.9	34.1
1960	14.1	8.5	17.7	25.5	40.3
(projections)					
1961	22.3	17.0	17.9	34.9	57.2
1962	31.4	43.4	20.5	63.9	95.3
1963	39.3	58.9	27.5	86.4	125.7
1964	40.0	69.6	35.8	105.4	145.4
1965	30.0	65.0	50.0	115.0	145.0
1966	25.0	51.1	48.3	99.4	124.4
1967	22.0	40.0	50.0	90.0	112.0
1968	20.0	35.0	55.0	90.0	110.0
1969	20.0	30.0	60.0	90.0	110.0
1970	20.0	30.0	60.0	90.0	110.0
1961-70	<u>270.0</u>	<u>440.0</u>	<u>425.0</u>	<u>865.0</u>	<u>1,135.0</u>

a/ Excludes E⁰ 100 million transfer payments for Agrarian Reform

Notes to Appendix Table 4

4. AGRICULTURE

Irrigation (Obras Publica). Includes only direct public investments both in mission projection and 10-year plan. Foreign exchange component in mission projection changed as a result of revised estimates by Irrigation Department.

Land Development (CORFO). Includes all on the farm developments for irrigation, land clearing, levelling, drainage.

Orchards and Vineyards. Includes only on the farm investments up to point when plants reach bearing stage.

Farm Machinery. Mission projection for farm machinery includes all machinery and equipment for livestock development. Ten-year plan and Government's revised livestock program include some machinery under livestock. Mission projection also provides for more adequate level of replacements.

Livestock. Ten-year plan and Government's Revised Livestock Program provides for some machinery and equipment included under farm machinery in mission projection.

Other Agricultural Improvements. Includes capital items in support of expanded research, extension and training program, fertilizer subsidies, seed farms, forestry development loans, etc.

Agrarian Reform. Mission projections are notional and subject to considerable changes as details of the program are developed.

Processing and Marketing Facilities. Mission projections include processing and marketing facilities relating to all agricultural products. 10-year Plan includes only facilities for which financing arrangements have not been arranged and appears to understate depreciation and private investments for which public financing is not required. The Revised Livestock Program prepared by the Chilean Government relates only to livestock processing and marketing facilities not financed and appears to omit depreciation.

Transportation Equipment. Investments in this category are included under the transportation investment program and have been excluded from the grand total of agricultural investments.

Grand Total. Total agricultural investments of E^o 938.4 million in the 10-year plan cited in earlier tables includes E^o 49.5 million for transportation equipment excluded from total shown above.

Appendix Table 4

Details of Agricultural Investments, 1961-70
(in millions)

<u>Projects</u>	<u>1961 (E\$)</u>	<u>1962 (E\$)</u>	<u>1963 (E\$)</u>	<u>1964 (E\$)</u>	<u>1965 (E\$)</u>	<u>1962-65 (E\$)</u>	<u>1966-70 (E\$)</u>	<u>1961-70 (Total E\$)</u>	<u>Foreign Exchange (US\$)</u>	
Irrigation (Obras Publicas)	11.7 4.5	14.0 6.6	19.3 10.0	20.0 11.6	10.0 13.7	63.3 41.9	25.0 69.2	100.0 115.6	17.1 2.8	Mission Projection (Public) 10-Year Plan (Total)
Land Development (CORFO) (including clearing, levelling, reclamation, ground water development)	2.5 3.5 1.4	6.5 8.5 1.7	10.0 13.0 2.0	13.0 17.0 2.6	16.0 23.0 2.9	45.5 61.5 9.2	52.0 95.0 22.7	100.0 160.0 33.3	14.2 21.2 1.5	Mission Projection (Public) Mission Projection (Total) 10-Year Plan (Total)
Orchards and Vineyards	0.1 1.0 0.4	0.9 2.5 0.5	2.0 4.0 0.8	3.0 5.5 1.0	4.0 7.0 1.5	9.9 19.0 3.8	15.0 30.0 6.0	25.0 50.0 10.2	0 0 0	Mission Projection (Public) Mission Projection (Total) 10-Year Plan (Total)
Farm Mechanization (includes machinery and equipment for livestock program)	6.0 15.5 11.8	11.0 22.2 13.3	21.0 31.0 15.3	24.0 35.3 16.9	20.0 35.0 19.0	79.0 123.5 64.5	45.0 121.0 101.3	130.0 260.0 177.6	70.0 150.0 81.2	Mission Projection (Public) Mission Projection (Total) 10-Year Plan (Total)
Livestock (cattle, fencing, pastures and installations)	5.6 8.0 17.9 13.0	17.0 20.7 21.0 16.8	19.9 25.9 21.7 19.3	22.6 32.6 22.3 17.0	20.0 30.0 28.6 6.4	79.5 109.2 93.6 59.5	64.9 117.8 144.2 0	150.0 235.0 255.7 72.5	30.0 50.0 0 43.7	Mission Projection (Public) Mission Projection (Total) 10-Year Plan (Total) Rev. Livestock Program (Pub. only)
Other Agricultural Improvements (res. and ext. facilities, seed farms, breeding stock)	10.6 14.0 0.5	14.4 18.4 0.4	15.0 19.5 0.4	15.0 20.0 7.0	15.0 25.0 8.5	59.4 82.9 16.3	50.0 103.1 120.0	120.0 200.0 136.8	40.0 50.0 10.1	Mission Projection (Public) Mission Projection (Total) 10-Year Plan (Total)
Agrarian Reform of which land purchases net of transfer payments	2.0 2.0 0 6.9	13.0 10.0 3.0 7.8	15.0 10.0 5.0 9.1	15.0 10.0 5.0 7.0	15.0 10.0 5.0 7.4	58.0 40.0 18.0 31.3	90.0 58.0 32.0 21.8	150.0 100.0 50.0 60.0	5.0 0 0 4.3	Mission Projection (Public) Mission Projection (Public) Mission Projection (Public) 10-Year Plan (Annual breakdown est. by Mission)

Appendix Table 4 (continued)

Details of Agricultural Investments, 1961-70
(in millions)

<u>Projects</u>	1961 (E\$)	1962 (E\$)	1963 (E\$)	1964 (E\$)	1965 (E\$)	1962-65 (E\$)	1966-70 (E\$)	1961-70 (Total E\$)	Foreign Exchange (US\$)	
Processing and Marketing Facilities	2.8	5.0	6.0	7.0	5.0	23.0	9.2	35.0	18.0	Mission Projection (Public)
	3.5	6.0	8.0	10.0	10.0	34.0	42.5	80.0	38.0	Mission Projection (Total)
	1.6	1.4	1.1	1.5	2.0	6.0	19.9	27.5	10.8	10-Year Plan (Total)
	5.0	6.3	2.8	1.4	0	10.5	0	15.6	9.0	Revised Livestock Program
Transportation, Equipment (excluded from Grand Total below)	0	1.0	2.0	2.0	2.0	7.0	3.0	10.0	8.5	Mission Projection (Public)
	9.0	10.5	12.0	13.0	17.0	52.5	98.5	160.0	108.5	Mission Projection (Total)
	0.1	1.6	2.0	2.2	3.3	9.1	40.3	49.5	0.4	10-Year Plan (Total)
Grand Totals	39.3	74.8	98.2	109.6	95.0	377.6	293.1	710.0	204.3	Mission Projection (Public)
	57.2	95.3	125.7	145.4	145.0	511.4	566.4	1,135.0	331.3	Mission Projection (Total)
	59.8	65.6	74.1	72.7	87.5	299.9	529.2	888.9	111.9	10-Year Plan (Total)

CHAPTER 5

INDUSTRY

I. CURRENT STATUS

1. The growth of manufacturing as a major sector of the Chilean economy dates from the early 1930's, when such growth first began to be favored by exchange controls and high protective duties. The Development Corporation (CORFO) was formed in 1939, and was instrumental in creating several new industries during World War II, besides aiding in the expansion of existing ones. The post-war period has been characterized by the development of modern steel, newsprint, and cellulose industries; the advent of petroleum refining and beet-sugar milling; and major investments in such food and feeding-stuff industries as edible oils and oilcake, condensed and powdered milk, and fish meal. During this period, there was substantial expansion and modernization of already established industries, e.g., the cement industry and the cotton and wool textiles industries. During the five-year period between the first quarter of 1956 and the first quarter of 1961, however, there was much smaller growth in output.

2. Today, manufacturing industry accounts for roughly one-fourth of the gross national product. Employment in manufacturing industry is in the neighborhood of 250,000 persons. The census of 1957 showed nearly 6,000 industrial establishments employing five persons or more. Most of industry is concentrated in the provinces of Santiago, Valparaiso, and Concepcion.

3. As Table 5-1 shows, industry is well diversified. The bulk of employment and value of output is in the major consumer goods industries: food, beverages, tobacco, textiles, clothing, and shoes. All industry groups taken together supply about 75% of Chile's requirements and manufactured products. That is, imports amount to about 25% of the value of manufactured goods each year. In 1957, approximately 70% of all imports of manufactured goods were in two branches of industry which are as yet relatively underdeveloped in Chile: machines and spare parts, and chemicals. In other areas, the 1957 census revealed a fairly high degree of self-sufficiency with respect to manufactured goods. This self-sufficiency, however, has in many cases been encouraged by high tariffs and other forms of protection -- with the result that much of Chilean industry is high-cost. Only 4% of Chile's production of manufactured goods (as measured by the value of output) could find export markets in 1957, and the bulk of this was in basic metals, such as rolled-steel products and manufactured copper. Total exports of manufactured goods amounted to about 10% of all Chilean exports in 1957. The proportion has not since changed significantly.

Table 5-1

Structure of Chilean Industry 1957^{1/}

(in millions escudos at 1957 prices)

<u>Industry Sector</u>	<u>Gross Value</u>	<u>Gross Value</u>	<u>Number Employed</u>	<u>Exports</u>	<u>Imports</u>	<u>Proportion of Value added by size of Fixed Assets</u>		
	<u>of Output</u>	<u>Added at Factor Cost</u>				<u>Large 200 E^o over</u>	<u>Medium 20-199</u>	<u>Small 5-199</u>
Food, Beverages, Tobacco	263.0	82.7	50.9	3.5	27.6	36%	49%	15%
Textiles	105.5	49.2	48.1	.9	5.6	66	25	9
Clothing and Shoes	52.2	27.1	26.5	-	5.0	33	42	25
Wood, Cork, Furniture	33.6	20.0	19.8	3.6	0.8	24	49	27
Pulp, Paper and Printing	37.2	17.8	13.2	0.2	6.3	50	35	15
Leather and Rubber	20.8	9.8	7.4	0.0	1.8	45	43	12
Chemicals	73.4	33.9	13.9	1.3	30.9	48	46	6
Non-metallic Minerals	40.1	22.2	16.1	0.0	3.5	77	16	7
Basic Metals	62.5	29.6	14.6	15.2	7.6	91	9	0
Metal Products and Machinery	51.2	29.9	28.7	1.5	134.0	(57)	(32)	(11)
Sundry Industries	7.5	4.0	5.4	0.5	11.0	18	50	32
TOTAL	752.0	326.2	244.6	26.7	234.2	49%	38%	13%

^{1/} Establishments with five or more persons employed.

Natural Resources

4. The natural resource base is favorable for the further development of manufacturing industry in Chile. The Chilean heartland between Aconcagua in the north and Puerto Montt in the south, where 85% of the population is found, compares favorably with some highly industrialized countries in terms of climate, agricultural and forest resources, and hydroelectric potential. Chile's copper reserves are the largest in the world, and the iron ore resources are promising. Oil and coal reserves are also very satisfactory in relation to the size of the country, although some qualities of coking coal must be imported. The internal cost of transportation is increased by the many mountains, particularly in the coastal range; but this cost handicap is not excessive, and may be very much reduced in the future through improved transportation. On the debit side, there is the geographic isolation of the country, which raises the landed cost of exportable goods in foreign markets. For example, to move a ton of wood-pulp to Buenos Aires from Concepcion costs about the same as from Goteborg, Sweden.

Human Resources

5. In spite of the relative stagnation of Chilean industry in recent years, it is apparent from the total performance during and since World War II that Chilean management and labor have the necessary adaptability and other qualities to meet the targets of the 10-year program. Nevertheless, the difficulties ahead should be faced squarely. In the past, inefficiencies and technical backwardness have been tolerated under a system of high protective tariffs, and steady inflation has made tight cost controls unnecessary. Chilean industry is composed mainly of medium-sized companies which, generally speaking, are not well advanced in modern industrial management. If Chilean industry is to compete internationally -- which means competing internally with products offered from abroad, especially when the Latin American Free Trade Area begins to function -- then Government must take steps to make sure that management becomes much more intensely concerned with improved organization within the plant and with improved industry structure (e.g., in terms of standardization, quality control, specialization, etc.). Management will automatically move in these directions as a result of increased competitive pressures; but the mission believes that Government should provide more encouragement, incentives, and technical assistance to increase the rate of industrial productivity. Through its educational media, Government can also help the labor unions to come to a full realization that increased productivity is the only possible road to higher living standards and increased employment.

II. THE GOVERNMENT PROGRAM

6. The Government program is an integrated program for economic development, i.e., it is more than a series of loosely related sector programs.

The growth rates calculated for individual industries are determined not only by the postulated growth rates in gross national product, investment, and consumption, but also by the programmed increases in such things as hydropower capacity, road construction, and other manufacturing industries.

7. At the same time, it is well to remember that less than 15% of the program for manufacturing industries represents public investment in publicly owned industries, and only about 25% of the financing is assumed to come from public sources. Most of the investments will be made by individual business entities on the basis of their long-term appraisal of future economic opportunities in their own lines of activity. We can be sure that the actual industrial development over the next decade will differ, in some respects, from the Government program or from the slightly different development envisaged by the mission. But if the overall goals of economic growth outlined in the 10-year plan are to be fulfilled, the actual changes in industrial output would no doubt be similar to the patterns outlined in the plan. To achieve these goals, three types of action are required by the Government. First, it must sell Chilean industrialists on the idea that the plan targets can be and will be fulfilled. In many cases, this will mean no less than a revolution in their present appraisal of economic opportunities. Secondly, the Government must convince individual industries or industry associations of the need for developing plans for their own industries consistent with the general goals of the plan. This is necessary to assure orderly expansion and modernization. Finally, the Government must help create the material and institutional conditions and a climate conducive to healthy industrial growth, particularly in the field of finance but also in many other ways (new forest legislation and a positive program for extending and improving the forest area, a new Fisheries Institute, etc.).

8. One of the important determinants of the future pattern of Chilean industry will be the Latin American Free Trade Area. For Chilean industry, accustomed as it is to heavy protection, this change will not be easy. The Government can facilitate a smooth transition by affirming its unflinching adherence to the idea and the timetable of the Free Trade Area and its willingness to assist financially those industries faced with major problems of adjustment. The advent of the reduction of tariff barriers to intraregional trade reinforces the case for each major industry to elaborate its own development plan in line with the general targets of the Plan.

9. Statistically and analytically, the Government program divides investment in manufacturing industry into four categories: "specified projects", non-specified projects, small-scale industries, and replacements and renewals. The so-called specified projects are not projects in the usual meaning of that term. That is to say, they are not clearly made on the basis of feasibility studies, market surveys, cost-income analyses, etc. Rather, they are estimates of the investments which the Chilean authorities think should be made in the more important industrial

sectors, such as steel, paper and pulp, cement, timber, petroleum derivatives, and so on. The other categories -- non-specified projects, small-scale enterprises, and replacements and renewals -- are adequately defined by their terms.

Overall Magnitude of Major Categories

10. The planners have courageously tackled the difficult task of estimating the future line of development of Chilean industry and the corresponding output and investment targets. Their highlighting of certain sectors for special attention seems amply justified. Viewed as a whole, the industrial projections (Table 5-2) give an idea regarding general goals and provide a framework that, with suitable modifications and refinements, should provide a valuable guide for governmental and private action.

Table 5-2

Investments in Industry, 1961-1970
(in millions)

	Government Program			Mission Recommendations		
	Domestic (E ^o)	Foreign Exchange (US\$)	Total (E ^o)	Domestic (E ^o)	Foreign Exchange (US\$)	Total (E ^o)
Specified Projects	313.0	381.4	713.5	239.5	313.6	568.8
Non-Specified Projects	318.0	194.3	522.0	311.7	189.8	511.0
Small-Scale Industries	116.7	27.0	145.1	104.6	24.2	130.0
Replacements and Renewals	400.5	230.0	642.0	416.2	239.8	668.0
Total Of which:	<u>1,148.2</u>	<u>832.7</u>	<u>2,022.6</u>	<u>1,072.0</u>	<u>767.4</u>	<u>1,877.8</u>
Publicly Financed	178.8	214.9	404.4	171.7	190.4	372.0
Privately Financed	969.4	617.8	1,618.2	900.3	577.0	1,506.2

11. As will be seen from Table 5-2, the mission is in substantial agreement with the general magnitude of the Government investment projections. Nevertheless, the table is apt to give a somewhat misleading view of the degree of agreement for the four principal sectors.^{1/}

^{1/} The methods used in preparing the projections are described in detail in Appendix A.

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12. The planners placed great emphasis on the industries subsumed under "specified projects". In this category are certain basic industries, some with an export potential: beet sugar production, the fishing industry (including the processing of fish meal), paper and pulp, lumber, cement, steel, agricultural implements, shipbuilding, chemicals, and petroleum refining (including petrochemicals). The planners' main purpose in analyzing these industries was to indicate what type of development would be required to fulfill the general goals of the 10-year plan. Another motivation was the belief that Chilean industry was entering into a more difficult phase, characterized by a greater capital intensity, greater technical complexity, and subject to sharper foreign competition. Over the 10-year period, anticipated investments in the "specified projects" (excluding investments for replacement and renewal in the industries represented in this category) come to about one-third of the total investments expected in manufacturing.

13. The much lower mission figures for specified projects is due mainly to the mission's doubts regarding the likelihood of greatly expanded steel exports. To a lesser extent the reduction reflects the mission's scepticism regarding the economics of beet-sugar production in Chile, and to its feeling that the growth of the market for petrochemicals may have been overestimated.

14. The mission believes that the plan total for the other three sectors combined is a reasonable one. In the case of replacement investments, the similarity between the mission's independent estimate and the plan estimate is particularly close. The apparent similarity between the estimates for non-specified projects and small-scale industries, on the other hand, conceals some real differences in estimating procedures. In the case of non-specified projects, the mission made an econometric evaluation of probable investment requirements based on an appraisal of production targets, available unused capacity, representative capital output ratios, etc. The mission's resulting estimates for investment requirements in this category for investments strictly necessary to reach the targets of the plan were somewhat higher than those contained in the plan estimates.

15. Like the plan architects, the mission felt it appropriate to make a generous allowance for underestimates and contingencies. A figure of about 20% for the manufacturing sector, including replacements, did not seem too high to the mission. This figure takes into consideration two factors: (a) the program estimates for specified projects are on the low side, and (b) there is the possibility that more steel expansion than that assumed by the mission may, in the final analysis, prove to be justified. The choice of 20% as a contingency allowance brought the mission's estimate -- for all except the specified projects -- to just about the same level as originally set forth in the Government program.

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The decision to exclude specified projects from the contingency allowance, as a matter of convenience, meets with the mission's agreement -- on the basis that statistical methods used to estimate the specified projects were more rigorous than could be used with the other categories.

16. A question may be raised whether in actual fact the mission thought the manufacturing targets could be achieved at a lower investment cost than the conservative figure finally chosen. The answer is in the negative, for the following reasons. In the first place, there is an almost universal tendency for both preproject and engineering estimates to be below the actual cost of the project. Secondly, the mission is wary about reliance on the mechanical-statistical approach. This approach is a useful, indeed, an indispensable aid in providing points of reference and filling out gaps in the detailed analysis; but it must not become the major measuring rod. Suggestions for a complementary approach, which enlists the aid of the industries concerned, are given later in this chapter.

17. Table 5-2, the summary of investments, does not show an important difference between Government and mission projections in the time phasing of probable investments in manufacturing industry. As shown in Table 5-3, the mission believes that planned activities and developments now underway should result in rather more investment in this sector than the Government estimates in the early years of the program, and rather less in the later years.

Table 5-3

Time Phasing of Investments in Manufacturing
(in millions)

		<u>1961</u>	<u>1962-65</u>	<u>1966-70</u>
<u>Government Program</u>				
Domestic (E ^o)		32.9	288.4	826.9
Foreign (\$)		27.4	237.5	568.0
Total (E ^o)		<u>61.7</u>	<u>537.8</u>	<u>1,423.3</u>
<u>Mission Recommendations</u>				
Domestic (E ^o)		67.5	372.8	631.7
Foreign (\$)		48.3	278.0	441.1
Total (E ^o)		<u>118.2</u>	<u>664.7</u>	<u>1,094.9</u>

5. INDUSTRY

18. In the mission's view, the plan allocations for replacement and modernization in the early years are too low. Unless there is a quicker build-up in this respect, it is doubtful that the planned targets could be attained.

III. SPECIFIC ASPECTS OF PROGRAM

Steel Industry

19. The steel industry's ability to export requires special discussion. The Government plan assumes that steel imports will continue to represent about 20% of total consumption, and that Chile would export 150-200,000 tons of steel per year. During the last four years, CAP (Compania de Acero del Pacifico) has exported an average of slightly over 100,000 tons per year, mainly to Argentina (flat products and sections) but with occasional large shipments to the United States and other countries. Prices for these exports have averaged well below cost, including a reasonable return on the investment. While they contributed in the past towards covering overhead expense and depreciation, it would be quite a different matter to plan for future new capacity with a view to exports. The best prospects for Chilean steel exports, within the framework of the Latin American Free Trade Area, would be neighboring countries.

20. It is far from certain that Chilean steel could become competitive in the main Argentine market. This would seem to follow from the fact that the lower iron ore cost for Chilean steel and the somewhat lower coal cost are offset by the freight on finished steel and also by the larger domestic market in Argentina which will make it possible to achieve a larger scale of output at Rosario or Villa Constitucion. United States coal delivered in Concepcion is at least \$1 per ton cheaper than the same coal delivered at Rosario or Villa Constitucion. (The fact that Chilean industry would use two-thirds domestic coal -- which is more expensive -- might be disregarded since, in calculating the economic benefits from steel exports, it would clearly be unreasonable to charge the Chilean steel industry a higher price than the cost of imported coal free of duty.) By the same token, the cost of Chilean iron ore should be figured on the basis of the present export quotation which is on the order of \$7.00 for 60-62% ore, to which should be added ocean freight to Concepcion, say on the order of \$1.50 -- giving a total of \$8.50 per ton delivered. By comparison, the cost of similar grade Brazilian or Chilean ore delivered at Villa Constitucion or Rosario may be estimated at \$12.50. The approximate difference in assembly costs per ton ingot may therefore be summarized as follows (to the advantage of Chile):

$$\begin{array}{rcl} 1.2 \text{ tons of coal} & \times \$1.00 = & \$1.20 \\ 1.85 \text{ tons of ore} & \times \$4.00 = & \underline{\underline{7.40}} \\ & & \$8.60 \end{array}$$

The cost difference per ton finished steel would be of the same order of magnitude since the use of, say, 1.33 tons of ingots per ton finished steel would be compensated by the scrap credit. The freight rate for steel between Concepcion and Buenos Aires is estimated at about \$9-10 per ton.

21. Detailed studies would be necessary to determine (a) what quantities of steel Chile might profitably sell to Argentina before domestic production in that country catches up with demand, and (b) what quantities may be marketed, on a more permanent basis, within the framework of a Latin American Free Trade Area.

22. Such studies are presently under way in Chile. Steel company and government officials are quite hopeful the studies will prove that substantial export opportunities exist. Strong emphasis is placed on the coming into force of the Free Trade Area. This means that steel production would not be started or excessively expanded in areas where it would not be competitive with other Latin American producers. Secondly, it means that Latin American steel exporters like Chile, when selling to other Latin American countries, would enjoy some degree of protection against European steel exporters. Thirdly, Chilean experts believe there may be some possibility of reducing ocean freights from Chile to other Latin American countries. Finally, emphasis is placed on Chile's prior experience in steel-making, which it is said will make the conversion costs at all stages of steel-making lower than in other Latin American countries. Hence it is argued, Chile should be able to supply (a) intermediate steel products (pig iron, billets, and slabs) to Argentina during an interim period until that country has developed its basic steel-making capacity more fully, (b) various types of finished products to Latin American countries now lacking a steel industry, and (c) various specialities (e.g., silicon sheets) all over Latin America.

23. It is to be hoped that the opportunities suggested above can be confirmed by further detailed studies and that the necessary agreements with other Latin American countries can be reached. Viewing the Latin American community as a whole, this would be the preferred solution. Until more concrete data are available, however, the mission does not feel justified in projecting a higher export demand than 100,000 tons per year. On this basis, the development of steel consumption, production, and foreign trade over the next 10 years would be as follows (in 1,000 tons of finished steel):

	<u>1961</u>	<u>1970</u>
Consumption	275	600
Imports	55	100
Exports	100	100
Production	320	600

24. According to these projections, steel production would grow more slowly than steel consumption due to the stagnation of steel exports. A somewhat more optimistic assumption, which might be capable of fulfillment, would be the maintenance of a net export surplus on the order of 50,000 tons per year. On this basis, the required domestic output by 1970 would be on the order of 650,000 tons of finished steel.

25. At the present moment, CAP can produce about 450,000 tons of ingot steel per year -- assuming no abnormal interruptions through strikes, etc. -- and this would suffice for a rolled-steel production of about 350,000 tons. CAP's present plans are to expand basic metallurgical capacity to 600,000 tons, which would permit the rolling of about 500,000 tons of finished steel. The cost of this expansion is estimated at about E° 40 million equivalent. In order to meet the expected demand in the early 1970's, further expansion would have to take place during the last few years of the plan. Our optimistic estimate of 650,000 tons per year by 1970 would correspond to a demand in a boom year of about 750,000 tons. And with consumption growing at nearly 50,000 tons per year, CAP would need a capacity of about 800,000 tons of finished steel by the end of 1970 in order to meet all expected requirements. Assuming that the increase from 500,000 to 800,000 tons of finished steel would cost E° 200 per ton, the investment requirements would be on the order of E° 60 million. Allowing about E° 30 million for modernization investments, mainly in 1964-66, the total investment in steel-making capacity would be on the order of E° 130 million. This, of course, is far below the E° 216 million included in the Government plan. 1/

26. Owing to the "lumpiness" of investments in the steel industry, it is conceivable that actual investments would be higher. Thus, the installation of the second blast furnace would probably provide pig-iron capacity geared to a steel production of a million tons of finished products rather than 800,000 tons. On the other hand, future development of continuous casting of steel billets might reduce investment costs per ton of steel. The steel company quite naturally has not planned 10 years ahead in detail.

1/ The rough estimate of E° 130 million of required investment relates to the possibility (mentioned in the text) that an export surplus of 50,000 tons might occur, making the annual output requirement 650,000 tons of finished steel, as compared with CAP's present plans for 600,000 tons per year. The investment figure of E° 111 million shown in Table 5-5 (and carried throughout all of the summary tables) is based on the CAP forecast.

Investment Criteria

27.. The preceding discussion of the steel industry was prompted by the differing appraisals made by the Government and the mission as to the potential of the industry, especially in the export field. We realize that there is room for differences in the assessment of demand prospects and of cost estimates. But we believe that the different estimates illustrate quite clearly the need for a Government re-examination of some of the manufacturing investment projections. Needless to say, we would not advocate any Government steps to slow down private industrial investment while such an examination is under way. Our only purpose here is to point out that when Government contemplates positive means of encouraging particular investments in industry, it should give special and more detailed study to the opportunities believed to exist.

28. Sometimes such studies -- and the conclusions -- require unorthodox analysis. In economies characterized by reasonably full employment and no endemic balance of payments difficulties, the profitability of certain investments (assuming no subsidies and no net protection by import duties, etc.) would normally be a fair measure of the economic usefulness of the investments. In considering the promotion of various industries in such an economy, there would be no reason for special consideration of balance of payments and unemployment effects. It is a characteristic feature of the Chilean economy, however, that the shortage of capital hinders the best social allocation of capital resources and the full utilization of labor resources. Hence, it is important that project analysis should include an effort to calculate the cost of capital at its real (opportunity) cost to the economy, rather than in accordance with the easier terms at which capital may be made available from foreign or official domestic sources.

29. The economic implication of foreign exchange earnings and savings also must be taken into account. Balance of payments difficulties have caused much harm to the Chilean economy in the past. This suggests that vigorous attention and aid -- in the form of government financing of basic research, government loans and guarantees, etc. -- should be given to industries promising a better utilization of Chile's mineral, ocean, and forest wealth. In these areas, one would expect possibilities for additional production at internationally competitive prices with some hope for really exceptional surpluses above the cost to the economy. A very determined effort must be made to overcome obstacles impeding the optimum growth of natural resource industries such as lumber, pulp and paper, and fish meal.

Industrial Policy

30. Chile's balance of payment is important for the development of the industrial sector of the economy in still another way. In the past,

the Government has given high protection and other privileges, virtually without exception, to any manufacturing enterprise which could produce a commodity hitherto imported into the country. In some instances, protection has helped in the establishment of industries which are now strong and can hold their own with little or no Government support. There also exists, however, a rather wide range of industries which have not become more efficient as they have grown older. They still claim a need for high protection -- on the grounds that any competition from abroad would adversely affect their cost structure because of the small size of the Chilean market, which barely permits one domestic source of supply to exist.

31. We realize the real handicap of a small market. But we also think that the productivity of many enterprises can be improved by increased efficiency of management and modernization of machinery and equipment. We therefore stress the need for Government authorities to pay close attention to the capital that established industrial enterprises need for modernization and expansion in line with the growth of the domestic market. The project for the establishment of a private industrial-development bank is an important step toward securing long-term financing for industrial re-equipment and expansion as a supplement to Corfo's activities. We recommend that the Government give this initiative its full support.

Finance

32. Although the overall financial implications of the plan are discussed at some length in the Plan Summary, there is no analysis of the special financial conditions for reaching the targets with respect to industry. In some of the large sectors of the economy, such as transportation and public power, the inclusion of projects in the investment budget would by itself guarantee their financing -- assuming, of course, that there is an overall balance in the accounts of the nation and of the Government. In certain other areas, such as mining and private "public-utility" power, the financing is mainly conditional on the existence of a reasonable investment climate for large foreign companies. But the financing of the major portion of private industrial investments raises problems regarding the availability of funds: the retention of earnings, the functioning of the capital market and the banking system, the creation of an Industrial Development Bank, the role of CORFO in financing private industry, the special problems of small and medium-scale industry, etc.

33. The mission recommends that the Government appoint a special committee of highly qualified experts, including both Chilean and foreign experts, to study this problem. Since the proportion of funds to be channeled through CORFO would also have to be considered, this committee should report at the highest Cabinet level.

34. Pending such a study, the mission has tried to gain a preliminary perspective as to the magnitude and character of the financing problem. The results of the mission analysis are shown below with reference to 1963 (figures in E⁰ millions). The figures are of necessity based on rough estimating procedures and should be regarded as purely illustrative.

Capital Needs

Fixed investment requirements for 1963, according to mission estimate	157.8
Working capital requirements	27.0
	<u>184.8</u>

Financing

Budgeted allocation of public funds (mission estimate)	37.9
Requirements for private financing	<u>146.9</u>
	<u>184.8</u>

Breakdown of private financing

146.9

Depreciation, less debt repayment	67.5
Retained earnings	45.0
Net financial requirements to be covered through capital market, foreign loans or investments or additional allocation of public funds.	34.4

35. The major assumptions on which the above analysis is based are as follows:

- a. Depreciation will average 5.8% (2.5% for buildings and 7.5% for machinery) of fixed assets valued at 1960 prices. About 17% of the funds made available through depreciation would be needed for debt repayment.
- b. Retained earnings were estimated on the assumptions that 80% of the fixed assets existing at the beginning of 1963 would be financed through equity, and that the average return on equity (revalued at 1960 prices) before taxes would be 12% of which about one-third would be retained by the company after the payment of taxes and dividends.

c. The current assets (inventories and receivables) required at given levels of production were estimated separately for different industry groups based generally on typical ratios of current assets to sales. It was then assumed that half of the estimated increase in gross current assets would be financed through short-term liabilities (bank debts, trade debts, etc.), the balance representing a claim for long-term financing.

35. Since many of the figures are uncertain and conjectural (e.g., the present value of fixed assets or the amounts required for debt repayment), it would be premature to draw any far-reaching conclusions from the above analysis. The purpose is to show the need and feasibility of planning in this area, both on a global basis and for industrial sectors likely to be faced with financing problems. Industry-wide studies of production goals and investment targets, recommended earlier in this chapter, should also include analyses of financial requirements.

APPENDIX 5-A

PROJECTION TECHNIQUES

Demand Estimates

37. The Government program was based on estimates of demand for each major industrial sector, as related to projected per capita income:

- a. The demand for manufactured consumer goods was calculated on the basis of postulated growth rates for public and private consumption, and on the basis of the estimated relation of demand to income growth (income elasticity of demand). The calculation was made for each of the broad areas of industry.
- b. Separate estimates were made of the demand for Chilean manufactured exports, the domestic demand for capital goods purchased within Chile, and the derived demand for certain basic materials (e.g., steel, cement, lumber).
- c. Estimates were also made regarding the practicable degree of substitution of domestic articles for previously imported articles.

38. In the final analysis, the validity of the Government estimates depends on the validity of the estimates of demand elasticity in relation to per capita income. This method of analysis is useful as a first approximation, but it is too blunt a tool to be relied on without additional checks. This is especially true of the projections for specific industries where a less schematic and more down-to-earth forecasting method could have been used. We shall offer some examples of what we consider to be useful methods of cross-checking the detailed forecasts.

39. On more general lines, the mission has used a cross-check technique which relies on what is believed to be a systematic relationship between industrial output on the one hand, per capita income and population on the other.^{1/} With this method (which was not available when the program was prepared) adjusted to conditions in Chile, and applying it to the broad categories of manufacturing output, the mission made a comparison (Table 5-4) with the Government projections based on elasticity of demand.

^{1/} This method was developed by Professor Hollis Chenery, of Stanford University. Professor Chenery collected data regarding the net per capita imports in different sectors of manufacturing in 1952-54 for some 50 countries. He then converted these values into dollars of a constant purchasing power, and computed a series of regression equations expressing the relationship between per capita income, industrial output in a given manufacturing sector and the total population. (See American Economic Review, September 1960).

Table 5-4

Production and Investment Targets
in Manufacturing
 (Indexes 1957-59 = 100)

<u>Industry</u>	<u>Production</u>		<u>Capacity</u>	
	Government	Mission	Government	Mission
Food	171	180	106	106
Beverages	180	189	145	152
Tobacco	170	179	71.5	113
Textiles	170	219	100	112
Clothing and shoes	166	198	75	120
Lumber	282	236	90	106
Furniture	178	175	137	122
Pulp and paper	254	257	254	313
Printing	171	235	101	139
Leather	157	201	83	105
Rubber	180	234	120	152
Chemicals n.e.s.	252	221	104	125
Coal and Petroleum Derivatives	254	208	251	234
Non-metallic Minerals	299	197	203	157
Basic Metals	225	220	155	200
Machinery & Equipment	252	184	103	125
Sundry Industries	184	670	77.5	224
Total Industry Average	<u>200</u>	<u>221</u>	..	..

40. The mission does not claim that its estimates of potential production increases and of required capacity increase are superior to those used by the Government. But they do illustrate the desirability of cross-checking -- when substantial differences appear, it will be known at once that further investigation is desirable. Like the original projections, these estimates for broad categories of industry groups also need to be supplemented with special market studies, especially for industries which are expected to have a large export demand. The authors of the industrial program realized that market analyses for the "specific projects" fall short of what is required. This is true, for example, for the important export projections for steel and lumber. Similarly, in the study of the future domestic market for cement, two approaches yielded widely different results; instead of restudying the whole problem, the authors of the plan simply struck an arithmetic average of the two demand estimates. We cannot overemphasize the need for detailed and careful specific analyses, particularly for the key industries in terms of total investment. In

subsequent Appendices we present analyses covering the "specified projects" of forest products, steel making, beet-sugar refining, and fish meal. They are offered as examples of the kind of analytical approach we think the Government should attempt in the future even though our analysis necessarily suffers from lack of detailed information on many relevant points.

Investment Cost Projections: Other Than Specified Projects

41. The useful procedure would be to request each industry (a) to prepare an analysis of the present structure and problems of its sector; (b) to estimate the volume of future production and foreign trade compatible with the general plan targets for national income, consumption, investment, etc.; (c) finally, to estimate investments needed for modernization and expansion. Qualified plan officials could be made responsible for liaison with the industry groups and co-ordination of their estimates. Although many Chilean industrial associations lack the highly qualified staff required for this type of planning, it should be possible, with the full cooperation of the industries, to answer some important questions regarding major industries:

Obsolescence as a factor reducing actual capacity in a 10-year perspective below the nominal capacity.

The number of shifts to be assumed.

Possibilities of obtaining higher output from the same machinery by improved internal organization, working methods, and incentives.

Possibilities of obtaining higher output by improved industry structure (standardization, specialization, weeding out inefficient procedures).

42. The relevance of cooperative investigations may be demonstrated by a few examples. One important firm in the woolen industry raised its output over a period of three years by 50% through improved organization -- using the same machinery and actually reducing its labor force. On the other hand, there has also been much progress in the techniques of textile manufacturing in the recent decade, and there are many spindles and looms included in the capacity calculations which will never be used again. One large cement mill is idle much of the time; and the circumstances under which it could effectively compete have not been elucidated. In the lumber industry, only perhaps a third of the present nominal capacity is utilized; yet the plan specifically recognizes the need for wholesale replacement of outmoded equipment. In contrast, improved organization within the machinery industries could conceivably lead to important economies in the use of its installations and equipment.

Investment Cost Projections: Specified Projects

43. For two reasons, the mission concentrated its detailed examination on the "specified projects". First, they are the ones which have been singled out by the Chilean Government for special attention. Second, they account for a much larger proportion of the potential investment in industry than any other group of potential investments that can be identified and studied in detail. In short, they are crucial to an appraisal of the programmed investments in manufacturing industry. Table 5-5 shows the main differences between the Government's estimates of investments in "specified projects" and those of the mission; both, of course, are estimates of investment needs as related to forecasts of production requirements and demand.

Table 5-5

Investments in Specified Projects, 1961-70
(in E^o millions)

	<u>Government Plan</u>	<u>Mission Estimates</u>
Beet Sugar Refining	21.7	4.9
Fishing Industry, including fish meal	29.0	38.1
Paper and Pulp	116.2	105.0
Lumber	40.6	40.4
Cement	38.9	39.0
Steel	216.0	111.2
Agricultural Implements	3.0	nil
Shipyards	19.7	20.1
Chemicals	26.6	26.6
Petroleum Refining and petrochemicals	201.7	183.4
Total	<u>713.5</u>	<u>568.8</u>

44. In most respects, as will be seen from the table, the mission's estimates tie in very closely with the estimates of the Government. We foresee, however, the need for approximately E^o 140 million less than the Government does. Most of this can be explained as follows:

- a. More than E^o 100 million of the difference is due to our less optimistic attitude towards the future of steel exports from Chile. This point is elaborated in Appendix 5-C.

- b. Under present cost patterns, we see little justification for plans to expand the sugar refining industry in Chile. This point is elaborated in Appendix 5-D. This accounts for about E^o 15 million of the difference.
- c. Approximately E^o 20 million more is accounted for by our lower estimate of investment needs in petroleum refining and petrochemicals.
- d. Offsetting these reductions to some extent is the mission's recommendation that approximately E^o 10 million more than the Government estimates be invested in further exploitation of the fishing industry, especially in the production of fish meal. This point also is elaborated in Appendix 5-E.

APPENDIX 5-B

FOREST PRODUCTS

45. Production targets are given in the original draft of the Government plan. The proposed capacities are according to the printed version of the plan.

	Production Targets			Capacity Target 1970
	1959	1963-64	1968	
Lumber (million Cu.m.)	<u>0.67</u>	<u>1.16</u>	<u>1.77</u>	
Domestic Consumption	0.44	0.82	1.24	
Exports	0.23	0.34	0.53	
Newsprint (1000 tons)	<u>68.0</u>	<u>168.0</u>	<u>228.0</u>	230.0
Domestic Consumption	25.0	30.5	37.0	
Exports	43.0	137.5	191.0	
Other Paper and Board (1000 tons): Domestic				
Consumption	47.0	56.0	67.0	70.0
Chemical Pulp (1000 tons)	<u>50.0</u>	<u>100.0</u>	<u>205.0</u>	240.0
Domestic Consumption	37.0	55.5	70.0	
Exports	13.0	44.5	135.0	
<u>Investment Requirements (E^o at 1960 prices)</u>				
<u>Lumber:</u>	Twenty-two new sawmills with a double shift capacity of 47,000 cu.m.(s) per year at \$0.75 million per mill, all for replacement.			
	Thinning, reforestation, forest roads. Drying capacity for 350,000 cubic meters per year, plus sheds.			
	Sub-Total			
				<u>40.9</u>
<u>Newsprint:</u>	Expansion Bio-Bio from 60,000 to 160,000 tons per year			
				25.2
	New Mill of 60,000 tons per year capacity			
				17.6
	Sub-Total			
				<u>42.8</u>
<u>Chemical Pulp</u>	Expansion Laja from 70,000 to 100,000 tons per year			
	Two new plants of 70,000 tons per year each			
	Sub-Total			
				<u>46.8</u>
	Sub-Total			
				<u>48.9</u>
<u>Replacement investments, paper and chemical pulp (cellulose)</u>				
				<u>24.1</u>
	GRAND TOTAL			
				<u>156.7</u>

46. In the balance-of-payments projections, it is assumed that newsprint will sell at an average price of \$130 per ton f.o.b. and cellulose (unbleached kraft pulp) at \$100 per ton f.o.b. Lumber exports are projected at a price of \$48.60 per cu.m.

47. According to the original plan estimate, internal Chilean lumber consumption would grow from about 0.65 million cu.m. in 1960-61 to about 1.50 million cu.m. in 1970 (extrapolated from 1968). More recent CORFO estimates (December 1961) place internal consumption in 1970 at a much lower level, at only about 0.9 million cu.m. The mission has not had occasion to see the details of these latter estimates; the major reason for the new lower figures appears to be a revised estimate of actual consumption in 1959. The percentage rate of growth, however, is also less than originally assumed. On the latter point, rough calculations undertaken by the mission suggest that the plan targets would require a rate of growth in line with, or even slightly above, the original plan estimates. A new study of the lumber requirements implied in the Government housing program might therefore be in order.

48. There is as yet no comprehensive market study to back up the proposed expansion in exports from 0.10 million cu.m. in 1959 to 0.53 million cu.m. by 1968-70 (recently revised to 0.38 million cu.m.). The present price in Argentina is about \$82.00 per thousand board feet, c.i.f.; with freight on the order of \$34.00 to \$39.00, this would result in an f.o.b. Chile price of \$43.00 to \$48.00. This price could conceivably suffice for well-managed, large-scale operations. Apart from profitability, however, exports may be hampered by a shortage of raw materials.

49. The market outlook for Chilean exports of pulp and newsprint is very favorable. The following estimates for production and consumption in all of Latin America of newsprint, other paper and board, and paper pulp were prepared by FAO in September 1959. The figures are exclusive of Chilean expansion plans.

	1958	1965	1970	1975
<u>Newsprint</u>				
Production	0.13	0.40		
Consumption	<u>0.64</u>	<u>1.00</u>	1.40	1.80
Balance	-0.51	-0.60		
<u>Other Paper and Board</u>				
Production	1.42	2.45		
Consumption	<u>1.75</u>	<u>2.50</u>	3.60	4.70
Balance	-0.33	-0.05		
<u>Total Paper and Board</u>				
Production	1.55	2.85		
Consumption	<u>2.39</u>	<u>3.50</u>	5.00	6.50
Balance	-0.84	-0.65		
<u>Wood Pulp</u>				
Production	0.49	1.08		
Consumption	<u>0.88</u>	<u>1.62</u>		
Balance	-0.39	-0.54		
<u>Long-Fibered Wood Pulp</u>				
Production	0.28			
Consumption	<u>0.58</u>		1.07	
Balance	-0.30			

50. The most important fact to be retained from the above summary is that by 1965 virtually the whole Latin American pulp and paper possibilities of expanding the output of these products in countries other than Chile are extremely limited. Thus Chile's potential export market in Latin America by 1970 would compare as follows with planned exports (million tons):

	Potential Market	Planned Chilean Exports
Newspaper	0.60	0.19
Long-fibered pulp paper	0.79	0.14

51. Demand and supply for paper on a world basis is expected to be in reasonable balance through 1965. Hence, there is no reason to anticipate unusual pressures on the Latin American market by Scandinavian and Canadian exporters. In fact, recent studies suggest that world export prices which were relatively stable during the past five-year period will not deviate much from their average 1955-59 level. Given reasonable competitiveness, a market would seem assured for the maximum possible output by the Chilean pulp and paper industry.

52. Chilean competitiveness would depend mainly on production costs (including an adequate return on the investment) and shipping costs to major markets. At present capacity levels, it is unlikely that more than a modest profit would be earned on Chilean exports of pulp and newsprint; but this situation should be very much improved when the existing producer expands its newsprint output from 60,000 tons per year to 160,000 tons and its pulp output from 20,000 tons per year to an estimated 140,000 tons or more besides integrating its pulp and paper operations with saw-milling.

53. Lumber, newsprint, and kraft pulp are no doubt destined to become the volume items in the exploitation of the Chilean forests. Substantial opportunities also exist in the production of semichemical pulp, paperboard, and fibreboard. The development of a market for these products is particularly important since it would permit the use of a considerable volume of wood from the Chilean natural forest. CORFO is now making a feasibility study of a fibreboard project.

Resources

54. There are two types of forest resources in Chile. The natural forests (20 million hectares, of which 4 million hectares are classified as accessible and exploitable) supply about 7 million cu.m. of wood per year, of which about half is for fuel. In contrast, the forest plantations (mainly Insignis pine) cover only 0.25 million hectares, but it is estimated that the existing plantations could supply at least 2.5 million cu.m. per year on a sustained yield basis; the availabilities will be higher at the end of the decade when many of the existing stands will reach maturity.

55. Turning first to the Insignis pine plantations, FAO estimates of availabilities and requirements are summarized below (figures in million cu.m. of roundwood equivalent):

	<u>1959</u>	<u>1962</u>	<u>1965</u>	<u>1968</u>
Total volume	31.3	47.1	61.4	68.5
Annual increment	2.7	3.3	3.8	4.0
Allowable cut	1.8	3.3	5.3	6.6

The FAO report specifies that, in the absence of much relevant data, the above figures must be regarded as rough estimates. Even so, FAO's conclusion that the "average allowable cut over the next 20 years would be at least 3 million cu.m., somewhat less in the immediate future but much higher at the end of the 1960's" is surprisingly conservative. Although no further explanations are given in the report, one might guess that this conclusion is based on several considerations. In the first place, many plantations would reach maturity in the late 1960's, and the figure of 6.6 million cu.m. considerably exceeds the sustained average annual yield from the present plantations. Even if new areas are planted at a rapid rate, there would still be a discontinuity in the supplies so that it would not be possible to expand the forest industries, particularly not the saw-mill industry, to absorb the full allowable cut in the late 1960's. Secondly, the practical availabilities would be below the allowable cut because of poor accessibility, small dimensions, and other factors.^{1/} The above discussion, though cursory, clearly indicates the great national interest in a thorough appraisal of economic availabilities of pinewood-- so that the expansion of the forest industries be properly adjusted and timed.

56. Based on earlier and somewhat more conservative figures, CORFO used the following estimate of wood availabilities as a basis for the

^{1/} In Sweden, the annual "cuttable" growth in the forests is 70 million cu.m. but the actual cut is only 40 million cu.m. The difference is said to be largely composed of small dimensions and thinnings which cannot be used economically. (This proportion would presumably be higher in Sweden, because of hard climate and poor soils, than on Chilean pine plantations). There may also be differences in the definition of the volume of growth. The previous study, on which the plan was actually based, indicated a "potential production" of 2.25 million cu.m. of pulp logs and 4.37 million cu.m. of saw logs for 1968.

plan. The corresponding requirements are also shown (million cu.m. roundwood):

	<u>1959/61</u>	<u>1961/64</u>	<u>1965/67</u>	<u>1968/70</u>
<u>Supply</u>				
Sawlogs	<u>1.2</u> 0.4	<u>3.8</u> 1.3	<u>4.3</u> 1.7	<u>5.0</u> 2.3
Other	0.8	2.5	2.6	2.7
<u>Requirements</u>				
Sawlogs				
Present use (pine lumber)			0.25	
Increase in requirements (all pine lumber; no increase from natural forests)			<u>1.84</u> <u>2.09</u>	
Pulpwood				
205,000 tons of cellulose at 5 m ³ /ton			1.03	
228,000 tons of newsprint at 3.3 m ³ /ton			<u>0.78</u> <u>1.81</u>	
Total Requirements			<u>3.90</u>	

57. According to the above figures, and considering accessibility, etc., there were some doubts regarding the availability of pine logs to meet the requirements of the plan. The program for the saw mill industry, however, has recently been revised downwards, and figures supplied by CORFO to the mission (December 1961) show the following new estimate of 1970 requirements (million cu.m.):

	<u>Lumber</u>	<u>Roundwood Equivalent</u>
Pine lumber	0.52	1.0
Hardwood lumber	<u>0.71</u>	<u>1.4</u>
Total	1.23	2.4

58. The above figures imply rather more than a doubling of the present output. Domestic consumption would increase from 0.45 million cu.m. in 1959 to 0.85 million cu.m. in 1968-70, and exports would rise from 0.11 million cu.m. to 0.38 million cu.m. over the same period. Out of the total required output of lumber, 0.52 million cu.m. would come from Insignis pine and 0.71 million cu.m. from domestic hardwoods. The mission questions this

allocation on two grounds. In the first place, the physical availability of pine saw logs (say, over the next two decades) will tend to be higher than the 1.0 million cu.m. required to cut 0.52 million cu.m. of lumber. This suggests that the saw-milling industry in the Insignis pine area should be expanded. It is conceivable, on the other hand, that it would be advantageous for Chile to reserve some of these saw log dimensions for additional pulp and newsprint production, and this would be a problem for the study of wood availabilities recommended above. Secondly, the production of domestic hardwood lumber may well encounter substantial economic difficulties. The FAO experts, however, do not believe that it will be possible even temporarily to accelerate the output of hardwood lumber, and focus their attention on long-run measures designed to prevent a deterioration of the forest wealth. These measures would include:

- a. An inventory of natural forests and a plan for appropriate use, defining lands suitable for agricultural settlement and for respectively protective and commercial forest.
- b. Definition of reforestation goals, based primarily on natural regeneration but including a minimum program of re-planting 40,000 hectares per year in selected species so as to secure requirements for uses to which Insignis is not suited.
- c. Creation of a National Forest Corporation to administer State-owned natural forests (about one-half of the natural forest area) and to promote better silviculture among private forest owners.

59. Admittedly, the difficulties faced in logging the natural forests are formidable. There are uncertainties regarding the yield of good lumber. In view of the low density of usable timber, the prevalent method of exploitation is by mobile mills which yield a lower quality of lumber. Also, transportation costs are high since the construction of good roads is not justified for temporary operations. It may still be possible, however, to locate tracts of natural forest which could form the basis for large-scale integrated forest operations (lumber, fibreboard, semichemical pulp). The identification of such areas and the feasibility study for such an integrated project would seem to deserve the highest priority.

Investments and Export Targets

60. In terms of investments, the Government program envisages the establishment of 22 new saw mills with an estimated average double-shift capacity of 47,000 cu.m. per year at an average investment of \$0.75 million per mill. This investment cost would seem far too high; a mill of about 100,000 cu.m. per year is being built in the Concepcion area at approximately the same cost. Since the existing milling capacity is in excess of the estimated 1970 output, the essential purpose of these investments would be modernization to produce better grade of lumber at a lower cost. The quality aspect is particularly important; improved quality is essential if lumber is to maintain its present position in expanded domestic housing construction, and even more so if exports are to be developed.

61. The possible rate of exports will be dependent on raw material availabilities and, in the case of lumber, also on markets which would need to be carefully studied. The mission investment cost estimates for the pulp and paper industry reflect the assumption made by plan officials at the time of the mission's visit -- that newsprint production at the existing Bio-Bio plant would be expanded from 60,000 tons to 160,000 tons, and that about 60,000 tons per year would be produced from the new Industrias Forestales mill. The cellulose output, according to the same source, would be expanded by 30,000 tons through various additions and improvements to the Laja plant and by another 140,000 tons through the erection of two new mills. These estimates are very preliminary, and the whole subject is one requiring re-appraisal. In this appraisal, special weight will no doubt be given to the following considerations. It is much more economical to expand the output of the existing mills than to build entirely new mills. Hence, first priority should be given to the expansion of the Laja cellulose plant and the Bio-Bio newsprint mill to a size where the advantages of scale are reasonably fully utilized. In this manner, the most efficient use would also be made of the existing know-how, organization, and credit standing. For the same reason, the financial means of accomplishing this expansion with a minimum of delay should be given careful consideration by the Government. Simultaneously, and subject only to the limitations imposed by the uncertainties regarding the available wood supplies, the Government should actively study the possibility of establishing the pulp and paper industry in new localities, both as a contribution to the industrialization of these areas and to take advantage of nearness to local timber supplies.

Summary

62. A firm evaluation of the program for forest products is difficult, considering many uncertainties and some inconsistencies in this part of the plan. Nevertheless, in framing a program for forest products, weight should be given to the following considerations:

1. It is believed that Chile's actual and potential forest wealth represents one of the major resources available for the development of employment and exports. There are obstacles to exploitation of this wealth both on the demand side and on the supply side but these could perhaps be overcome by vigorous action.

2. An effort should be made to establish the present pattern of domestic demand for lumber, particularly in housing construction, by types of housing and by geographic regions. At the same time, the character of competition between lumber and other building materials must be elucidated both in terms of marketing factors and intrinsic values. On this basis better projections of future demand might be established.

3. A complete study of the export market for all major types of lumber and products should be undertaken. This would necessarily include the problems of the cost of inland transportation and ocean shipping.

4. In terms of supplies, it is of highest urgency to reconsider the estimates regarding availabilities of Insignis pine for saw logs and pulp logs over the next decade. The pessimism of the FAO report regarding the exploitation of natural forests should not deter the Government from taking such action as would be necessary to chart the forest resources in areas holding reasonable promise, and to solicit and support private industrial investment in saw-milling or integrated forest operations (saw mills, fibreboard, possibly semichemical pulp, etc.). A minimum program of forest planting should be initiated immediately, both in the area suited for Insignis pine and in other areas where reforestation is indicated to prevent soil erosion and to put wasteland into economic use. A more definite program should be framed once definitive projections for lumber, fibreboard, pulp, and paper have been completed.

5. Reforestation and new forest plantings should be undertaken on a large scale. Government assistance should be provided by technical assistance, support prices (guaranteed in terms of constant purchasing power) and by long-term finance.

6. A study should be made regarding the economic possibilities of locating a major pulp and paper industry in some suitable area in addition to the pulp and paper industry now growing up around Concepcion.

APPENDIX 5-C

PROBABLE STEEL CONSUMPTION

63. This Appendix illustrates two different methods of calculating probable levels of steel consumption in 1970.

Method I

64. Studies made by the World Bank Economic Staff indicate that per capita consumption of finished steel (in kg.) in any given country and year may be computed from the formula

$$y = \frac{1}{4} x_1 + x_2$$

where x_1 indicates the domestic gross fixed capital formation in construction measured in U.S. dollars of the 1953-55 average purchasing power and adjusted (according to a special formula) for differences in the internal purchasing power of the U.S. dollar as compared with the currency of the country examined. The term x_2 denotes the gross value added in metal products and machinery industries (ISIC groups 35-38), similarly adjusted for differences in internal purchasing power.

65. In applying this formula to Chile, the preliminary working hypothesis was adopted that Chilean 1960 escudos would have the same internal purchasing power as U.S. 1953-55 dollars. On this basis, the following results were obtained:

	<u>1/4 x₁</u>	<u>x₂</u>	<u>y</u>
Total Consumption (th.tons)	1960	59	132
	1970	187	289
Per Capita Consumption (kg.)	1960	7.7	17.1
	1970	19.1	29.4
			24.8
			48.5

66. There are a number of factors which could make the estimates above in error, because the equation, developed for general use, is obviously not valid for all countries. Accordingly a further adjustment is warranted, and in this case a reasonable one is readily available. The adjustment consists simply of comparing the computed figures for 1960 with the actual observed consumption in 1960, and adjusting the 1970 computed figures by the

1/ The following estimates of capital formation were adopted for the purpose of estimating steel consumption. (As more reliable data become available, the estimate for steel consumption would, of course, have to be adjusted accordingly).

	Chilean Domestic Gross Fixed Capital Formation			
	(E ^o millions at current prices)			
	1959	1960	1961	1970
Equipment	217	266	301	600
Construction	245	327	326	750
Total	462	503	627	1350

resulting ratio. On this basis, the following results are obtained (in thousands):

	<u>Computed as above</u>	<u>Adjusted</u>
1960	191	251 ^a
1970	476	626

57. We believe that the estimate, as adjusted, for 1970 would tend to be slightly on the high side. This is because the method does not take into account the probable long-term trend towards more economical use of steel. In other words, by 1970 it is very likely that less steel will be required to produce a given volume of steel-using goods.

Method II

58. This method projects estimates for total rolled-steel production as well as rolled-steel consumption by categories and consuming sectors based upon a market study made by the Chilean Steel Institute for 1960 (reported in the ILAFA Bulletin of June 1961). The following table with attached notes should be self-explanatory.

^a/ Actual 1960 consumption. See Method II below.

<u>Sector</u>	1960 Actual ('000)				<u>Total</u>
	<u>Bars</u>	<u>Flats</u>	<u>Other</u> (tubes, shapes, semis)		
(Industry	29.2	35.4	3.1		67.7
<u>Domestic</u> (Construction	41.0	15.1	5.8		61.9
<u>Steel</u> (Mining	13.7	2.9	5.4		22.0
(Transportation	2.7	5.2	10.5		18.4
(Other Uses	3.9	12.9	1.1		17.8
(Warehouses	4.5	13.0	1.1		18.6
<u>Imported Steel</u>	95.0	84.5	27.0		206.5
	9	4	rails, etc.	15	
			tubes, etc.	17	45
					251
Estimated 1970 ^{1/} ('000)					
	<u>Bars</u>	<u>Flats</u>	<u>Other</u> (tubes, shapes, semis)		<u>Total</u>
(Industry	62	77	9		148
<u>Domestic</u> (Construction	82	30	12		196
<u>Steel</u> (Mining	28	6	15		49
(Transportation	3.5	6.5	13		23
(Other Uses	6	19.5	1.5		27
(Warehouses	9	26	2		37
<u>Imported Steel</u>	190.5	165	52.5		480
	18	8	rails, etc.	15	
			tubes, etc.	50	91
					571

^{1/} Basis of estimate for 1970:

Industry: Estimated increased output in metal products and machinery industries.

Construction: Estimated increased value added in the construction industry.

Mining: Assuming a tripling in consumption by the petroleum industry, and a doubling in consumption by other mining sectors.

Transportation: Mainly railroad consumption.

Other Uses: 50% increase assumed.

Warehouses: Main ultimate use is construction. Hence same increase assumed as for construction industry.

Imported Steel: Rails, etc.; no increase assumed for railroads; for other products the import percentage would remain unchanged.

Tripling of tube consumption assumed.

Conclusion

69. The two methods give rather similar estimates for finished steel consumption by 1970, i.e. about 625,000 tons and 575,000 tons respectively, or, say on the order of 600,000 tons \pm 4%. Neither of the two methods gives any consideration to possible economies in the use of steel. On the other hand, they do not either take into account the increases in steel consumption which would result from substantial price reductions, for which there would seem to be great opportunities as CAP's scale of operations increases. Pending a detailed study of these factors, our guess is that they could tend roughly to compensate one another.

APPENDIX 5-D

BEET-SUGAR REFINING

70. The cost of beet sugar produced in Chile is today \$357 per ton (including depreciation and debt interest) as compared with a cost of about \$165 for sugar refined from imported raw cane sugar. The main argument for the industry is that it gives the farmers a higher income than alternative crops (considering also the green tops for winter feed, the dried beet pulp, and the residual effects from fertilizers). At the present moment, however, this superiority is entirely conditioned on the government subsidy to the industry. A second argument is that sugar-beet growing raises the level of technical competence in agriculture. The beet-sugar industry in Chile is less than 10 years old, and the agricultural benefits of sugar-beet culture in Chile are not yet fully evaluated. Hence, although the 10-year plan envisages the construction of two new sugar mills in addition to the three existing mills, both the Government and the National Sugar Corporation (IANSA) recognize the need for a definitive economic study before these expansion plans are carried out. Pending such a study, a few salient points may be brought out to facilitate a preliminary judgment.

71. Probable future price for imported sugar. The average world market price for a raw sugar over the seven-year period 1952-59 was \$70.50 per ton f.o.b. Cuba. Adding freight at \$15.00 per ton and refining at \$60.00 per ton gives a target price c.i.f. Chile of about \$150 per ton.

72. Probable future price for domestic sugar. Reduction in prices for Chilean-made sugar could be achieved by a reduction in processing margins or a reduction in the beet costs.

73. The estimated average price paid for Chilean beets ex factory in 1961 varied between \$14.30 equivalent and \$20.00 equivalent for the three factories concerned, with an average of about \$17.50 (price includes freight bonuses paid to a small proportion of the growers). These prices are rather higher than those paid e.g. in the United States (about \$14.00 per ton in 1958 and 1959) and much high than Danish prices (about \$12.50 per ton in 1957-59). Since many Chilean farmers still lack experience in beet-growing, it should be possible in the medium run to increase yields and reduce costs. In the immediate future, however, there is a problem of beet procurement, and in 1961 beet-sugar factories operated at only one-half of their rated capacities, based on a 100-day campaign.

74. In contrast, the processing margin is disturbingly high. The following figures are taken from the IANSA budget for 1961:

	<u>E^o per ton of refined sugar</u>
Cost of beets	134.55
Variable processing costs	37.33
Fixed processing costs	118.10
Sales and general overhead	34.47
Financial charges	41.27
Total Costs	<u>365.72</u>
Sales Receipts	173.16
Net Loss	192.56

Processing margin: E^o 231.17

75. The following comparison with Danish figures may give a rough idea how high the Chilean costs are (in U.S. dollars):

	<u>Chile</u>	<u>Denmark</u>
Cost of 7 tons beets ex factory ^{1/}	122.00	86.00
Cost of ton refined sugar ex factory	<u>347.00</u>	<u>151.00</u>
Difference	<u>225.00</u>	<u>75.00</u>
No. of workers and employees per 1,000 tons sugar per year	57.8	14.5

76. One outstanding reason for the high processing margins is the poor capacity utilization, estimated at 52% for 1961, based on a 100-day campaign. Under the assumption that all costs shown in the IANSA budget except the "variable processing costs" are truly fixed, a change from 52 to 100% capacity utilization would reduce the necessary processing margin from about \$225 to about \$150. Even then, the factories would still be a long way from really efficient operations. One reason, though not necessarily the major one, is that the original investment in Chilean beet-sugar factories would appear to be very high by international standards. (The new plants, according to the investment cost projections, would cost even more per ton of capacity than the present plants.) Another reason, according to IANSA, is that a higher proportion of the labor force in the beet-sugar factories has to be permanently employed in Chile than in more developed countries, since it is difficult to enlist skilled people for the campaign from among the farm population.

Conclusions

77. Every effort should be made to reduce costs at all beet procurement levels. A study should assay the reasons for the high sugar factory investment and processing costs and provide an estimate regarding the lowest possible processing margins attainable in the future. Finally, the work initiated in appraising the agricultural economics of beet-sugar growing should be vigorously pursued with a view to arriving at scientifically established conclusions. Only after these studies have been essentially completed should a decision be made regarding possible future capacity expansion. ^{2/}

1/ Seven tons of beets of average quality produce one ton of sugar.

2/ See discussion of sugar beets in Chapter 4, Agriculture, page 23.

APPENDIX 5-E

FISH MEAL INDUSTRY

78. The fish industry has developed rapidly since the war. The average catch of fish and shellfish in 1955-59, at about 215,000 tons, was more than three times the 1946-1950 average which, in turn, was about twice the prewar average. In 1954, about half of the catch was sold fresh and the rest industrialized, mainly as canned shellfish and fish, and in the form of fish meal. In 1959 three quarters of the catch was processed; practically the whole increase was due to the four-fold expansion in fish meal production.

79. The Chilean Government has taken various steps for the development of the fishing industries, including loans for vessels and equipment on liberal terms and exemption from import duties on vessels and fuels. Improvements in port installations to serve the fishing industry are included in the 10-year development program. Finally, exporters of fish meal obtain subsidies; partly on purchases of fish and partly on sales of fish meal, amounting to about 20% of the f.o.b. value of fish meal.

80. The capacity of the fish meal industry at the end of 1957 was 84,000 tons per year (based upon 120-210 working days per year, depending upon the area, with an average of 18 hours worked per day) though only 16,000 tons were produced. This shortfall was due mainly to lack of fishing vessels. Hence, high priority was given in the 10-year plan to an increase in the fishing fleet by about 40 vessels, estimated to catch an additional 200,000 tons of fish per year, and permitting an increase in fish meal production to about 50,000 tons per year. In addition, five new fish meal plants with an estimated combined output of about 90,000 tons per year would be built in 1960-68.

81. The actual expansion has been much more rapid. It is estimated that about 50,000 tons of fish meal were produced in 1960, and by the end of 1961 the combined fish meal capacity at Arica and Iquique alone, where most of the expansion occurred, will be over 70,000 tons per year, as compared with about 15,000 tons in 1957. A study is being made for a new CORFO promoted project for an integrated (frozen fish - canned fish - fish meal) plant in the port of Iquique at an estimated capacity of 20-24,000 tons per year. There are still more important private expansion plans, and a total fish meal production in the order of 250-300,000 tons per year, or even higher, has been predicted.

82. Hence, the whole focus of the problem has shifted from means of achieving expansion to the safe limits of expansion. Although

the resources of the ocean outside Chile are known to be abundant, precise estimates are lacking. The Government, with the assistance of the U.N. Special Fund, therefore hopes to create a Fisheries Institute which would evaluate resources and establish long-term production goals. Active policies to encourage decentralization of the industry may also be necessary since the present special facilities granted to industries establishing themselves in Tarapacá Province may have favored an unduly heavy concentration of the fish-meal industry in that area.

83. Price expectations as well as estimates of production costs have changed radically since the first projections were made. The main reason for the change in costs, as may be seen from the following summary, is the reduction in the cost of catching fish. The new assumptions are that a fleet of 10 vessels would catch at least 120,000 tons of fish per year as compared with the previous assumptions that 15 somewhat smaller and more expensive vessels would be needed to catch 90,000 tons per year.

Cost and Returns for Fish-Meal Production
(US\$ per ton)

	<u>10 year plan estimate</u>	<u>CORFO Iquique Project</u>
<u>Costs</u>		
Fish (5 tons)	60.00	35.00
Fuel	12.00	--
Bags and containers	n.a.	4.50
Direct Labor	9.00	2.60
Overhead, depreciation, maintenance	15.00	16.50
Selling expenses, etc.	n.a.	4.90
Contingencies	4.00	--
	<u>100.00</u>	<u>63.50</u>
<u>Returns 1/</u>		
Fish meal (1.0 ton)	120.00	72.00
Fish oil (0.25 ton)	30.00	28.75
Solubles (0.1 ton)	<u>12.00</u>	<u>11.50</u>
	<u>162.00</u>	<u>112.75</u>
<u>Available for profits, interest, taxes</u>		
Per ton of fish meal	62.00	49.25
Total (US\$1,000)	868	985
Percent of investment	28.9%	32.8%

1/ The draft 10-year plan assumed a selling price of US\$120.00 per ton for each product. The return at Iquique is estimated at \$72.50 for fish meal, and \$115.00 for oil and for solubles.

84. The above cost projections are most encouraging but would need to be closely supported by actual operating data. In particular, it seems doubtful that the cost of fish could be reduced to about \$7.00 per ton; the present price is on the order of \$10.50 per ton. Moreover, the average yield of fish oil from catches in northern Chile waters appears to be substantially lower than indicated in the above cost and earnings statement.

85. The market outlook for fish meal is good. World consumption of fish meal has grown steadily in the post-war period by 50% (630,000 tons) between 1954 and 1959. Exports to Western Europe and North America tripled between 1954 and 1959, exceeding 450,000 tons in the latter year.

86. The main use for fish meal is as a protein animal feed, and there is considerable scope for increased consumption. According to expert predictions, the most advanced fishery nations in Western Europe may be reaching a ceiling in their fish catch, and continued diversion of their fish resources to the fresh fish market would greatly increase the import demand for fish meal. There is also the hope that fish flour (a somewhat different product requiring higher standards of freshness in the fish and the separation of fats) will eventually make an important contribution to the protein intake of low-income nations. As far as new supplies are concerned, the West Coast of South America is one of the areas of greatest promise. Peru is already the world's largest supplier of fish meal, and Chile's production is probably well below its reasonable share in the available sources. An FAO expert has recently concluded that Peru, Chile, and the Union of South Africa are likely to continue to be the lowest cost producers of fish meal in the world.

87. According to expert opinion, a balance between supplies and demand in the fish-meal market will probably be reached around a level of \$100 to \$110 per metric ton c.i.f. Western Europe (corresponding to a price f.o.b. Chilean port of about \$75 - 85). At this price, fish meal would still be underpriced, in terms of nutritive values, as compared with e.g. meatmeal or soybean meal. A Fish Meal Exporters' Association (comprising Angola, Iceland, Norway, Peru, and South Africa) has been formed recently with a view to ensuring stable supplies and prices in the industry.

Conclusions

88. The fish-meal industry fully justifies the place given to this industry in the 10-year plan. Demand prospects must be regarded as exceptionally good. The only limits on expansion are the estimated long-run availabilities of raw material and the agreements which may be reached with other producers for the orderly expansion of supplies. The proposed creation of a Fisheries Development Institute which, as one of its functions, would carefully assess these availabilities, will help the formulation of policies. In addition, pending completion of long-range studies by the Institute, it should be possible for CORFO to obtain expert advice regarding the maximum immediate expansion which could be responsibly supported. Research on the production and marketing of fish flour for human consumption should be accelerated, either individually by Chile or in cooperation with other producers. Foreign exchange earnings may be projected conservatively upon a fish meal price c.i.f. Western Europe of \$105 per ton.

Notes to Appendix Table 5 below

1. The distribution of public investments by industry is based on various observations made in the text of the plan and upon analytical grounds. The breakdown, both for the plan and for the mission estimates, is therefore somewhat subjective. Factors considered were (a) existing public ownership (petroleum refining and beet sugar; these are apparently the only areas considered for public direct investment); (b) the necessity for public financial contributions to help launch projects in new and difficult fields (shipbuilding, petrochemicals); (c) the necessity of public financial contributions because of the magnitude of the investment effort involved (steel).
2. The mission totals for industrial investments, other than specified projects, were computed on the following assumptions:
 - a. The overall totals 1961-70 for the three categories combined would remain the same as in the plan.
 - b. The time-shape of investments in small-scale industries was changed to provide a higher proportionate investment in the early years.
 - c. Replacement investments were geared to the estimated actual requirements. The difference between the plan figures and the mission estimates for the whole period 1961-70 is relatively small (the mission figure being about E^o 26 million higher). The mission, however, shows substantially greater replacement requirements in the early years of the plan. The estimate of replacement investments was prepared assuming that depreciation would be equal to 2% per year of the replacement value of buildings and 7.5% per year of the replacement value of other fixed assets existing at the end of 1960 or added in 1961-70.
 - d. The percentage breakdown between foreign exchange and local expenditure is the same as assumed in the plan.

Appendix Table 5-

Ten-Year Development Program for Manufacturing Sector, with Projections
of Financing Methods and Foreign Exchange Expenditures
(in millions)

A. Plan Figures

	1961		1962		1963		1964		1965		1962-65		1966-70		1961-70	
	\$	E*	\$	E*	\$	E*	\$	E*	$	E*	$	E*	$	E*	$	E*
Grand Total Industry	<u>27.4</u>	<u>32.9</u>	<u>42.2</u>	<u>50.9</u>	<u>48.7</u>	<u>59.5</u>	<u>56.1</u>	<u>74.9</u>	<u>90.5</u>	<u>103.1</u>	<u>237.5</u>	<u>288.4</u>	<u>568.0</u>	<u>826.9</u>	<u>832.7</u>	<u>1,148.2</u>
Public	.6	7.6	17.8	16.0	20.9	17.5	19.7	18.9	36.3	26.1	94.7	78.5	113.6	92.7	214.9	178.8
Private	20.8	25.3	24.4	34.9	27.8	42.0	36.4	56.0	54.2	77.0	142.8	209.9	454.4	734.2	617.8	969.4
Total Specified Projects	<u>16.3</u>	<u>12.0</u>	<u>28.8</u>	<u>23.2</u>	<u>31.0</u>	<u>24.1</u>	<u>32.8</u>	<u>29.8</u>	<u>59.6</u>	<u>45.6</u>	<u>152.2</u>	<u>122.7</u>	<u>212.9</u>	<u>178.3</u>	<u>381.4</u>	<u>313.0</u>
Public, direct	6.1	2.7	12.0	5.5	16.5	7.8	11.1	5.4	20.8	10.1	60.4	28.8	79.5	38.5	146.0	70.0
Public, indirect	0.3	0.7	5.6	6.3	4.2	5.5	8.4	9.3	15.3	11.8	33.5	32.9	33.1	33.0	66.9	66.6
Private	9.9	8.6	11.2	11.4	10.3	10.8	13.3	15.1	23.5	23.7	58.3	61.0	100.3	106.8	168.5	176.4
Beet Sugar Refining -	-	-	-	-	1.8	1.1	1.8	1.1	2.9	1.8	6.5	4.0	6.5	4.0	13.0	8.0
Fishing Industry -	-	-	0.6	0.4	1.1	0.9	1.1	0.8	1.1	0.8	3.9	2.9	4.5	3.3	18.4	6.2
Public	-	-	-	-	-	-	-	-	0.7	0.5	0.7	0.5	7.1	5.3	7.8	5.8
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paper and Pulp -	-	-	1.6	1.3	-	-	2.2	1.7	3.4	2.5	7.2	5.5	5.5	4.2	12.7	9.7
Public	-	-	4.5	3.4	3.3	2.5	2.2	1.7	7.8	5.9	19.8	13.5	27.0	20.8	51.5	39.3
Private	6.9	5.0	4.5	3.4	3.3	2.5	2.2	1.7	7.8	5.9	19.8	13.5	27.0	20.8	51.5	39.3
Lumber -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public	-	-	0.7	0.7	0.7	1.4	0.6	1.4	0.6	1.4	0.6	1.3	2.5	5.5	7.7	6.1
Private	-	-	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	1.2	2.8	4.7	5.9
Cement -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Steel -	-	-	0.5	0.5	0.5	0.5	0.9	1.0	0.9	1.0	2.8	3.0	13.3	15.0	18.0	20.0
Public	-	-	1.8	2.1	1.3	1.6	2.8	3.1	3.3	3.6	9.2	10.4	10.6	11.8	19.8	22.2
Private	1.3	1.6	5.5	6.3	5.5	6.2	8.7	9.9	12.8	14.6	32.5	39.0	45.4	51.2	79.2	89.8
Agricultural Implements -	-	-	-	-	0.3	0.6	0.4	0.7	-	-	0.7	1.3	-	-	0.7	1.3
Public	-	-	-	-	-	-	0.3	0.7	-	-	0.3	0.7	-	-	0.3	0.7
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shipyards -	-	-	-	-	-	-	-	-	5.6	2.0	5.6	2.0	7.4	4.0	13.0	6.0
Public	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemicals -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public	-	-	0.9	1.1	0.9	1.0	1.3	1.6	1.3	1.6	4.4	5.3	1.8	2.0	6.2	7.3
Private	-	-	0.4	0.5	0.7	0.9	0.9	1.1	1.0	1.0	3.0	3.5	2.8	3.2	5.8	6.7
Petroleum Refining and Petrochemicals -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Public, direct	6.1	2.7	12.0	5.5	14.7	6.7	9.3	4.3	17.9	8.3	53.9	24.8	73.0	34.5	133.0	62.0
Total Industry other than Specified Projects	<u>11.1</u>	<u>20.9</u>	<u>13.4</u>	<u>27.7</u>	<u>17.7</u>	<u>35.4</u>	<u>23.3</u>	<u>45.1</u>	<u>30.9</u>	<u>57.5</u>	<u>85.3</u>	<u>165.7</u>	<u>355.1</u>	<u>648.6</u>	<u>452.3</u>	<u>835.2</u>
Public	0.2	4.2	0.2	4.2	0.2	4.2	0.2	4.2	0.2	4.2	0.8	16.8	1.0	21.2	2.0	42.2
Private	10.9	16.7	13.2	23.5	17.5	31.2	23.1	40.9	30.7	53.3	84.5	148.9	354.1	627.4	449.3	793.0
Non-specified Projects	0.9	1.5	1.0	1.5	1.0	1.5	1.3	2.2	4.4	7.1	7.7	12.3	185.7	304.2	194.3	318.0
Small-scale Industries	0.8	3.2	1.7	7.5	1.7	7.7	1.9	8.0	1.9	8.0	7.2	31.2	19.0	82.3	27.0	116.7
Replacements and Renewals	9.4	16.2	10.7	18.7	15.0	26.2	20.1	34.9	24.6	42.4	70.4	122.2	150.4	262.1	230.0	400.5

Appendix Table 5 (continued)

Ten-Year Development Program for Manufacturing Sector, with Projections
of Financing Methods and Foreign Exchange Expenditures
(in millions)

	B. Mission Recommendations															
	1961		1962		1963		1964		1965		1962-65		1966-70		1961-70	
	\$	E*	\$	E*	\$	E*	\$	E*	\$	E*	\$	E*	\$	E*	\$	E*
Grand Total Industry	<u>48.3</u>	<u>67.5</u>	<u>59.7</u>	<u>81.2</u>	<u>65.9</u>	<u>88.6</u>	<u>71.7</u>	<u>94.9</u>	<u>80.7</u>	<u>108.1</u>	<u>278.0</u>	<u>272.8</u>	<u>441.1</u>	<u>631.7</u>	<u>767.4</u>	<u>1,072.0</u>
Public Private	8.6 39.7	8.6 58.9	14.9 44.8	13.8 67.4	18.9 47.0	18.1 70.5	22.9 48.8	21.2 73.7	22.5 58.2	25.8 82.3	79.2 19.8	78.9 293.9	102.6 338.5	84.2 547.5	190.4 577.0	171.7 900.3
Total Specified Projects	<u>18.2</u>	<u>13.2</u>	<u>27.4</u>	<u>21.2</u>	<u>29.4</u>	<u>21.8</u>	<u>33.7</u>	<u>24.7</u>	<u>37.7</u>	<u>29.3</u>	<u>128.2</u>	<u>97.1</u>	<u>167.2</u>	<u>129.2</u>	<u>313.6</u>	<u>239.5</u>
Public, direct	5.4 3.0	2.4 2.0	8.7 6.0	3.9 5.7	8.1 10.5	3.5 8.1	13.9 8.6	6.4 6.9	14.5 7.4	6.8 7.1	45.2 32.5	20.6 27.8	74.5 26.9	33.0 26.8	125.1 62.4	56.0 56.6
Public, indirect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	9.8 12.7	8.8 11.6	12.7 11.6	11.6 10.8	10.3 10.3	11.2 11.4	11.2 11.4	11.4 15.8	15.4 15.4	50.5 50.5	48.7 48.7	65.8 65.8	69.4 69.4	126.1 126.1	126.9 126.9	126.9 126.9
Beet Sugar Refining -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, direct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Fishing Industry -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	2.6 -	1.4 -	1.2 0.6	0.7 0.4	1.9 0.6	1.1 0.3	1.2 1.3	0.7 0.7	1.2 1.2	0.7 0.7	5.5 3.7	3.2 2.1	3.3 7.2	2.5 5.5	11.4 10.9	7.1 7.6
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Paper and Pulp -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	6.5 8.1	5.2 6.5	- 5.4	- 4.4	- 2.7	- 2.7	2.2 2.2	1.7 5.4	3.2 4.3	2.6 4.3	5.4 21.6	4.3 17.4	6.1 17.7	4.6 13.4	11.5 45.8	8.9 36.0
Lumber -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	0.4 0.4	0.6 0.6	0.8 0.6	1.2 0.4	1.2 0.4	1.7 0.6	1.2 0.8	1.7 1.2	0.8 0.8	1.2 1.1	4.0 2.4	5.8 3.5	2.7 4.3	6.3 9.7	7.1 6.7	12.7 13.2
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cement -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Steel -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	1.9 1.4	2.0 1.6	0.5 2.7	0.5 3.1	0.5 3.2	0.5 3.6	0.9 4.6	1.0 2.2	1.9 2.2	2.0 5.2	3.8 5.5	4.0 6.2	12.4 16.0	14.0 18.2	18.1 21.4	20.0 23.6
Agricultural Implements -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Shipyards -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chemicals -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, indirect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Petroleum Refining and Petrochemicals -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Public, direct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Private	5.4 0.4	2.4 0.5	8.7 1.1	3.9 8.0	8.1 1.9	3.5 8.0	12.8 2.2	5.6 9.7	12.8 11.1	5.6 9.7	42.4 42.4	18.6 38.0	74.5 82.2	33.0 142.7	122.3 239.8	54.0 416.2
Total Industry other than Specified Projects	<u>30.1</u>	<u>54.3</u>	<u>32.3</u>	<u>60.0</u>	<u>36.5</u>	<u>66.7</u>	<u>38.0</u>	<u>70.2</u>	<u>43.0</u>	<u>78.8</u>	<u>150.8</u>	<u>275.7</u>	<u>223.9</u>	<u>502.5</u>	<u>453.8</u>	<u>822.5</u>
Public	0.2 29.9	4.2 50.1	0.2 32.1	4.2 55.8	0.3 36.2	6.5 60.2	0.4 37.6	7.9 62.3	0.6 42.4	11.9 66.9	1.5 148.3	30.5 245.2	1.2 272.7	24.4 478.1	2.9 450.9	59.1 773.4
Private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Non-specified Projects	10.0 1.1	16.5 4.8	11.1 1.9	18.3 8.0	14.5 1.9	23.8 8.0	14.9 2.2	24.4 9.7	18.9 2.2	31.1 9.7	59.4 8.2	97.6 35.4	120.4 14.9	197.6 64.4	189.8 24.2	311.7 104.6
Small-scale Industries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Replacements and Renewals	19.0 19.0	33.0 33.0	19.3 19.3	33.7 33.7	20.1 20.1	34.9 36.1	20.9 36.1	21.9 38.0	21.9 38.0	38.0 82.2	142.7 142.7	138.6 138.6	240.5 240.5	239.8 239.8	416.2 416.2	

CHAPTER 6

MINING

I. RECENT TRENDS

1. The major end product of the Chilean mining industry is copper, and nine-tenths of the copper output is accounted for by three large copper companies. These companies are Chile Exploration Co. and Andes Copper Mining Co. (controlled by Anaconda) and the Braden Copper Co., a subsidiary of Kennecott. Three other sectors (medium and small copper companies; iron ore; and nitrate production) each have an annual output value equal to about one-tenth of the output of the large copper companies; but iron ore output has been rising rapidly in recent years. Gold and silver, which were formerly important minerals in their own right, are still fairly important by-products of copper mining. All other products combined (manganese ore, lead and zinc concentrates, and molybdenum concentrates are the most important ones) contribute a very small percentage of the total value of minerals exports.^{1/}

Copper

2. Chile has the largest indicated copper reserves in the world. The ores, though not as rich as in the Congo or in Northern Rhodesia, average a respectable 1.5% copper content. All the Chilean mines are within reasonable distance of the coast, and all but a small portion of the ore is smelted in Chile by large companies well versed in all aspects of mining and metallurgical operations. Anaconda, through its Chuquicamata and El Salvador plants, is responsible for over two-thirds of the present output of the large mines, with El Teniente (Braden) accounting for the remaining third. Production costs are among the lowest in the world.

3. Reflecting in part the relatively slow growth of world copper consumption and the rapid increase in African production, Chile's share in the world mine output of copper has fallen from a high of about 18% just before World War II to an average of barely 16% in 1951-55 and an average of slightly better than 16% in 1956-60. Other factors retarding expansion, particularly during the 1950's, were discriminatory exchange rates and perennial labor troubles. In 1955, new legislation was enacted, aimed at providing stable rules under which the companies could operate; as an incentive to vigorous expansion, the discriminatory exchange rates were eliminated. A single graduated tax of 50-75% on income was established, with lower rates becoming applicable as the output of each company increases above a specified base level. In the case of investments in new mines or new refineries,

^{1/} The production of coal and oil is discussed in Chapter 7.

the 50% rate applies. At the same time, a Copper Department was created, on whose board the Government, the large mining companies, and the labor unions are represented. This institution is empowered to investigate copper market conditions and to supervise the proper allocation of receipts and expenditures to the Chilean operation. Under the new regime, substantial capacity expansion has taken place. Some further additions to capacity are now under way but expansion has recently been stalled. The copper companies, before undertaking major new investments, desire certain guarantees governing their future operations. No agreement has been reached between the Chilean Government and the copper companies. This stalemate represents a serious threat to the entire development program because the balance of payments projections are based on the assumption of greatly increased copper exports for which the substantial investments are essential. The mission recommends that a prompt solution to this problem be found in order not to endanger the entire development program.

4. The production of medium and small copper mines was fairly constant at a level of about 45,000 tons of copper content per year in 1955-59, about one-tenth of total production. Nearly one-half of this production was treated at the Paipote smelter, operated by the Government-owned Empresa Nacional de Minería, with the rest being exported as ores or concentrates. The Empresa also acts as a sales agency for the medium and small mines, and provides technical and financial assistance. In 1960, the Empresa held 75 loans to small mines totalling about E^o 1 million, mainly for modernization of mining and transportation facilities. Empresa's lending operations are intended to conform to reasonable banking standards and are supervised by the Superintendent of Banks. The smelting operations showed a fair profit in 1959.

5. The largest venture, among the medium copper mines, is the Mantos Blancos Company which recently started production of fire-refined copper at a rate of about 18,000 tons per year. The ore, holding about 1.8% copper content, is obtained in open cast mining.

Iron Ore

6. Iron ore production approximately doubled between 1955 and 1960, and iron ore now rivals nitrate as the second most important Chilean mineral in value of output. In 1955, the industry consisted mainly of one large mine (operated by the Bethlehem Steel Corp.) and a number of small operators. Today, several additional large iron-mining concerns are either in production or are actively developing new properties (CAP Steel Company, Santa Fe, Santa Barbara, Mitsubishi). Most of these mining operations are concentrated fairly close to the Pacific Coast between Huasco and La Serena. While the ore is generally high grade, proven reserves in this region are relatively modest, though exploration continues. The largest known deposit, El Laco, is located inland in Antofagasta Province. Though this deposit is over 400 km. from the coast, the ore could be transported for a considerable distance along the existing

Antofagasta-Bolivia railroad. "Potential" reserves are estimated at 300-500 million tons of 65% ore. More recently, the Government announced the discovery of large new deposits just north of Huasco in Atacama Province. Although the deposit was reported to be of unusual importance with claims of a final stage annual output of 10 million tons, no estimate has yet been made of the probable reserves or of the economics of the entire operation.

Nitrate

7. At the turn of the century, Chile, the world's only producer of natural nitrate, accounted for about two-thirds of the world nitrogen output. The subsequent expansion of synthetic nitrogen production dealt a severe blow to the industry. In spite of rapid increases in world nitrogen consumption, production of natural nitrates fell from an average of 2.5 million tons in 1925-30 to about 1.5 million tons in 1951-55. Another spurt in synthetic nitrogen production, based upon improved technology as well as new raw materials (particularly natural gas), further curtailed the market for Chilean nitrate; and by 1961, the annual output had fallen to 1.2 million tons.

8. In 1934, after the world depression had forced many small producers out of business, the Government organized COVENSA (Corporacion de Ventas de Salitre y Yodo de Chile) to handle all sales of nitrate and iodine. The producers were given output quotas, and were obliged to deliver nitrate at cost to the new sales corporation. COVENSA's net profits (the Government claiming 25% of its gross profits before debt service) were distributed among the producers in proportion to their output. While these arrangements succeeded in restoring the financial position of the industry, they provided no incentive towards increased efficiency.

9. In the 1950's, the situation was again critical. In 1950, two of the largest companies merged to form the Anglo-Lautaro company which at the time of the merger accounted for about 58% of the output and which today is responsible for about 80% of the total. The third among the large producers ran into financial difficulties, and CORFO took control in 1960. A new company, Empresa Salitrera Victoria, was formed. The number of the small producers has dwindled rapidly, and today only two remain.

10. In the early 1950's, the Government had added to the burden of the industry by fixing unfavorable exchange rates for export and by freezing domestic prices. A new law, approved in 1956, contains provisions against discriminatory exchange rates, allows duty-free imports of equipment, permits the companies to charge amortization and interest on new facilities against costs, and provides price incentives for quality output.

11. The steadily declining export prices and the long period of efficiency-impeding Government regulations would have doomed the industry but for the remarkable technical and production achievements by the major producer. The first step was the gradual replacement of the Shanks process

by the Guggenheim process, enabling the companies to produce a much superior product at a lower cost, to use much lower-grade raw materials, and to fully mechanize mining operations. The second major step forward was the recovery, through solar evaporation ponds, of about 20% of the nitrate content and 45% of iodine content of the original ore, previously left in the tailings from the Guggenheim process. Finally, and linked with the solar evaporation process, is the growing recovery of by-products, including potassium nitrate which sells at a considerable premium compared to sodium nitrate, boric acid, sodium sulphate, and others.

II. THE PROGRAM

12. The total investments in the mining sector were planned at E^o 688 million, of which about three-fifths would be for copper mining and smelting, and about 45% for the large copper companies alone. The Government's program, along with the mission's recommended revisions, is summarized in Table 6-1.

13. The major expected development among the medium-sized copper mines is the bringing into production of the Rio Blanco deposit (initial capacity: 60,000 tons) by the Cerro Corp.; the estimated investments are in the order of E^o 75 to 85 million. A new smelter at Las Ventanas, already under construction, will process ores and concentrates from the copper mines in Central Chile which are too far from the existing Paipote smelter for economic treatment.

14. The nitrate investments would be primarily for the modernization of existing installations; the two major producers have sufficient capacity to meet the total production target.

15. About one-half of the planned increase in iron ore production would come from the mines of the Santa Fe Mining Company. The new Algarrobo mine, owned by the CAP Steel Company, would contribute 1.2 million tons, and the remainder would come from smaller producers.

16. In contrast with the other economic sectors, public investment in mining will be very small relative to private investment. The Government Plan for 1961-70 calls for E^o 26 million of public funds and E^o 662 million of private investment.

6. MINING

Table 6-1

Proposed Investment in Mining, 1961-70
(in millions)

	Government Program		Mission Recommendations	
	\$	E ^o	\$	E ^o
<u>Copper</u>				
Private				
Gran Mineria del Cobre	195.0 ^{a/}	195.0 ^{a/}	189.4 ^{a/}	190.4 ^{a/}
Medium and Small Producers	67.2	41.1	67.2	41.1
Public				
Copper Smelter	12.2	9.5	12.2	9.5
<u>Iron Ore</u>				
Private (various)	26.6	18.3	49.5	33.0
<u>Nitrate</u>				
Private				
Anglo-Lautaro	4.0	1.8	8.0	3.9
Public				
Victoria	2.0	1.3	4.5	3.0
<u>Replacement</u>				
Excluding Gran Mineria del Cobre	57.0	38.3	57.0	38.0
<u>Totals</u>				
Including Gran Mineria del Cobre	364.2	305.3	387.8	318.9
Public	14.2	10.8	16.7	12.5
Private	350.0	294.5	371.1	306.4
Excluding Gran Mineria del Cobre	169.2	110.3	198.4	128.5
Public	14.2	10.8	16.7	12.5
Private	155.0	99.5	181.7	116.0

^{a/} Including replacement investments of US\$ 35.0 and E^o 35.0, respectively.

Table 6-2

Government Plan Production Targets of Mining Sectors
(thousands of metric tons per year)

	<u>Highest Output 1956-1960</u>	<u>Planned Increase 1961-1970</u>	<u>Percentage Increase</u>
<u>Copper</u>	<u>550</u>	<u>295</u>	<u>54%</u>
Large Mines	497	182	37%
Medium and Small Mines	53	113	213%
<u>Iron Ore</u>	<u>4,843</u>	<u>6,000 1/</u>	<u>124%</u>
<u>Nitrate</u>	<u>1,310</u>	<u>100</u>	<u>8%</u>

17. The following f.o.b. prices were assumed in the Government Plan for purposes of export projections (in U.S. dollars).

Blister copper	27¢ per lb.
Electrolytic copper	29¢ per lb.
Iron ore	\$ 8.00 per metric ton
Sodium nitrate	\$35.00 per metric ton

The above figures for copper were later revised by the Government to 25.5 and 27.5¢, respectively.

III. EVALUATION

18. In the mission's view the projected increases in copper production represent a reasonable target provided an agreement between the Chilean authorities and the copper companies is reached promptly. The investment cost projections also appear to be consistent with estimates published by the major mining companies.

19. The original Government program target for increasing iron ore production and exports by 6 million tons, also appears reasonable. However, during the mission's visit the Government announced plans for the eventual production of 10 million tons of ore and concentrates per year from newly discovered deposits in Atacama Province. Many questions remain unanswered regarding the feasibility of this project and it does not appear to the mission to be reasonable to include it in projections of iron ore production and exports during the 1960's. In the first place, the future of the Atacama project will depend upon the results of the test drillings which are yet to be undertaken. Secondly, the mission believes that such a large investment undertaking would place a heavy strain on public financial resources and a serious burden on public administration. Moreover, as will be shown below, the marketing of an

1/ Exclusive of the Atacama announcement by the Government.

additional 10 million tons of iron ore over and above the exports included in the original plan would represent a formidable task at best. Finally, should the study show the Atacama project feasible and economic, the Government should consider as an alternative to a direct public investment a suitable arrangement with private investors to carry out and operate the project.

20. On the other hand, the mission believes that some additional possibilities for increased iron ore exports - perhaps by as much as 5 million tons over the original program target of 6 million - might be possible and certainly should be explored. In the mission's view, private investors are likely to undertake this additional expansion if a promising market appears and the incentives to iron ore mining in Chile are adequate to attract private domestic and foreign investors. Although the mission hopes that such private investments will take place, because of the many uncertainties involved, the mission has not included these possible additional quantities in its projections of output and exports of iron ore.

21. In terms of total investment requirements, the mission's estimate is higher by about E^o 50 million than the plan estimate. This is due mainly to the inclusion, in the mission total, of approximately this sum for additional iron ore investments. On the other hand, the mission arrives at a slightly lower investment figure for the planned increase in copper output.

Copper.

22. At the time the program was developed, the large copper companies offered to invest the following sums to expand their output (in metric tons):

Anaconda:	\$125 million over six years (say 1962-67)
	for 80,000 tons
Kennecott-Braden:	\$193 million over the same period for
	100,000 tons

Adding about \$20 million per year for 1968-70 gives the total of E^o 389.3 million shown in the mission's projections.

23. The following figures indicate the effect these programs, together with the program for the medium and small mines, would have on Chile's share of the world copper output.

Chile's Share of Copper Market
(thousand metric tons)

	<u>1959</u>	<u>1960</u>	<u>1970</u>
World, excluding Soviet bloc	3,140	3,600	4,500-4,800
Chile	550	535	815
Chile's Percentage	17.5	14.9	17-18

24. It is assumed above that world production in 1970 will be equal to world consumption, based on a 4% cumulative increase over the 1955-57 average through 1965 and a slightly lower increase after 1965. This gives a consumption of 4.8 million tons by 1970, with the lower figure of 4.5 million tons representing a somewhat more pessimistic estimate. Chile's 1970 production is assumed to be the 1959 output of 550,000 tons plus 90% of the proposed capacity increase of 295,000 tons.

25. If the Chilean authorities and copper companies can reach agreement in regard to the latters' future operations in Chile, the prospects would seem to be good for the attainment of the above output target. The projected moderate increase in Chile's share of the world market over a 10-year period would appear reasonable considering the relatively low cost of copper mining in Chile and the unusually large ore reserves.

26. The mission has agreed with the Chilean authorities to base export projections on a price for electrolytic copper f.o.b. Chile of 27.5 cents per lb. as compared with the price of 29 cents per lb. used in the plan, with a corresponding reduction for blister copper to 25.5 cents per lb. The mission accepts the price of 26.5 cents per lb. (average for blister and electrolytic copper) used in the revised Government report projections as a reasonable figure.

27. The Government's plan does not include provisions for electrolytic refining of copper. Nevertheless, Anaconda's subsidiary, Andes Copper, is said to have offered to construct a new electrolytic refinery at Chanaral to process El Salvador's blister output totalling 100,000 short tons, plus another 20,000 short tons from other sources. In addition, the Government has announced plans for an electrolytic refinery, of about the same size as the proposed Chanaral refinery, at Las Ventanas. The cost of the Chanaral refinery would be on the order of \$18 million equivalent, and a similar sum would have to be allocated for the Ventanas plants. According to official pronouncements, refining the copper in Chile rather than abroad should lead to "a noticeable reduction in the total refining cost." This presumably refers mainly to that portion of Chilean copper presently sold to Western Europe after refining in the United States and where freight costs would be reduced if the copper were refined in Chile for direct shipment to the consumer market.

28. If, in fact, refining in Chile will mean a lower average cost to the companies for copper, delivered at the point of final consumption and including a normal power cost and a satisfactory return on the refinery investment, the inclusion of the new refineries in the plan would be amply justified. If the opposite were true (and this is a point which merits investigation) it would be against the country's interest to pursue these relatively capital-intensive projects. Likewise, market preferences and possibilities in various parts of the world must not be left out of consideration or the total exports might be adversely affected.

Iron Ore

29. While there should be no overriding difficulty in marketing an additional six million tons of Chilean ore by 1970, the marketing of further sizable quantities -- more than five million tons or so -- poses a problem of a completely different order of magnitude.

30. According to one recent market study, the total iron-ore import requirements of the United States and Western Europe would be on the order of about 155 million tons of ore by 1970 as compared with actual imports of about 70 million tons in 1957, or an increase of 85 million tons. Even though Chile may direct a significant portion of her iron exports to Japan, the total exports might become so large that it is doubtful whether they could be absorbed over a decade. This is particularly true considering the substantial expansion of iron-ore output under way or planned in Sweden, Canada, Africa, Venezuela and Brazil -- to mention only the most important exporters. Before a conclusion could be reached regarding actual export prospects, it would be necessary to undertake a detailed study of the future market and to establish contact with prospective buyers since large investments could not and should not be initiated without long-term contracts for a major portion of the output.

31. In any such study, Chilean costs would have to be closely examined in relation to costs in other major existing and potential iron ore producing areas. From a practical point of view, such studies are of little value unless they refer to actual ore-bodies so that mining conditions, cost of transportation to the coast, and the character of port facilities can be taken into account. Another factor of strategic importance is the future level of ocean freight. Chile belongs to the suppliers furthest away from the major markets, and any fall in United States import prices, and/or any decrease in ocean freights, would be reflected in a disproportionate decline in Chilean f.o.b. prices to all markets except, perhaps, Japan. On the other hand, a careful study may show the possibility of a further decline in freight rates over the next 10 years -- resulting from the use of larger ore carriers. Summing up the above argument, the mission believes that such a study would be of great assistance to the Chilean Government in framing export targets and policies for achieving these targets.

32. The price (\$8.00 per ton) used in the plan export projections for iron ore would seem high. The average f.o.b. value of Chilean 1960 iron ore exports was \$6.35 per ton. This is somewhat below the 1956-59 unweighted average of \$6.84 but probably better reflects the impact upon future prices of the very large iron expansion programs now under way in many areas of the world. Moreover, present Chilean exports include a very high proportion of open-hearth ore, for which a considerable premium is

paid. There are some reasons for believing that both the proportion of ore that can be sold as open-hearth ore and the premiums paid will decline over the next decade. These reasons include a reduced share of open-hearth steel in total steel production, and uncertainty as to whether Chilean deposits developed over the next decade will contain the same high proportion of open-hearth grade.

Nitrate

33. The first priority in planning for the nitrate sector is an up-to-date study of the future position of natural nitrates in the world market for nitrogen. The market for major actual and potential co-products and by-products (boron, iodine, potassium-sodium nitrate, sodium sulphate) would also have to be studied.

34. There are quite a few facts justifying some degree of optimism regarding the industry's future. The export price f.a.s. Chile at the present moment leaves a small margin of profit to the major producer, Anglo-Lautaro. The demand for potassium-sodium nitrate is brisk and exceeds the present production possibilities. Iodine is a very profitable by-product. There is no lack of good quality nitrate ore. Moreover, if the solar evaporation process meets all expectations, it might double the economically recoverable reserves.

35. There are, it would seem, three possible threats to the industry. One would be a possible further fall in the world market prices for synthetic nitrate. The second would be increased protectionism in the remaining major markets for Chilean nitrate (United States, Japan, India, Australia, Spain), such as would be associated with an accelerated development of domestic fertilizer industries. The third would be some change in market preferences or in the quality of rival fertilizers that would make consumers less willing to pay the customary premium for the natural nitrates. The proposed market study would give a better idea of the exact nature of these threats. If none of these fears should prove justified, there would be a clear inference that the 10-year program for the Chilean nitrate industry is too modest, perhaps far too modest.

36. This raises the question of Government policy. In the mission's opinion, this policy might be inspired by two considerations. In the first place, every assurance should be given to the major producer that there will be no discriminatory taxation or social charges, and that Government intervention in its business activities will be limited to a minimum, necessitated by the coordination of export sales or the protection of local labor forces against widespread unemployment.

37. The policy with respect to the Victoria company raises more complex issues. At the present moment, this company operates at a loss, and service on its long-term debt is overdue. In terms of nitrate resources, Victoria

has the advantage that the minerals are located closer to the extraction plant but the by-product values are smaller (no potassium nitrate, only one-half the iodine content). Company officials believe that by doubling the present output from 9,000 tons per month to 19,000 tons, it would reduce its costs to about the Anglo-Lautaro level. Such expansion could probably take place only gradually, however, or the market might become disorganized. The estimated cost of such expansion would be on the order of E^o 6 million.

38. In the immediate future, increased production could be obtained much more economically by increased output at Anglo-Lautaro, which is now operating at only about 70% of capacity. There is the complicating factor that the important town of Iquique gets its livelihood, in large part, from the Victoria mine. Even a temporary closing of that mine is hardly a practical possibility. Moreover, in the long run, it may prove beneficial to Chile to have two producers developing the nitrate deposits. If these basic premises are accepted, the following Government action would seem indicated: first, to undertake the market study suggested above as a matter of urgent priority; secondly, to confirm present estimates regarding the probable production costs for an expanded and modernized operation at Victoria; thirdly, once these studies have been completed, to undertake negotiations with the Anglo-Lautaro company to explore whether the Chilean national interest might be served better by a rapid expansion at Victoria than by expansion at Anglo-Lautaro, and, if so, under what conditions Anglo-Lautaro might be willing to accommodate a temporary increase in Victoria's share of total industry sales.

Table 6

Ten-Year Program for Mining Sector, with Projections of
 Financing Methods and Foreign Exchange Expenditures
 (in millions)

A. Plan Figures

	1961		1962		1963		1964		1965		1962-65		1966-70		1961-70	
	US\$	E ^o	US\$	E ^o	US\$	E ^o	US\$	E ^o								
<u>Grand Total, including</u> <u>Gran Minería del Cobre</u>	31.0	28.0	45.1	38.5	50.1	40.7	43.9	35.9	27.6	20.5	166.7	135.6	166.5	141.7	364.2	305.3
Public	-	-	6.5	5.2	6.4	4.7	0.3	0.2	0.3	0.2	13.5	10.4	0.7	0.4	14.2	10.8 ^a
Private	31.0	28.0	38.6	33.3	43.7	36.0	43.6	35.7	27.3	20.3	153.2	125.2	165.8	141.3	350.0	294.5
<u>Gran Minería del Cobre</u> <u>(private)</u>	22.2	22.2	22.2	22.2	22.2	22.2	22.1	22.1	8.7	8.7	75.2	75.2	97.6	97.6	195.0 ^b	195.0 ^b
<u>Grand Total, excluding</u> <u>Gran Minería del Cobre</u>	8.8	5.8	22.9	16.3	27.9	18.5	21.8	13.8	18.9	11.8	91.5	60.4	68.9	44.1	169.2	110.3
Public	-	-	6.5	5.2	6.4	4.7	0.3	0.2	0.3	0.2	13.5	10.4	0.7	0.4	14.2	10.8
Private	8.8	5.8	16.4	11.1	21.5	13.8	21.5	13.6	18.6	11.6	78.0	50.0	68.2	43.7	155.0	99.5
<u>Copper</u>															12	12
Medium and small producers (private)	-	-	8.0	5.5	13.0	8.2	13.0	8.0	10.0	6.0	44.0	27.7	23.2	13.4	67.2	41.1
Copper smelter (public direct)	-	-	6.1	5.0	6.1	4.5	-	-	-	-	12.2	9.5	-	-	12.2	9.5
<u>Iron Ore</u>																
Private	2.6	1.8	2.6	1.8	2.6	1.8	2.6	1.8	2.7	1.8	10.5	7.2	13.5	9.3	26.6	18.3
<u>Nitrate</u>																
Anglo-Lautaro (private)	0.8	0.4	0.4	0.1	0.5	0.2	0.5	0.2	0.5	0.2	1.9	0.7	1.3	0.7	4.0	1.8
Victoria (public direct)	-	-	0.4	0.3	0.3	0.2	0.3	0.2	0.3	0.2	1.3	0.9	0.7	0.4	2.0	1.3
<u>Replacement Investments</u> <u>(excluding Gran Minería</u> <u>del Cobre)</u>	5.4	3.6	5.4	3.6	5.4	3.6	5.4	3.6	5.4	3.6	21.6	14.4	30.0	20.3	57.0	38.3

^{a/} The printed version of the program gives totals for the public investment of only 12.2 and 9.5 million, respectively, representing mainly investments in the new Ventanas smelter. The additional sums included above correspond to investments in the Victoria nitrate plant which, at the present moment is Government-administered, and presumably would receive its investment funds mainly from Government sources.

^{b/} Including replacement investments of US\$ 35.0 and E^o 35.0, respectively.

Table 6. (continued)

Ten-Year Program for Mining Sector, with Projections of
Financing Methods and Foreign Exchange Expenditures
 (in millions)

B. Mission Recommendations

	1961		1962		1963		1964		1965		1962-65		1966-70		1961-70	
	US$	E°	US$	E°	US$	E°	US$	E°	US\$	E°	US\$	E°	US\$	E°	US\$	E°
<u>Grand Total, including</u>																
<u>Gran Mineria del Cobre</u>	16.8	13.0	54.5	45.2	64.7	51.4	54.2	43.4	51.2	41.5	224.6	181.5	146.4	124.4	387.8	318.9
Public	-	-	7.1	5.0	0.8	0.5	0.8	0.5	0.7	0.5	15.7	11.5	1.0	1.0	16.7	12.5
Private	16.8	13.0	57.6	46.6	53.4	42.9	53.4	42.9	50.5	41.0	208.9	170.0	145.4	123.4	371.1	306.4
<u>Gran Mineria del Cobre (private)</u>	5.0	6.0	25.8	25.8	25.8	25.8	25.8	25.8	25.9	25.9	103.3	103.3	81.1	81.1	189.4	190.4
<u>Grand Total, excluding</u>																
<u>Gran Mineria del Cobre</u>	11.8	7.0	28.7	19.4	38.9	25.6	28.4	17.6	25.3	15.6	121.3	78.2	65.3	43.3	198.4	128.5
Public	-	-	7.1	5.5	7.1	5.0	0.8	0.5	0.7	0.5	15.7	11.5	1.0	1.0	16.7	12.5
Private	11.8	7.0	21.6	13.9	31.8	20.6	27.6	17.1	24.6	15.1	105.6	66.7	64.3	42.3	181.7	116.0
<u>Copper</u>																
Medium and small producers (private)	-	-	9.0	5.5	15.0	9.2	15.0	9.0	12.0	7.0	51.0	30.7	16.2	10.4	67.2	41.1
Copper smelter (public direct)	-	-	6.1	5.0	6.1	4.5	-	-	-	-	12.2	9.5	-	-	12.2	9.5
<u>Iron Ore</u>																
<u>Private</u>	5.4	2.9	6.0	4.3	10.0	7.3	6.0	4.0	6.0	4.0	28.0	19.6	16.1	10.5	49.5	33.0
<u>Nitrate</u>																
Anglo-Lautaro (private)	1.0	0.5	1.2	0.5	1.4	0.5	1.2	0.5	1.2	0.5	5.0	2.0	2.0	1.4	8.0	3.9
Victoria (public direct)	-	-	1.0	0.5	1.0	0.5	0.8	0.5	0.7	0.5	3.5	2.0	1.0	1.0	4.5	3.0
<u>Replacement Investments</u>																
<u>(excluding Gran Mineria del Cobre)</u>	5.4	3.6	5.4	3.6	5.4	3.6	5.4	3.6	5.4	3.6	21.6	14.4	14.4	20.0	57.0	38.0

CHAPTER 7

FUEL AND POWER

I. RECENT TRENDS

1. Chile's total energy consumption, measured in tons of coal equivalent, rose by nearly 30% between 1950 and 1955 but has since remained stationary. Until 1955, the Chilean coal mines managed to find a market for about 2.3 million tons of coal per year; since then there has been a steady decline to 1.8 million tons in 1959. The 1960 consumption of Chilean coal was only 1.4 million tons but this figure was affected by a 3-month strike in the coal mines.

2. In contrast to coal, consumption of oil products rose from about 1.5 million cubic meters (cu. m.) in 1951 to 2.4 million cu. m. in 1959 and 2.6 million cu. m. in 1960. The rapid growth in oil was aided by the initiation of crude-oil production from the Magallanes fields, which rose from about 0.1 million cu. m. in 1950 to 1.15 million cu. m. in 1960, and by the completion, in 1954, of the Concon oil refinery which last year produced about 1.6 million tons of oil products, or over 60% of the Chilean consumption, including consumption by the large copper and nitrate mines.

3. The total production of electric energy grew from 2.9 billion kwh. in 1950 to about 4.6 billion kwh. in 1960. About three-quarters of the increase came from additional hydropower. In 1960, hydropower accounted for 65% of the total power generation, though only a little more than one-half of the installed capacity.

4. Out of the total power generated in 1960, self-producers (mainly the large copper and nitrate companies) accounted for 49%, ENDESA (the Government-owned power corporation) for 35%, and other public utilities (mainly the foreign-owned Compania Chilena de Electricidad, known as Chilectra) for 16%. ENDESA's sales are mainly bulk supplies to distribution companies and large industrial customers.

4. An interconnected system to be completed in 1962 will serve an area encompassing more than 90% of the total population. Apart from the large copper and nitrate companies in the North, which are self-sufficient in power, consumption outside the interconnected grid is very small.

5. The prices for coal and oil are high in Chile. The cost of coal (slack) to consumers in Santiago is E° 24-25 per ton, with perhaps 10-15% less for large customers. Bulk No. 6 fuel oil sells at a price of about

E° 52 per ton (including about E° 17 in duties and sales taxes). In contrast, prices for electric power are relatively moderate, particularly at the wholesale level. Thus, ENDESA's average sales revenues both in 1959 and 1960 were only 11.7 mills per kwh. of primary power generated.

II. THE PROGRAM FOR FUEL AND POWER

6. The Government is now making an intensive study both of the probable future demand for various types of fuels and desirable expansion targets and policies.

7. Pending the completion of this study, certain tentative targets were established for the major fuel and power sectors. The corresponding investment requirements are summarized in Table 7-1, together with the mission recommendations.

Table 7-1

Investments for Fuel and Power (in millions)

	Government Program			Mission Recommendations		
	E°	US\$	Total E°	E°	US\$	Total E°
Coal Mining	16.0	6.9	23.1	22.6	10.2	33.3
Crude Petroleum and Natural Gas	251.9	159.2	419.1	238.9	159.2	405.9
Electric Power	425.0	244.7	682.0	396.2	224.7	632.2
Total	<u>692.9</u>	<u>410.8</u>	<u>1,124.2</u>	<u>657.7</u>	<u>394.1</u>	<u>1,071.5</u>

8. The Plan assumes that the ENAP (the Government-owned petroleum enterprise) and ENDESA investments would be publicly financed (in the case of ENAP entirely by its own means). According to the ENDESA financial plan for 1959-68 (the latest one available), showing total investment requirements of E° 423 million, about E° 235 million would be obtained through retained earnings and reinvested dividends, about E° 75 million would be raised through CORFO advances and the remaining E° 113 million through foreign loans. CHILECTRA, in a recent contract with the Chilean Government, has agreed to execute a plan involving a minimum expenditure of US\$ 100 million equivalent and a minimum new thermal capacity of 200,000 kw. A recent Eximbank loan for \$42 million will help finance this plan.

Electric Power

9. ENDESA's "Electrification Plan" covering the period 1959-1972 contains detailed estimates of energy requirements (in kwh.) for 1959-1968; the figures through and beyond 1970 were apparently determined

by extrapolation. The mission has made an independent estimate of the probable power demand which shows a total energy requirement for 1970 only slightly higher than the Plan figures for 1968. The major difference between the mission figures and the Plan figures concerns residential and commercial consumption where the mission's estimates are considerably lower. In some areas, however (cement, miscellaneous industries, and rural demand), the mission's estimates are significantly higher. Because small percentage differences in the estimated power demand in 1970 would make a substantial difference in total investment requirements, a continuous refining and keeping up to date of the power demand estimates, particularly in such areas as residential and rural demand, is necessary.

10. The Plan targets for capacity expansion in the interconnected system, along with estimates of peak loads and energy requirements, are summarized below:

	Installed Capacity (MW.)	Estimated Peak Load (MW.)	Energy Requirements Plan (billion kwh.)	Mission (billion kwh.)
1960	607	575	2.88	2.88
1965	1,286	1,050	5.20	4.67
1970	1,600	1,575	7.90	7.05

11. According to the Plan, both capacity and energy requirements would increase by about 12.5% per annum between 1960 and 1965 and by about 9% between 1965 and 1970. In actual fact, one would have expected capacity requirements to increase at a more rapid rate than energy requirements since, under the Plan, the share of residential, commercial, and rural consumption would increase from 25 to 35% of the total. Considering furthermore that energy is now rationed during the winter peak, it would seem that the capacity increases scheduled under the Plan are too small. If the mission's demand projections prove correct, however, the scheduled capacity increases would be about right, since the total demand would only increase to 7.05 billion kwh. (corresponding to an estimated peak load of only 1,400 kw, allowing a reasonable reserve) instead of 7.9 billion kwh., and there would be no major change in the combined share of residential and rural consumers.^{1/}

^{1/} In a revised estimate received after this chapter was written, ENDESA estimates the 1970 requirements in installed capacity at 1460 MW and the energy demand at 6.4 billion kwh. These figures are both about 9% below the mission's estimates, and represent ENDESA's adjustment of earlier higher figures to take account of the relatively slow rate of industrial growth during the last three years. There is no need for adjusting the mission's figures since these are consistent with the mission's assumptions regarding the possible growth in other sectors of the economy.

12. The Plan investment cost estimates for the ENDESA projects have been checked against similar estimates accepted by the World Bank for purposes of financial projections (December 1959). Although the Rapel project will be more expensive than originally estimated, the program as a whole would seem to contain adequate contingency allowances. The inadequacy of present power rates has, however, reduced ENDESA's self-financing below the sums anticipated in ENDESA's financial projections. Because of the substantial increases in domestic prices, which have raised both operating and investment costs, and the inability of ENDESA to adjust rates, ENDESA is dependent upon the budget for large contributions toward the cost of its expansion program. The return in recent years -- only about 3-1/2% in 1960 -- on its investments is inadequate. Prompt action to increase rates would strengthen ENDESA's financial position and afford relief to the already heavily burdened Government investment budget.

13. The estimate for other power projects (mainly CHILECTRA) was raised from about E^o 192 million at 1960 prices (of which E^o 94 million is for new generating facilities) to about E^o 251 million in the summary program. This estimate, it would appear, includes considerably more generating capacity (the exact figure is not specified in the Plan) than assumed in ENDESA's overall projections for the interconnected system. Also, it appears that a substantial portion of CHILECTRA's new unit now under construction at Renca was already paid for by the beginning of the Plan period. To compensate for these apparent inconsistencies, the mission tentatively reduced the investment cost estimates for power companies other than ENDESA by E^o 50 million (from E^o 251 to 201 million).

14. Question of Balance. One final question to be raised is the proper balance between hydropower and thermal power. This choice is particularly relevant to the requirements during the second half of the Plan period. Nevertheless, because of the long planning and construction period for hydro projects and because of important repercussions on the coal mines and transportation system, the economic evaluation should take place today.

15. As presently drafted, the Plan relies almost exclusively upon hydropower for the additional needs arising during the second half of the Plan. Calculations undertaken by the mission (based on an analysis by a power expert in a German Government economic mission to Chile) suggest that there is very little difference in final production costs under Chilean conditions between hydropower and a hydro-thermal combination, at least if the thermal power is supplied by large units on the order of 100 MW. The final choice will very much depend on assumptions made with respect to fuel costs and capital charges. With respect to fuel costs, it will be shown below that coal could probably be supplied economically at a cost considerably below the present market price. With respect to capital charges, it is essential that the rates of return used for calculating purposes in this type of comparison should be high enough to reflect the actual and expected relative scarcity of capital in Chile and that the depreciation rates should reflect realistically all risks of obsolescence, wear, and physical damage.

16. Beyond the calculation of immediate yields on the investment, certain advantages of a higher proportion of thermal power would seem to merit attention, namely lower investment costs, better capacity utilization of the Chilean coal mines, and more independent of weather conditions.

Coal and Oil Fuels

17. Demand for Fuels by 1970. The planning for the coal and oil sectors is handicapped by the absence of a fuel balance sheet for 1970 consistent with the Plan targets for railroad and highway transportation, electric power generation, steel and cement production, etc. To obtain some preliminary bearings, the mission has constructed its own tentative fuel balance sheet for 1970.

18. The method used in drawing it up was to take account of the projected increases in major fuel-consuming sectors as well as expected structural changes (e.g., continued dieselization of the railroads) and improvements in the efficiency of fuel use (e.g., coke consumption in blast furnaces). The future coal/oil price relationship was also considered in apportioning markets between these two fuels.

19. The mission estimate for oil products requirements in 1970 is shown below, together with the corresponding estimate by ENAP (in millions of cu. m.).

	<u>Enap</u>	<u>Mission</u>
Aviation gasoline	0.12	0.03
Motor gasoline	1.30	1.10
Gas/diesel oil	0.48	0.49
Fuel oil	1.50	2.05
Kerosene	0.42	0.42
Total	3.82	4.09

20. The two estimates are in reasonably good agreement although Enap used a completely different forecasting method, namely the extrapolation of past trends. The mission estimate for gasoline is consistent with the assumed growth in the motor vehicle population (apart from inevitable shortcomings in the forecasting technique, such as higher than expected increases in the fuel consumption per vehicle). If passenger vehicles could be imported free of license and under less-burdensome conditions with respect to customs duties and financing, it is probable that the demand for gasoline would rise to and beyond the figures assumed by ENAP.

21. The major difference between the mission's estimate (2.05 million tons) and ENAP's estimates (1.50 million tons) is in fuel oil: 550,000 tons of fuel oil or about 830,000 tons of coal equivalent. It has its counterpart in coal where the mission's estimate, at 2.16 million tons, falls considerably short of the Plan figure of 2.80 million tons. A forecast recently prepared by one of the major coal companies is even lower than that of the mission.

22. On an overall basis for all coal and oil fuels combined (using an equivalent of 1.5 tons of coal per ton of oil products), the mission's estimate works out at 8.30 million tons of coal equivalent as compared with 8.53 million tons for the Plan, a negligible difference of only about 2.5%. This is in spite of the mission's assumptions that production in certain fuel-consuming sectors will not rise quite as rapidly as assumed in the Plan (steel, power, production, private motor transport) and that the improvements in fuel efficiency will be very important (steel, thermal power, railroads).

23. Petroleum. Chile's only petroleum producer, the state-owned Empresa Nacional del Petroleo, (ENAP) plans to spend E^o 419 million in increasing the annual output of crude oil from 1.2 million cu. m. to 4.2 million cu. m. The gross capital expenditure per ton of oil produced, according to these plans, would change only slightly from an estimated U.S.\$1.90 per barrel for 1962 to \$2.10 by 1970.

24. The size of this expansion program is determined by the target of making Chile virtually self-sufficient both in crude oil and in petroleum products. This target is expected to be reached by 1965. After 1965, production of crude oil will grow essentially with the Chilean market for refined oil products; exports are not envisaged.

25. In the mission's opinion, this is a sound program provided that the crude oil can be produced in the desired quantities and at a reasonable cost. ENAP has been doing a competent job in mobilizing the country's oil resources, and there would seem to be no reason why it should not be able to expand production at a rate consistent with the actual availabilities of oil. There is a large element of conjecture, however, in the projection of reserves, and in this respect, the attainment of the target is by no means assured.

26. In accordance with present Chilean law, no exploration licenses have been granted to private oil companies, domestic or foreign. If it were thought that Chile had very large oil resources that potentially could make a substantial contribution to the country's exports, there would be much to be said for allowing increased competition in the development of the southern area. ENAP's experience leads the Government and ENAP to believe that resources are probably limited, and that therefore development by several companies would give rise to unwanted exports and raise the long-run production costs as compared with operations under a single enterprise.

27. In the mission's opinion, however, it should be of interest to Chile to encourage foreign-oil-company participation in the northern and central parts of the country. ENAP's program in the north, though as yet relatively modest in scale, diverts financial resources from the major task of ensuring self-sufficiency based on the southern fields. The drillings in the north also raise the question whether the same sums could

not be spent more usefully in some other way to promote the economy of the north. On the other hand, foreign investors might find the risks in some northern and central areas worth taking. As late as June 1959, however, the Chamber of Deputies defeated a proposal to permit private participation in oil field development in the north.

28. The mission is not competent to evaluate the probabilities of Enap actually attaining the 4.2 million cu. m. output target by 1970. The figures quoted by ENAP suggest that the crude oil part of their operations is a profitable one at the present moment, i.e. that the cost of Chilean crude compares favorably with the cost of imported crude estimated at \$15 to \$22 per cu. m., c.i.f. Valparaiso, depending on the quality.

29. In terms of finance, ENAP expects to carry out both its crude-oil expansion program and its refinery expansion without recourse to outside borrowing. This is made possible, in part, by the fact that Enap sells its products at the c.i.f. price plus duties which average about 40% of the c.i.f. price. Moreover, duties paid on imported equipment and materials are automatically refunded by the Government to ENAP.^{1/} Finally, ENAP pays no corporate taxes, and its entire earnings, by a 1950 Law, will be added to reserves until the Chilean petroleum industry "has reached its full development."

30. The special incentives and the tremendous capital investments clearly indicate the need for more detailed accounts of the financial and economic implications of ENAP's operations than given in its present annual reports. In that way, the public would be informed as to the costs and benefits to the economy of planned investments in both oil-field development and oil refining. As a minimum, such a statement might indicate (a) what profits are being earned on the crude oil operation, based on a selling price equivalent to the price of imported crude; and (b) how actual refining costs compare with, say, the margin between imported crude and imported refined products. (The latter comparison would provide an up-to-date measure of the economic efficiency of refining imported petroleum in Chile. It is not suggested that it would be advantageous to refine Chilean crudes outside Chile).

31. The Future of Coal. The mission believes that coal's role as a transportation fuel and as a general-purpose industrial and household fuel will fall to insignificant proportions over the next decade. From a commercial point of view coal is no longer competitive in many areas, and from an economic point of view there is a limit beyond which additional protection against fuel oil would be unjustified. However, coal still

^{1/} Thus, in the ENAP budget forecast for 1962, there is an item of Esc 6 million which occurs on both sides of the operating budget (as "customs duties" on the expenditure side and as "fiscal contribution for import duties" on the income side.) In addition, the capital budget contains an item of Esc 5.8 million representing "refund of customs duties."

has an important role to play as a thermal-power fuel, as a raw material for the production of metallurgical coke, and as a low-price fuel for certain major industries, especially those located near the mines. In fact, as will be shown below, the potential market for coal may be substantially higher than its projected market share, assuming an energetic program to take full advantage of this national fuel. According to mission estimates, the major markets remaining to coal would be thermal power, steel and cement, and (more problematically) the Santiago gas plant. There are, in addition, some major fuel markets which have not been allocated to coal in the mission estimates, but where the balance of advantages in favor of oil is very slight. In the first place, the thermal power market could turn out to be larger than assumed in the table, depending on more intensive studies regarding the optimum proportions of thermal and hydro-power in the second half of the Plan period. Secondly, there is the demand for fuels by the major pulp and newsprint mills, which are all likely to be located very near to the coal mines. Thirdly, there is the demand for fuels by the large copper mining industry in the north. Both these latter industries are at present using mainly fuel oil.

32. The present coal-oil relationship is analyzed in Table 7-2. The analysis is based on the supply situation for large industrial consumers (thermal power stations, large mining companies, etc.), since these consumers would form the bulk of the coal market in future years. As will be noted, the price of fuel oils is complicated by three price elements: a sales tax, the distributor's gross margin, and a customs duty. Consequently, alternative prices -- I, II, and III -- are listed for the fuel oils:

Price I is the full price.

Price II is based on two assumptions, which would hold true only for very large consumers. First, by importing their fuel oil directly, these consumers would be exempt from the sales tax of E^o 5 per ton. Second, we are assuming that oil companies would be willing to reduce their distributing margin to a minimum of \$3, or less than half their normal margin; to the extent that this expectation is exaggerated, the comparative price would not be operative.

Price III focusses attention on the price the nation pays for fuel oils, as opposed to the price paid by oil consumers. This price is arrived at by subtracting the import duty from Price II.

Table 7-2

Price Comparison of Coal and Oil
(in U.S.\$ per ton)

Slack Coal Prices

	<u>Santiago</u>	<u>Concepcion</u>	<u>Tocopilla</u>
Ex Mine Price	15.10	15.10	15.10
Plus Freight:			
Sea Freight	4.68(2.78) ^{a/}	--	6.34(3.35)
Rail Freight	3.34(2.91)	1.50	--

Fuel Oil Prices

<u>Price Elements</u>	#5		#6	
	at port	at Santiago	at port	at Santiago
C.i.f. price, excluding duties	24.16	--	19.22	--
Duties	14.12	--	12.70	--
Distributor's gross margin	8.26	--	9.46	--
Sales Tax	4.89	--	4.34	--
<u>Price I:</u> Full Price	51.43	53.43	45.72	47.72
<u>Price II:</u> Excluding sales tax and with minimum distributor's margin of \$3.00	41.28	43.28	34.92	36.92
<u>Price III:</u> Also excluding import duties	27.16	29.16	22.22	24.22

Fuel Oil Prices, Per Ton of Coal Equivalent^{b/}

<u>Price I</u>	32.14	33.39	28.58	29.83
<u>Price II</u>	25.80	27.05	21.82	23.08
<u>Price III</u>	16.98	18.23	13.89	15.14

a/ The figures in brackets show the effects of possible reductions in freight rates according to the Coal Commission study; following this study, ocean transport for coal has been assumed, though it will be argued later that rail transport to Santiago would probably be more economical.

b/ Using a conversion factor of 1.6 tons of coal per ton of fuel oil. This is slightly higher than the straight heat-value equivalent (about 1.5 tons) but probably the minimum market equivalent considering the greater convenience of fuel oil.

33. The major conclusions suggested by Table 7-2 are as follows:

- a. Based on the assumed minimum fuel oil price to large consumers (Price II), coal delivered to Santiago would appear to be slightly less expensive than fuel oil #5 and roughly competitive with fuel oil #6. It should be noted that certain large industrial customers (of the type that would perhaps be most interested in using fuel oil #6) buy coal at a preferential rate which would be fully competitive with fuel oil. On the other hand, the Compania Chilena de Electricidad indicates an average cost of \$23 per ton (possibly including certain carrying charges) for the 87,000 tons of coal consumed in 1960.
- b. The price for coal at Concepcion is far below the price for fuel oil, including normal duties. However, the major paper producer benefits from a refund of duties on fuel oil corresponding to the quantities of pulp and paper exported, and since any increase in output from now on will be mainly for export, the "marginal" cost of fuel oil would tend to be slightly lower than the coal price. At present the newsprint mill at Bio-Bio is equipped only to burn fuel oil.
- c. The present price for coal placed at Tocopilla is approximately the same as for fuel oil #6, with present duties payable by the large copper-mining companies. The difference is much greater for the nitrate companies which pay no duties on oil.
- d. The above conclusions are based on the present price levels for coal f.o.b. mine and present ocean freights. The figures in brackets indicate the possible reduction in ocean freights arising from better port installations and more efficient operations, according to a study made for the Coal Commission. At such ocean freights, coal would be significantly less expensive than fuel oil at Santiago as well as at Tocopilla.
- e. As far as the Santiago market is concerned, the possibility of lower rail-transport rates must be examined. The present freight rate of E^o 9 per ton for the 600 km. between the coal mines and Santiago corresponds to about 1.5 cents per ton-km. This is roughly the rate for a 300-km. transport in Belgium and France, while the rates in the Netherlands, Italy, and the United States are only about one cent per ton-km. Because of the normal regression in railroad rates with greater distances, it may be assumed that where a 300-km. transport costs 1.5 cents per ton-km., the cost of a 600-km. transport would be at most one cent per ton-km. At a price of about \$5.50, the railroads would apparently be competitive with streamlined ocean-rail transport from the mines to Santiago. We strongly urge that the railroad management review the rate structure as it applies to coal, with a view to seeing whether or not increased traffic resulting from a lower rate would justify a reduction of the rates for carrying coal.

34. In the above calculation, no account has been taken of possible reductions in the present cost of coal f.o.b. mine. The study undertaken for the World Bank and the two major coal companies by a British firm of consulting engineers in 1956 indicated a future cost price, including a modest return on the investment, on the order of \$13-14 per ton, at a sales volume of about one million tons per year per company. This estimate would not necessarily hold true at present Chilean cost levels and the present exchange rate. Nevertheless, the order of magnitude represents a relatively low price by international standards. In early 1960, the Ruhr price f.o.b. colliery for bituminous coking fines was \$14.47. The U.S. export price f.o.b. Hampton Roads was about \$12.84, which, adding freight to Chile, gives a c.i.f. price of about \$17.50.

35. Moreover, the recently agreed merger between the two coal companies offer certain additional opportunities for price reduction. In the long run, it should permit a more rational development of the mines as well as economies in administration and sales. With the market concentrated in the main to thermal power, cement, and a few major industrial users, it will no longer be necessary to provide a substantial portion of coal according to exacting specifications in terms of size and grade; mechanization can be pushed; and areas with relatively poor coal can be mined. If the combined output of the two large companies could be raised from 1.6 million tons to, say, 2 million tons (for which there is enough capacity) there would be significant economies of scale. This would create a special opportunity for establishing a mine-based power station. This station could be supplied with standard or relatively high-ash smalls at a lower than average price (corresponding to the lower than average costs for the increased portion of the output); the station would also be able to use the lowest grade products and rejects from the coal preparation plant. The possible interest in such a power station -- which would have to be supplied with coal at a very competitive price -- was discussed in the section on Electric Power.

36. The above calculations suggest that there may be a substantial additional market for the coal mines, approximately on the order of the difference between the program and the mission estimates of the consumption of Chilean coal by 1970. Before this conclusion is accepted, however, reference should be made to two elements of uncertainty in the future price for fuel oil. The first concerns the probable future import price free of duty. Although it seems unlikely that the future price for fuel oil No. 6 will fall below \$2.00 per barrel f.o.b. Aruba, which is the basis for the above comparision, the mission cannot take it upon itself to make a definite forecast in this respect. The second question concerns the degree of customs protection for coal against imported fuel oil which would be economically justified. The actual protection, it will be seen from Table 7-2, amounts to about \$8 per ton coal equivalent. The strictly necessary protection would depend on the future development of coal production costs and freight charges, but would probably be on the order of \$3-\$5 per ton coal equivalent; i.e., 16-26 % of the c.i.f. price for fuel oil.

37. Without attempting to pass judgment on whether or not this degree of protection would be justified, the mission would nevertheless like to stress certain aspects. In the first place, according to ENAP's calculations, Chile would not become self-sufficient in fuel oil during the 1960's. Even in 1970, Chile still would be marginally dependent on imports of fuel oil. Secondly, the necessary protection for coal would be substantially lower than the effective protection enjoyed today by a majority of Chilean industries; and the indirect economic and social losses consequent to a severe reduction of employment in coal mining would be very heavy. Finally, even if we restrict the comparison to Chilean oil, it is interesting to set side-by-side the modest investment required to keep the coal-mine industry in operation (about \$23 million equivalent for the 10-year period, based on an output of 2.8 million tons) with the investments in crude oil (about \$400 million equivalent to expand production by 3 million cu.m. of crude, or about 5 million tons of coal equivalent).

38. In conclusion, the mission's main findings with respect to the future of Chilean coal are as follows:

1. The coal industry still has an important role to play in Chile. In the mission's view, the fuel market that could be economically supplied by coal by 1970 is substantially on the order of magnitude assumed in the Plan. The actual market demand, under present government policies, however, is likely to be lower.

2. The Government can assist the coal industry to obtain an economically justified share in the fuel market (a) by making a general study of the future demand and supply of energy in Chile; (b) by co-ordinating Chilean coal production with fuel-oil production, based on Chilean crude, to serve the best economic interests of the country; (c) by making sure that increased coal production is not inhibited by freight rates in excess of the long-run costs of moving additional quantities of coal; and (d) by investigating closely the economics of increased use of thermal power during the latter half of the Plan period.

Table 7-A

Chilean Fuels Consumption: Actual 1959 and Estimated 1970
by Types of Fuel and Sectors of Use
 (in original units)

<u>Fuel User</u>	1959					1970				
	Coal (th. tons)	Fuel Oil (th. cu. m.)	Diesel Oil (th. cu. m.)	Gasoline (th. cu. m.)	Kerosene (th. cu. m.)	Coal (th. tons)	Fuel Oil (th. cu. m.)	Diesel Oil (th. cu. m.)	Gasoline (th. cu. m.)	Kerosene (th. cu. m.)
Aircraft	n. s.				0.06					0.03
Shipping	0.09	0.09	.03				0.03	0.13	0.04	
Railroads	0.46	0.04	)				0.10	0.04	0.03	
Highways			) 0.21		0.68				0.12	1.10
Electric Power	0.11	0.57	0.05				0.72	0.88	0.06	
Gas Plants	0.18	)					0.18			
Steel Production	0.26	)					0.40			
Cement Production	(0.10)	)					(0.40)			
Other Industries)))				
Nitrate Mines	) 0.43	) 0.43)				
Copper Mines	)	)				) 0.12	1.00			
Other Mines)))				
Domestic and Unspecified Uses	)	)	0.04			)			0.24	
Fuel Producers' Own Use	0.21	-	-	-	-	0.21	-	-	-	-
<u>Total Domestic Demand</u>	<u>1.84</u>	<u>1.13</u>	<u>0.33</u>	<u>0.74</u>	<u>0.25</u>	<u>2.16</u>	<u>2.05</u>	<u>0.49</u>	<u>1.13</u>	<u>0.42</u>
<u>Domestic Output</u> (actual or planned)	<u>1.90</u>	<u>0.27</u>	<u>0.24</u>	<u>0.60</u>	<u>0.11</u>	<u>2.80</u>	<u>1.40</u>	<u>0.48</u>	<u>1.42</u>	<u>0.42</u>
<u>Exports (+) or</u> <u>Imports (-)</u>	<u>+0.06</u>	<u>-0.86</u>	<u>-0.09</u>	<u>-0.14</u>	<u>-0.14</u>	-	<u>-0.65</u>	<u>-0.01</u>	<u>+0.29</u>	-

Table 7-B
Projection of Electric Power Consumption, 1961-70
(in million kwh.)

Power User	Actual			Plan Assumptions 1959			Projected		
	1957	1958	1959		Plan 1961	Plan 1965	Mission 1965	Plan 1968	Mission 1970
Steel (CAP)	150	138	152	150	159	245	234	343	322
Cement	72	112	129	75	86	107	214	128	308
Pulp and Paper	164	193	256	200	312	596	603	791	854
Ferro-alloys and Carbide	75	(75)	81	79	90	117	117	147	147
Manganese	-	-	-	-	100	140	-	140	-
Copper, small mines	(18)	(19)	(20)	20	122	250)	102	270)	336
Quinteros smelter	-	-	-	2	6	15)	-	15)	-
Coal	80	85	89	80	121	143	143	142	150
Pupunahue coking	-	-	-	5	7	11	-	15	-
Other "known" Industries	4	23	31	14	39	116)	924	129)	1,260
Unspecified Industries	526	529	557	535	578	676)	-	760)	-
Total Industry	1,089	1,174	1,315	1,160	1,620	2,416	2,337	2,880	3,377
Transport	136	130	128	140	176	267	267	283	297
Federal and Local Government	204	225	229	242	288	407	367	283	548
Residential and Commercial	549	586	634	560	738	1,281	900	1,837	1,350
Rural	59	65	75	88	131	290	290	527	685
Losses and Power Company Use	369	389	424	401	399	583	509	757	793
GRAND TOTAL	2,406	2,569	2,805	2,591	3,352	5,244	4,670	6,812	7,050
Outside System									
Copper Nitrate		1,246	1,437						
		341	356						

CHAPTER 8

BUILDING AND URBAN DEVELOPMENT

I. THE PROGRAM

1. The building and urban-development part of the 10-year program contemplates investment expenditure of just under E^o 2,900 million, or 29% of the total planned investment. The greater part of the proposed investment in this sector (E^o 1,727 million) is for housing, both public and private; much of the private housing will have to be publicly financed. Of the balance, E^o 687 million will go into building construction other than housing, roughly E^o 387 million into urban development (water and sewer service, paving, etc.), and E^o 75 million into improving the communications system. The program is summarized in Table 8-1, together with the mission's recommendations for revisions.

2. It should be noted that although the mission's cost figures are higher than the Government's, there is only a minor substantive difference between the two: our proposal to spend E^o 6.5 million over the 10 years for housing research and training. Accounting for the greater part of the financial difference, the Government program allowed no funds for land purchase for housing and other building construction. Land purchase is not a new investment from the point of view of the nation as a whole; but it is an expenditure which requires financing both for public and private buildings, and failure to show it as a "cost" understates the magnitude of the fiscal and private financial problems connected with a building program. Consequently, we have added 10% to the Housing and Other Building projections as the estimated cost of land.^{1/}

Housing

3. Based on today's standards and costs, the program's allocation of funds to housing is sufficient only to maintain the per-capita quantity of housing that existed at the beginning of the period, plus the replacement of earthquake losses. That is, excluding the earthquake losses, the program would, in terms of dwelling units, just keep up with the expected population increase and the attrition of existing dwellings. Contemplated expenditures would amount to about 2.7% of Gross Domestic Product (GDP). The average expenditure on housing during the 1940-55 period was about 3.3% of GDP; the rate fell off rapidly after 1955 to an average, through 1960, of only 1% of GDP. The program calls for construction of 538,000 dwelling units as follows (in thousands of units):

	Total	Urban	Rural
Required for population growth	395.0)	422.3	57.7
Normal replacement requirements	85.0)		
Earthquake losses	58.7	22.2	36.5
Total	538.7	444.5	94.2

^{1/} This "cost" is shown separately, or eliminated, in those summary tables of Chapter 1 which show the relation of the investment program to the total economy.

8. BUILDING

Table 8-1

Building and Urban Development Expenditure 1961-70
(in £ million equivalent)

	<u>Government Program</u>	<u>Mission Recommendation</u>
<u>Housing</u>		
Financed by public sector	1,295.2	1,424.7
Financed by private sector	431.7	474.9
Housing research and training (public)		6.5
Total Housing	<u>1,726.9</u>	<u>1,906.1</u>
<u>Other Building</u>		
Financed by public sector	529.7	582.7
Financed by private sector	156.8	172.5
Total Other Building	<u>686.5</u>	<u>755.2</u>
<u>Urban Development</u>		
Financed by public sector	332.4	332.4
Financed by private sector	55.0	55.0
Total Urban Development	<u>387.4</u>	<u>387.4</u>
<u>Communications</u>		
Financed by public sector	14.4	14.4
Financed by private sector	60.9	60.9
Total Communications	<u>75.3</u>	<u>75.3</u>
<u>Grand Total</u>	<u>2,876.1</u>	<u>3,124.0</u>
Financed by public sector	2,171.4	2,360.7
Financed by private sector	704.4	763.3

4. The average production rate would be 54,000 dwelling units a year, or nearly twice the previous peak of 30,000 dwelling units attained in 1959. Even at this high rate of production, the program will fail to make inroads on the estimated deficiency of 317,000 units which existed at the beginning of the decade (as measured by the 1952 census standards). This deficiency arose from two chief factors:

a. The proportion of resources devoted to housing fell to a very low level during the inflationary years prior to 1960, as was pointed out above.

b. In previous years, building was heavily concentrated on housing for middle and upper-income groups, with worker housing falling considerably behind. Available data indicate that the average size of dwellings built during the decade of the 1950's was on the order of 80 square meters, a size considered to be generally beyond the reach of most working-class families. The average size dwelling unit contemplated in the 10-year program is 55 square meters, mostly for workers.

Several alternative programs were considered that would at least partially restore the housing standards of 1952, but a realistic appraisal showed that a bigger program than that now contemplated would claim too large a proportion of total resources and would jeopardize other sectors of the investment program. (To restore the 1952 number of dwelling units per capita would require the construction of 85,000 units a year over the next decade.)

5. As Table 8-2 shows, the plans call for a graduated increase each year, a schedule which the mission believes can be well within the capabilities of the Chilean construction industry, provided that contemplated rationalization procedures are carried out. Although the plan shows that there is sufficient capacity to produce the required building materials, it will take time to organize the construction industry for its expanding role in the economy.

Table 8-2

Estimate of Annual Investment in Dwelling Units, 1961-70

	Dwellings (thousands)	Area (millions M ²)	Investment (E ^o millions)
1961	42.1	2.31	135
1962	44.4	2.44	142
1963	46.8	2.57	150
1964	49.3	2.70	158
1965	51.9	2.85	166
1966	54.7	3.00	175
1967	57.6	3.16	185
1968	60.7	3.33	195
1969	63.8	3.51	205
1970	67.4	3.70	216
Total	538.7	29.57	1,727

6. Among the rationalization procedures implied in the Government program are self-help projects which have already proven practicable in Chile. Another is simplified land development which would provide space and basic utilities, leaving responsibility for the construction of shelters to the occupants. A third possibility is to provide a "core" dwelling unit which can later be expanded to provide standard housing in a satisfactory community. Research (including experimental projects) can prove out these possibilities, as well as other housing methods which will be less demanding on resources than methods commonly used in the past. New methods, boldly used, can help to meet requirements within the limits of both the physical and the financial resources available.

7. More than three quarters of the proposed dwelling units are scheduled for working-class families. Another 16% will be for middle-class, and 8% for the upper-income group. In the rural areas (which are scheduled to get 17.5% of the new housing) nine out of 10 dwelling units will be for the working classes. Probable costs of the program have been developed from studies of previous experience which give average house size in terms of square meters of floor space in working-class, middle-class, and upper-income dwellings. These data, which also show the average cost per square meter, lead to the conclusion that a suitable working-class dwelling can be built for E^o 40 per square meter, a middle-class house for E^o 65 per square meter, and a dwelling for the upper-income group at E^o 100 per square meter. These figures were used in the computation of annual costs. Table 8-3 shows the distribution, over the entire 10-year period, of the proposed housing construction among the three broad classes of occupants.

Table 8-3

Construction of Dwellings by Income Class, 1961-70

<u>Urban Area</u>	<u>Number of Dwellings</u>	<u>Percentage of Total</u>
Working-Class	321,090	72.2
Middle-Class	86,070	19.4
Upper-Income	<u>37,340</u>	<u>8.4</u>
Total Urban	444,500	100.0
 <u>Rural Area</u>		
Working-Class	85,630	90.0
Middle-Class	1,980	2.1
Upper-Income	<u>6,590</u>	<u>7.0</u>
Total Rural	94,200	100.0
 <u>Totals by Class</u>		
Working-Class	406,720	75.5
Middle-Class	88,050	16.3
Upper-Income	<u>43,930</u>	<u>8.2</u>
Grand Total	<u>538,700</u>	<u>100.0</u>

8. The mission agrees with the program planners that the bulk of the housing construction will require public financial aid, even though eventual ownership will be private. Of the programmed expenditure of some E^o 1.7 billion, the mission estimates that about E^o 1.3 million would have to be financed initially with public funds, leaving only E^o 0.4 billion to be financed entirely through private sources. (To both figures the mission would add 10% to allow for the cost of land, as previously explained.) A substantial amount of "public" financing will come from the various social security funds, which have traditionally invested their reserves in housing for their members. We expect that over the 10-year period there would be a recovery of approximately E^o 250 million of public funds through rent receipts and loan repayments.

Building Construction Other Than Housing

9. The program for building, excluding housing, is for such structures as schools, hospitals, public buildings, commercial buildings, installation work on commercial premises, and other miscellaneous building. The plan is based on studies of national requirements.

10. The school building allocation contemplates an increase in school population of about 640,000 students in primary, intermediate and university institutions, requiring approximately 2,680,000 square meters of school buildings at a cost of approximately E^o 171 million. The targets in hospital construction are based on a standard of 6.56 hospital beds of all kinds per thousand inhabitants. On this assumption, 780,000 square meters of such buildings must be constructed in the 10 years, providing a total of 19,300 beds at a cost of E^o 87.5 million. The mission feels that there should be a re-examination of the public-facility requirements, particularly for schools and hospitals, in light of the anticipated improvement in communications. Better roads and other means of communications will result in greater mobility of the population, and will probably increase the demand for schools, hospitals, and community-service buildings.

11. Public buildings are usually constructed through the Office of Architecture in the Ministry of Public Works. The public building sector, other than schools and hospitals, is considered to be of relatively low priority, an opinion shared by the mission. Work is expected to continue at the present rate of 40,000 square meters per year for the 1961-70 decade at a total investment cost of E^o 29.4 million.

12. Commercial buildings--hotels, theaters and offices, markets and commercial-premise installations in general--are considered in the realm of private enterprise. Estimates suggest 2.6 million square meters of these types of structures will be built during the decade, at a cost of E^o 364 million. The cost of reconstructing buildings destroyed in the earthquake, amounting to an estimated E^o 33.6 million, must be added to the total for building other than housing.

Table 8-4

Building Other Than Housing
(in millions)

	<u>Square Meters</u>	<u>E^o</u>
School Building	2.68	171
Hospital Building	0.779	87
Public Building	0.420	29
Commercial Building	2.60	365
Reconstruction	—	<u>34</u>
Total	6.479	686

Urban Development

13. The principal expenditure contemplated for urban development is the extension of potable water supply and sanitary sewers. Based on estimates of urban population growth and conservative standards for water requirements (250 liters, or about 66 gallons, per capita per day), E^o 182.0 million will be required over the decade for water supply. Sewerage services in communities of over 5,000 inhabitants are expected to cost E^o 78.9 million. Urban paving, public lighting, and various municipal works, including flood control in urban areas, are given a relatively low priority and are continued at approximately the going rate at an anticipated cost of E^o 126.3 million over the period. Although these estimates contemplate quite low standards, the mission is in agreement with the Government that the anticipated expenditures cannot be exceeded without jeopardy to the total investment program.

14. The plan is thought of as a flexible pattern of global figures which from year to year must be adjusted in the preparation of annual budgets to take into consideration the details of area and community development.

15. The following table summarizes the urban works sector, excluding communications:

(E^o millions)

Water works	182
Sewerage works	79
Urban streets (paving)	103
Street lighting	5
Miscellaneous urban works	<u>18</u>
Total Urban Works	387

II. BACKGROUND FOR THE PROGRAM

16. Because of the great contrast in weather and topographical conditions in Chile, there must be considerable versatility in the establishment of standards for housing and urban development. In the dust deserts of the north (roughly a thousand miles) neither rain nor snow are a problem. Communities and street patterns can be designed without consideration of drainage; and although dust is a serious problem, paving is hardly essential to all-weather urban intercommunications. The basic purpose of a dwelling unit in the dust deserts is to provide privacy and relief from the sun and wind. By contrast, in the area south of the industrial midlands to Cape Horn, urban-development plans must reckon with heavy rains and snows. Construction seasons are short. Dwelling units must provide tight shelter not only against rain and snow, but also against bitter cold. Town sites also vary considerably. On the central plains, the level ground encourages and aggravates the tendency to "urban sprawl," i.e., a low-density urban population over a large area, which raises the cost of water, sewers, streets, and other municipal services. In the mountainous regions the topography crowds and cramps urban development.

17. These highly varied conditions make it necessary to tailor housing and urban-development plans to each area of need, and compound the difficulties of carrying out even a modest program. Judged by past performance, the present program is not physically a modest one, certainly not in the fields of urban housing and the extension of water and sewer facilities. However, Chile is fortunate in having legislation, administrative organization, and institutions already in being to give the country a good chance of success.

Legislation

18. As far back as 1906 Chile had legislation which established a Housing Council, provided some funds for the construction of workers housing, and set out certain minimum sanitary standards for workers' houses. This basic legislation has been broadened and strengthened throughout the years, culminating in 1959 in an act known as the Housing Plan of 1959 (Plan Habitacional). This act, together with the implementing regulations authorized by it, is of wide scope. Its purpose is to channel housing investment, to the maximum extent possible, into the area of greatest need, i.e., into the construction of low-cost housing primarily for the working class. It does so by limiting public housing and housing financed with public funds (or publicly guaranteed funds) to dwelling units of modest size and cost. The maximum size is set at 140 square meters, and the maximum space per inhabitant is set at 17.5 square meters. Thus, the maximum-size house qualifies only if it has sleeping space for eight people. The Department of Architecture in the Ministry of Public Works is authorized to establish appropriate standards of construction and design. To encourage private builders and developers to enter the low-cost housing field, the tax on income derived from low-cost housing is reduced and rent control is suspended--with the proviso in both cases, of course, that the structure

meets the standards set by the act and the regulations. Private builders complying with the standards are also often given remission of several miscellaneous charges, such as for deed registration, utilities connections, etc.

19. The legislation also authorizes the organization of savings and loan associations. Chartered by a new guarantee and supervisory agency known as the Central Savings and Loan Institution (Caja Central de Ahorros y Prestamos). Initial capital for the Caja Central--which can be relent to the individual savings and loan associations (15 have already been chartered)--consists of E^o 5 million from the Government of Chile and two loans of \$5 million each from the United States Development Loan Fund and the Inter-American Development Bank.

20. A unique feature of the savings and loan scheme is the establishment of a unit of account--the cuota--which is supposed to remain constant in real terms. One cuota is intended to have the value of 1,000 pesos, or one escudo, in 1959. Loans and repayments are made in cuotas. Periodic changes in the monetary value of the cuotas are made by reference to an index (developed independently by the Bureau of Statistics and Census), based on changes in average wages and salaries. The system is designed to protect against the inflationary forces which in recent years have made long-term home financing a most precarious undertaking for the lender, and which have brought windfall profits to the people, mostly middle- and upper-income groups, who have been able to secure long-term financing expressed in fixed monetary units. As of June, 1961, the cuota was valued at 1,320 pesos. The mission realizes that the equity of this arrangement will depend on how accurately the value of the cuota reflects the changing value of the escudo, but it seems obvious that the arrangement will be more equitable than the conventional financial arrangements under which prospective inflation is discounted by high interest rates. If the system operates effectively, it should provide an important protection to housing-finance schemes.

21. Since the savings and loan associations in Chile are relatively young, it is not likely that they will become a major source of housing financing for some years. It is the general rule that loans for housing can be made only to depositors, and that the amount of a loan to any one depositor is related to the amount of his deposits. Furthermore, the total of all loans cannot exceed the amount of total deposits except to the extent that the association can borrow outside on the security of mortgages that it holds. At present, this outside borrowing power is limited to the E^o 15 million mentioned above; this compares with an average contemplated expenditure of \$173 million per year over the next decade. Very few members of the low-income groups, at whose problems the housing program is basically directed, would be able to borrow from these institutions in any case.

22. A public agency called CORVI (Corporación de la Vivienda) has worked out a system of convenios under which a depositor pledges to save

a certain amount monthly over a stipulated period of time, at the end of which CORVI is committed to make a housing loan. The amount of the loan varies with the monthly savings and the period. If the savings are accumulated rapidly (in six months), the CORVI commitment may be to finance 56% of the cost of the dwelling unit; if the savings accumulate over a longer period (15 years), the CORVI commitment can be to finance as much as 78% of the cost. Some private savings and loan associations are reportedly wanting to have the regulations changed so that they, too, can make such commitments.

23. The mission recognizes the convenio system is a strong stimulant to savings and that increased savings are, of course, essential if the housing program is to grow to meet the increasing demand. However, several operating features of this scheme must be perfected if embarrassment to the housing program and the Government are to be avoided. The scheme should be carefully reviewed and, if found necessary, controls should be invoked to avoid or reduce the competition offered the private savings and loan associations. But more important, the CORVI convenio commitments virtually are government commitments and the volume of such must be controlled within the limits of funds accumulated or appropriated for the purpose. Such controls could be effected either by suspending the execution of convenios of certain maturities, by increasing interest rates and thus tending to reduce the volume of these maturities, or by establishing periodically limiting totals of convenio commitments to be executed for each maturity. A study should be made of this control problem, with emphasis on the limited experience in Chile as well as to experience elsewhere.

24. Other legislation relates to the investment of social-security-fund reserves. For many years there have been a large number of social-security-funds in Chile. These funds--known as Cajas--came mostly from payroll taxes as a form of forced savings. The basic legislation permitted investment of the funds in real estate; and they have been used extensively for this purpose, especially for the financing of white-collar and middle-income housing. Present law requires that surpluses in eight of these funds be made available for financing the Housing Plan, which is to say that with certain exceptions, surpluses must now go into low-cost housing.

25. It is also required by law that the larger business entities invest 5% of their net profits in one way or another on housing for workers. It was the mission's observation that this particular legislation has not heretofore had much of an impact on the housing shortage in Chile. In urban areas "company housing" evidently has not been adequate in supply for the workers. In the remoter locations, such as the mining communities, the companies are forced to provide adequate housing, regardless of legal requirements, in order to retain their labor force.

Institutions

26. CORVI. By far the most important agency in the housing field, CORVI, was organized in 1953 and operates under the Ministry of Public Works. It

now has offices, 20 in all, in the principal population centers in Chile. Since 1953, it has been responsible for nearly 40,000 housing starts valued at E^o 233 million. As would be expected, CORVI's responsibilities have grown along with the organization's own experience and with the increased emphasis on housing. In 1961, its budget was approximately E^o 89.5 million.

27. CORVI is now well equipped to do design and supervision of contract construction of housing. With the exception of its aided self-help housing projects--one of the largest such programs in the world--CORVI's own housing projects are awarded to private contractors by competitive bid. To some extent in recent months, private architectural firms have been retained for design and planning work.

28. During its early years, CORVI concentrated on the production of dwelling units for rental, and it still operates a considerable rental program. Since 1959 the emphasis on new works has shifted almost completely to production of housing for sale on a monthly payment plan. CORVI's financial resources come from the National budget, from the social security Cajas, from savings of individuals, and from the percentage of profits of larger business entities allocated by law to worker housing. CORVI is the major implementing arm of the Housing Plan of 1959 so far as it concerns public building or public financing of housing.

29. The work now under way includes multi-story, dense urban apartments and simple self-help construction programs; the work ranges from permanent masonry housing to the lightest temporary wood-frame construction. Mission members made an on-the-spot review of work under way on some 25 projects in various locations in Chile, and were convinced that CORVI is a well-organized agency with the capacity to carry out its responsibilities under the 10-year program. But the mission also observed that CORVI's effectiveness has in the past been hampered by the lack of clear national objectives in the housing field, by inadequate foresight in town planning, and by the unfortunate tendency of water and sewer extensions to follow, rather than lead, the completion of new residential areas.

30. The Emergency Housing Foundation. Quantitatively, the Foundation (Fundacion de Vivienda de Emergencia y Asistencia Social) has been much less important than CORVI in the housing picture. During its 12 years of life, it has been responsible for the erection of some 7,000 dwelling units, compared with CORVI's nearly 40,000 in eight years. However, the Foundation's purpose to date has been not so much to produce housing in quantity as it has been to develop an approach to shelter for the lowest income groups. So far the Foundation has dwelling units in 65 housing communities scattered throughout the country.

31. The Foundation is aimed at the heart of the slum problem in that it concentrates on the lowest income groups. The Foundation's normal method of operation is to resettle, in adequate living quarters, families which have

been housed in substandard and often dangerous quarters, at a rent that they can pay and under a training program that develops the family's home management and ownership potential. Following principles adopted by public housing agencies in many parts of the world, the Foundation recognizes the need of most of the families it deals with to have guidance in home making and in adjusting to a better type of dwelling facility. A well-organized corps of social workers and home demonstrators (educadoras familiares) are in frequent contact with the families during the early months of their adjustment period. For the first two years the families are charged a rental related to their ability to pay. When the family has completed two years of tenancy in a satisfactory manner, the tenant may, if he finds it possible and convenient, purchase the dwelling on a payment plan adjusted to his means. The good maintenance and rent-paying record attest to the success of the Foundation as a housing agency.

32. With rents geared to ability to pay, it is the general rule that families in Foundation settlements pay widely varying rates for substantially equivalent housing facilities. A very low income tenant may pay as low as E^o 3 a month while other tenants in the same development are paying E^o 13 or E^o 14 for identical quarters. This system of graded rents seems to be well accepted by the people living in Foundation housing. Perhaps this is because even at the higher levels of payment there is some element of subsidy involved. The long-term objective should be to keep such subsidies at a minimum. We recommend as a policy the present objective to reduce the subsidies gradually as the training or changing wage level of the tenants brings about an improvement of their incomes.

33. The Foundation operates within the budgetary purview of the Ministry of Public Works. It receives budget allocations from the Treasury and can receive donations and assistance from other sources. Its income from rentals covers substantially its operating and maintenance expenses; the budget for 1961 is approximately E^o 5 million. The mission was favorably impressed by the operation of the Foundation and by the staff. We are confident that it would be feasible to increase the scope of this agency extensively, perhaps to more than double it in the course of the next year or year and a half. The Foundation would seem to be the logical agency to carry out many of the housing projects recommended later in this chapter.

The Construction Industry

34. Past performance indicates clearly that the construction industry in Chile has sufficient flexibility to undertake the contemplated program. In the field of housing, the programmed construction of 2.31 million square meters in 1961 is less than the volume of production in the peak year of 1954, when 2.73 million square meters of housing were built.^{1/} The projected growth rate in construction of housing is about 8% a year; thus not until 1963 will the construction industry have to equal its 1954 performance.

^{1/} However, the number of dwelling units constructed was greater in 1959 than in 1954.

35. It would not be proper, however, to assume that the construction industry can surpass its past record with ease. One difficulty is that the characteristics of the planned housing construction will vary considerably from that of previous periods, and the changed characteristics will require some reorganization of the industry. In particular, construction of dwelling units will be spread all over the country in smaller projects and in rural and self-help types of work; administration of such projects is much more complicated and requires more key men than is the case with larger housing projects in high-density urban areas. On the other hand, this same characteristic of the new program, coupled with a predictable 10-year demand for housing construction, will make feasible the organization and utilization of smaller construction companies operating continuously at a relatively high rate of efficiency. In major cities an assured 10-year market should induce the larger builders to organize themselves for long-term contracting, and to mechanize in order to improve labor productivity.

36. There is no reason to expect a general shortage of building materials. Building materials used in low-cost housing construction are of a wide variety, almost all of domestic origin, and are well distributed over the country. Of course, local shortages of some components might occur, but reasonably careful planning should minimize this possibility.

37. The construction labor force will need to be more than double the 1960 level before the end of the decade. During the latter part of the program, the net increases in labor range from 10,000 per year to about 18,000 annually. Most of the work is such that relatively low skills will be acceptable, thus making it possible to expand the bulk of the construction labor force rather rapidly. Nevertheless, there is already an apparent shortage of skilled labor and much need for improvement in the quality of building work, especially in the finishing stages. The contractors' association (Camera Chilena de la Construccion) has been instrumental in starting some training programs in Santiago; very satisfactory results have been reported.

38. Much non-housing construction, including urban development, is contracted through the Ministry of Public Works or by quasi-government construction corporations. With the exception of certain water works for the metropolitan area of Santiago, all water and sewer works are operated by the Department of Sanitary Works in the Ministry of Public Works. The Paving Department of the Ministry of Public Works is responsible for most urban paving, although some of the larger municipalities handle this work themselves. Design of schools and other public buildings is done in the Architecture Department of the Ministry of Public Works, with design of hospitals handled by the Ministry of Health; construction is normally let to contract by the quasi-public corporations. There is evident need for better coordination between the school and housing program to promptly meet the school needs generated by the building of new communities; it is proposed to have CORVI take over school construction in communities where it has programs under way.

III. APPRAISAL: HOUSING POLICY AND THE URBAN HOUSING PROGRAM

39. This section gives the mission's appraisal of the general aspects of the housing policy as they apply to urban and rural housing, plus a discussion and appraisal of the urban housing program. Although the 10-year program contemplates that only 17.5% of the new (or renewed) housing structures will be in the rural areas, we believe that some aspects of the rural housing program are important and unique enough to deserve a special section, which follows this one.

Limitations of the Program

40. The mission has noted that, judging from past performance in Chile, the scheduled production of new or renewed housing facilities is not modest. Over the 10-year period, production would rise from 42.1 thousand dwelling units in 1961 to 67.4 thousand dwelling units in 1970.^{1/} This compares with a peak construction rate of 30,000 dwelling units in 1959. As pointed out above, however, we believe that the construction industry in Chile is capable of taking on this formidable task, from the point of view of organization, availability of materials, and availability of a labor force. But the job will not be easy; it will require administrative flexibility and cooperation between Government and private enterprise, which must be counted on for much of the physical construction work and part of the financing.

41. But if the projected production rate is not modest, the housing goal most certainly is. In the final analysis, it aims only at keeping up with the expected population growth and attrition of existing housing, so that by 1970 the number of dwelling units per capita will not be less than what it was in 1960--although it is to be hoped that the average quality of the dwelling units will be higher. But even accounting for an increase in quality, it is obvious that a tremendous effort is required to prevent further substantial deterioration. To accomplish the planned work and to do it at the least cost, the mission recommends most strongly that the Chilean authorities concentrate on two priority tasks. The first is to bring the housing organizations to a peak of efficiency, both the Government agencies and the private enterprise organizations which will carry out most of the work, including management. The second is to perfect programs designed to maximize the amount of usable housing per escudo spent; some of these programs have already proved their value.

Planning

42. The mission was impressed with the improvement in performance achieved by giving more attention to the coordination of planning activities and to the implementation of plans. Especially in urban housing developments, coordinated planning and implementation is the essence of success. The successful housing venture must provide not only shelter, but also all the other facilities that make a modern urban complex a productive place to work

^{1/} See Table 8-2.

and live. Planning for housing and urbanization work in Chile is conducted at two levels: agency and project or community.

Agency Planning. The most important step is program planning in each of the several operating agencies: the Ministry of Public Works, the utility agencies, the Ministries of Health and Education, CORVI, the Foundation. Resources should be allocated at this level for regions or projects according to priorities determined by the stage of the program, and in proper relation to the activities of other agencies in other projects.

Project Planning. All of the essentials to make each housing community operate successfully must be contemplated. At this level, timing becomes most important. Attention at the local level must be provided for land acquisition, utilities development, schools, shopping centers, transportation facilities, recreation, markets, etc.; these must become operational in a timely manner so that the community becomes reasonably complete at the time of occupancy.

43. Planning skills at agency and at project levels have not advanced sufficiently to meet the demands of the housing program. The program, as it is progressing, shows a need for implementation of skills in the essentially operational activities. For example, the mission has observed that high-level planning has proceeded energetically, for both rural housing and for directing the housing effort towards the lower-income groups, but without agency and project planning on a commensurate basis. In a number of projects, especially in the earthquake zone, the various elements in community building have fallen out of step: the major difficulty here, as elsewhere, is that installation of utilities is lagging behind housing production. Indeed, there is an urgent need to step up the sanitation and other supporting elements of urban development. In the early years of the program, some awkward phasing is to be expected; the mission only wants to point out that all segments must be completed before there is really a useful housing project in being.

44. Good planning is usually based on good research. The mission is recommending the provision of E^o 6.5 million over the 10-year period for research and training directed towards finding and putting into effect more efficient methods of housing planning and production. The increased financial cost is infinitesimal when compared with the total cost of the housing program. We list it separately to emphasize its importance. In the field of community improvement, there is no better investment for Government than a small sum devoted to finding better ways of doing what has to be done, and training people in the new methods. From a study of self-help projects, as well as study of other types of housing projects, answers can be obtained to a number of important questions. What economies are possible with different use of materials? With different construction methods? With improved accounting, reporting, and other administrative methods? With different land use and exploitation? It stands to reason that experience in Chile, combined

with an analysis of experience elsewhere in the world, would be bound to yield better answers to those and similar questions.

The Nature of the Urban Housing Problem

45. We have already pointed out that the focal point of the housing problem in Chile is in the lower-income groups. For this reason, over 70% of the projected urban housing units are classified as workers' housing. As would be expected, the most urgent problem is the lowest income groups. In common with many other countries, Chile in recent years has experienced considerable migration to the cities. Many of the migrants have settled in callampas¹/--squatters' villages--which are characterized by makeshift shacks, overcrowding, and an impossible pressure on the water and sanitation facilities (which were already inadequate).

46. This, of course, does not mean that adequate housing for workers of moderate income, living elsewhere, should be neglected. This, too, is a necessity, and should proceed at a reasonable rate.

Self-Help and "Core" Development

47. The mission believes that one of the most promising means of attacking the callampa problem--with limitations elaborated below--is through the extension of self-help projects of the type which have already proven successful in Chile. The general pattern (with, of course, local variations) is as follows: land is acquired by a public agency, usually CORVIL, and subdivided into minimum building lots, on the order of 15 to 20 lots per acre. Basic utilities are installed, streets are laid out and sometimes paved. The siting of the house is designated for each lot. Participating families then move onto the lot and build, by whatever means they can, a minimum of two rooms of shelter, situated so as not to interfere with the building of the permanent structure. The initial dwelling is often no better than a callampa shack, except that it is in better surroundings. The participants are then organized into groups of 20 to 30 families, usually within one block; these groups then take on the task of building, cooperatively, each other's permanent houses with materials furnished by the sponsoring agency (but ultimately paid for by the participants) and under the technical guidance of qualified construction personnel. The work proceeds on the familiar one-job-at-a-time pattern, e.g., foundations for all houses, then exterior walls and a roof, and finally interior finishing. Final completion of all houses is virtually simultaneous. Each family is required to contribute a certain amount of effective labor each week, normally 20 hours, and a strict accounting of time is kept. Working hours on the project are adjusted so as not to interfere with working hours in regular employment. The participants perform only the work which requires relatively simple skills; the more complicated operations, such as installation of plumbing and electricity, is done on contract with experienced labor.

1/ A callampa is a small mushroom that grows spontaneously in the springtime in gardens and orchards overnight in numberless profusion.

48. Although it normally takes up to two years to complete a project, the impact of the improvements is felt much faster. Long before the permanent dwellings are completed, community cohesion and community life begin to develop; the degrading and depressing characteristics of callampa life begin to disappear.

49. In a number of the completed communities, such facilities as schools, shopping and recreation centers, transportation arrangements, and regular refuse collection have been coordinated by the sponsoring agency. In others they have not. The mission believes that, in the future, self-help projects should always include the planning and scheduling of such services; they should be properly time-phased so that these essentials to community living will not be lacking for any significant periods. Without these essentials, a reversion to the haphazard callampa way of life might easily occur.

50. A variation of the basic self-help scheme has also been successful in some cases. In this variant, the sponsoring agency subdivides land as outlined above, and installs water and sewerage facilities. This is often done by putting a concrete core--on the building line of a pair of lots or at the convergence of four lots--and installing kitchens, lavatories, bathrooms, and showers, built back to back. Each participating family then builds its temporary shelter, and later the self-help groups build their permanent homes connected with the bathroom and kitchen core.

51. The self-help program is not without its critics. One difficulty, as pointed out above, is that construction takes an inordinately long time. This, of course, is to be expected with part-time labor not trained for even relatively simple construction tasks. The system is practical only for low-density developments (amateur cooperative construction is hardly feasible in the case of multi-story structures) and low-density development in urban areas adds greatly to the cost of land and of providing such services as water, sewerage, paving and electricity. There has been some friction due to an inadequate understanding by the participants as to just what their labor and financial contribution will have to be. Some of the existing communities, ranging up to 1,000 dwelling units, appear to the mission to be too large. These tend to concentrate too large a group of low-income families into a single area, which, like a poor phasing of community development, creates a tendency to revert to callampa life.

52. Another difficulty at present is that CORVI, in spite of its obvious success with these developments, appeared to the mission to be reluctant about expanding the self-help activity. This, we feel, is because CORVI conceives of itself as primarily a home-building institution, and not an agency to manage real-estate developments once they have been completed. Nevertheless, in the case of self-help and similar projects, continuous management is required, and it is a type of management which must combine business-like principles with the less precise skills of social workers. For example, it appears to the mission that an essential feature of a housing program that combines the building of human values along with the mere building of houses

would be the kind of family-education work that has been carried on quite successfully by the Foundation. Families participating in the self-help projects should know in advance exactly what their financial and working-time obligations will be. But, more important, they should be guided through the difficult period of readjustment to responsible community life through the proven system of educadoras familiares which the Foundation has perfected. The mission recommends careful study in CORVI as well as in the Foundation in order to develop some of the excellent features of both organizations. We cannot overstate our conviction that continuous management, from the inception of a program throughout its useful life, must be a responsibility that the sponsoring agency is willing, prepared, and able to take on.

Other Urban Housing

53. Obviously there are urban housing problems other than those affecting those present callampa dwellers who can to some considerable extent be relocated in self-help projects. There is no particular problem now seen by the mission which affects the provision of housing for the higher-income groups. These groups can somehow arrange their own financing, and the building industry is quite capable of meeting their needs without reducing the capacity to meet the requirements for more modest dwelling units.

54. The problems which the mission does foresee are, basically, two. One is the problem of relocating callampa dwellers in areas not suited to self-help projects, particularly where land is scarce and high-density housing is the only answer. The other is the problem of providing replacement and improved housing for those many families of moderate incomes who need only limited help and guidance from government agencies.

55. The mission believes there is only one answer to the first problem. This answer is multi-story publicly financed housing at subsidized rentals. CORVI is the logical agency to supervise the building of this housing and to manage it once it is built.

56. With respect to housing for workers who neither require nor want publicly constructed housing, there may nevertheless have to be public financing, or at least a public guarantee of private financing at reasonable rates of interest. Government, through CORVI, should continue to stand ready to make loans to private developers of low-cost housing, supervising the standards and the payment arrangements. The basis for this already exists in the Housing Law, and some of the financing is provided through the housing-investment requirement for business entities, etc. The mission doubts, however, that sufficient financing will be forthcoming from current legal provisions. Therefore we expect--and our estimates reflect--substantial annual financing through the Government budget. However, there will also be substantial additional Government income arising from rent receipts and repayment of housing loans. The mission estimates that, in the course of the 10-year program, Government income from these sources will amount to approximately E^o 250 million. This is an important offset to the gross cost of the over-all program.

IV. APPRAISAL: RURAL HOUSING

Rural Housing Need

57. The urgent need for urban housing replacement and renewal should not be permitted to overshadow the equally urgent need for improved rural housing facilities. Construction of new rural dwelling units has been at a virtual standstill for a number of years. Furthermore, the quality of rural housing is considerably lower than even the generally poor quality of existing urban housing. As is the case with urban housing, the Government program aims only at maintaining the per-capita number of rural dwelling units that existed in 1960, which means an estimated 94,200 new units to be built during the decade. A building program of 155,000 houses would be required to restore the 1952 standard of rural housing. The 1959 agricultural census indicates that to meet reasonable standards of shelter, sanitation, and privacy, at least half of the rural dwelling units should be replaced and another large percentage should have major repairs; the census leads to the conclusion that 220,000 totally new rural houses are needed, and that 100,000 should be repaired.

58. The mission is mindful of two considerations that seem to point in opposite directions. The first is that better rural housing facilities are essential to the success of the Government's agrarian-reform program. Studies show that three-quarters of the permanent farm labor force would prefer to remain in rural areas if living conditions were tolerable. Decent rural housing will stimulate agricultural production, help to stabilize rural life, and retard to some extent the accelerating migration to the urban centers. Furthermore, because of simpler utility systems and the lower cost of site acquisition and development, rural housing involves less social overhead cost than the equivalent amount of urban housing. These are some of the arguments in favor of enlarging the rural housing program. On the other hand, it is obvious that more expenditure on rural housing would be at the expense of other segments of the total investment program. The financial resources available for the 10-year program do not permit taking care of all urgent needs at once. Consequently, the mission's approach to the rural housing question parallels its approach to the urban housing problem. We accept the Government's proposed expenditure figure (adjusted only for the cost of land acquisition), but we recommend ways in which physical results, in the form of new or improved dwelling space, can exceed the Government's expectations at the same total cost.

Rural Population Groups

59. From the point of view of the housing problem, three distinct rural population groups can be distinguished. About 80,000 minifundistas operate small farms, usually on the margin of subsistence farming. Another 80,000 inquilinos are permanent farm workers tied to some extent to the great farms, or fundos. Some 220,000 afuerinos--literally, outsiders--are migratory or seasonal workers who usually have no tillable land of their own. Although some

of the minifundistas are adequately housed, the general standard is low; dirt floors, poor sanitary facilities, and inadequate protection from the elements are common. The quality of inquilino housing varies considerably, but most of it is substandard. A check study of 100 inquilino families showed that 74 had inadequate housing, including dirt floors, bad light, bad ventilation, no sanitary or washing facilities, and unsanitary or highly inconvenient water supply.

60. As a rule the inquilinos live on the fundos near their work. Their housing plight is aggravated by the custom of crowding the migratory and seasonal workers--the afuerinos--into inquilino houses during the working season. Two or three families are consequently squeezed into inquilino huts which are usually not really adequate for a single family. A recent survey indicated three to four persons per bed, with the usual unhealthy surroundings which accompany crowding on that scale. Provision of afuerino housing would result in an immediate improvement by relieving congestion.

61. The proposed land redistribution program (described in Chapter 4) would result in resettlement of 30,000 to 40,000 families drawn from all three of these groups. A special approach may be necessary for these families, but until more definite plans are formulated by the Government, one of the two different approaches suggested here should take care of them.

62. The two schemes which we suggest are: home improvement loans where existing structures are well located and can be improved, and the creation of new rural or expanded communities, complete with community facilities.

Home Improvement Loans

63. The mission believes that the major beneficiary of home-improvement loans would be the minifundistas whose way of life--i.e., typically operating a small family farm--would make them prefer to improve their present housing condition rather than to be relocated away from their land. Along with such loans should go a certain amount of technical assistance and a system of demonstrating the methods and advantages of standard improvement techniques. The program should aim at such simple, yet valuable, improvements as better roofs, the elimination of dirt floors, better water supply and sanitary conditions, and added living space when overcrowding exists. We believe that loans up to E^o 1,000 (and averaging about E^o 750) would be appropriate. Such a loan program, increasing at the rate of 1,000 loans a year, could reach 45,000 families by the end of the decade.

64. The second most important beneficiaries would the inquilinos--and incidentally their employers. In general, we are in favor of compact inquilino settlements so that these families can get the superior benefits of community life. In some cases the maintenance of high rural productivity and the economy of operating farms in large units requires a large population of inquilinos--say 100 to 200 families--on a single farm. This number of families is sufficient to populate a compact village on the farm premises.

Improvements would consist of repairing and up-grading existing housing--as would be the case with home-improvement loans to the minifundistas. But in addition there could be the installation of true community facilities such as schools, clinics, sanitary installations and water supply, etc. As a condition of assistance, the farm management should be required to set aside adequate land for community facilities and for potential expansion of the village tract. Since in most cases entirely new villages might have to be built on the fundos, we would estimate the cost of loans of this type at an average of E^o 2,000. It would be preferable for the loans to be made to the fundo management, but direct loans to the inquilino also should be considered. With 500 housing starts the first year, and an annual increase at the same rate, 22,500 inquilino families could be re-housed (or have their present housing vastly improved) during the decade.

65. Home-improvement loans should be at a rate of interest and with repayment terms tailored to the prospective earning capacity of the borrower. As has been the case with the dwelling units in existing Foundation communities this might lead to different charges for similar loans; however, as we noted earlier, tenants and owners in the Foundation projects have generally accepted such differentials without complaint.

New Rural Communities

66. The mission believes that a vigorous effort should be made to create entirely new rural communities (or new and improved extensions of existing ones) for the afuerinos and for the inquilinos now tied to fundos not large enough to support a minimum-sized village community. We are convinced that an essential factor in agrarian reform in Chile is a shift from family living in scattered, isolated, and inadequate housing facilities to living in communities, where the economies of scale will permit provision of social benefits which in themselves raise the standard of life: schools, medical care, sanitation, etc. Group living also fosters economies through the exchange of skills and talents.

67. Our conception of new rural housing, therefore, centers around community development. Groups of houses should be located at crossroads or other strategic points where farm labor is needed. Well-laid-out rural villages providing about one acre per dwelling unit could be started by contract construction using wood-frame houses in the south and masonry houses in the central areas. By the very nature of the problem, much of the rural community building will have to be sponsored by CORVI or the Foundation, using methods that have proved practicable elsewhere. Expansion and improvement of existing village tracts could well follow the self-help pattern. Also, self-help housing projects can follow the initial contract construction of entirely new communities.

68. We estimate that with careful planning some 53,000 rural housing units can be constructed in new or expanded villages over the next decade at an average cost, including the cost of community facilities, of E^o 3,000.

Administration

69. A widely scattered rural housing program of this nature, with rather small concentrations of work, involves administrative problems which are inevitably more complex than those connected with major urban construction programs. But the problems are not insoluble, and some experience has already been accumulated as a guide to coping with them. The Foundation has had several rural housing or village nucleus programs; it appears competent to expand such programs considerably. Following the same general rental or operating patterns developed in its urban work, the Foundation has recently undertaken pilot projects, with the financial assistance of the United States Government, for rural workers in the earthquake zone. Ten small communities, varying from 40 to 70 dwelling units in size, are in the process of construction. Four more projects are under consideration. The total in this pilot project is about 1,000 dwellings; but the experience which the Foundation will gain should add to its capacity to undertake a major role in the rural housing program.

70. CORVI, which has offices in many administrative centers servicing all the provinces, should be in a position to extend its home-improvement loan service throughout the rural areas. There is need for recruiting and training a substantial number of rural housing planners; and there is also a need for ensuring close cooperation with the resettlement activities of the Ministry of Agriculture, and with the Ministry of Public Works where water supply, sanitary services, and roads are involved. In many cases, when the rural housing planners actually get into the field, they will find that the nucleus of a modernized rural village already exists; in this case, the advantages of existing schools, water supply, roads, communications, etc., would be obvious, but could be realized only with the cooperation of the Ministry concerned with the auxiliary facility. The same consideration applies, of course, when new educational and health facilities must be provided for new communities. The important point is that the rural-housing program cannot be left in the hands of one or two Government agencies alone. It requires a coordinated effort to carry out what must be accepted as national policy.

Appendix Table 8
Construction: Ten-Year Investment Program
 (in E^o millions)

	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1962-65</u>	<u>1966-70</u>	<u>1961-70</u>
<u>A. Housing</u>								
<u>Program</u>								
Financed by public sector	115.0	116.0	117.0	118.0	120.8	471.8	708.4	1,295.2
Financed by private sector	20.0	26.2	32.9	39.9	45.5	144.5	267.2	431.7
Total	135.0	142.2	149.9	157.9	166.3	616.3	975.6	1,726.9
<u>Recommended</u>								
Public - as in Program	115.0	116.0	117.0	118.0	120.8	471.8	708.4	1,295.2
Add 10% for land purchases	11.5	11.6	11.7	11.8	12.1	47.2	70.8	129.5
Cost of Public Housing	126.5	127.6	128.7	129.8	132.9	519.0	779.2	1,424.7
of which: rural	-	7.8	11.0	14.2	19.0	52.0	185.8	237.8
urban	126.5	119.8	117.7	115.6	113.9	467.0	593.4	1,186.9
Private - as in Program	20.0	26.2	32.9	39.9	45.5	144.5	267.2	431.7
Add 10% for land purchase	2.0	2.6	3.3	4.0	4.6	14.4	26.7	43.2
Cost of Private Housing	22.0	28.8	36.2	43.9	50.1	158.9	293.9	474.9
Housing Research & Training (Public)	-	0.5	0.5	0.5	0.5	2.0	4.5	6.5
Total Housing Expenditure	<u>148.5</u>	<u>156.9</u>	<u>165.4</u>	<u>174.1</u>	<u>183.4</u>	<u>679.9</u>	<u>1,077.7</u>	<u>1,906.1</u>

(Continued on following page)

Appendix Table 8
Construction (continued)

	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1962-65</u>	<u>1966-70</u>	<u>1961-70</u>
<u>B. Other Construction</u>								
<u>Program</u>								
Financed by public sector	29.6	31.3	35.7	40.6	46.2	153.8	346.3	529.7
Financed by private sector	7.4	9.4	10.6	12.1	13.8	45.9	103.5	156.8
Total	37.0	40.7	46.3	52.7	60.0	199.7	449.8	686.5 ^{1/}
<u>Recommended</u>								
Public - as in Program	29.6	31.3	35.7	40.6	46.2	153.8	346.3	529.7
Add 10% for land	3.0	3.1	3.6	4.1	4.6	15.4	34.6	53.0
Cost of public other construction	32.6	34.4	39.3	44.7	50.8	169.2	380.9	582.7
Private - as in Program	7.4	9.4	10.6	12.1	13.8	45.9	103.5	156.8
Add 10% for land	0.7	0.9	1.1	1.2	1.4	4.6	10.4	15.7
Cost of private other const.	8.1	10.3	11.7	13.3	15.2	50.5	113.9	172.5
<u>Total Other Construction</u>	<u>40.7</u>	<u>44.7</u>	<u>51.0</u>	<u>58.0</u>	<u>66.0</u>	<u>219.7</u>	<u>494.8</u>	<u>755.2</u>
<u>Total Construction</u>	<u>189.2</u>	<u>201.6</u>	<u>216.4</u>	<u>232.1</u>	<u>249.4</u>	<u>899.6</u>	<u>1,572.5</u>	<u>2,661.3</u>
Public	159.1	162.5	168.5	175.0	184.2	690.2	1,164.6	2,013.9
Including land purchases	14.5	14.7	15.3	15.9	16.7	62.6	105.4	182.5
Public New Investment	144.6	147.8	153.2	159.1	167.5	627.6	1,059.2	1,831.4
Private	30.1	39.1	47.9	57.2	65.3	209.5	407.8	647.4
Including land purchases	2.7	3.5	4.4	5.2	6.0	19.1	37.1	58.0
Private New Investment	27.4	35.6	43.5	52.0	59.3	190.4	370.7	588.5
<u>Total Construction Investment</u>	<u>172.0</u>	<u>183.4</u>	<u>196.7</u>	<u>211.1</u>	<u>226.8</u>	<u>818.0</u>	<u>1,429.9</u>	<u>2,419.9</u>

^{1/} Consists of (E° millions) Schools 171.0
Hospitals 87.5
Miscellaneous municipal 29.4
Reconstruction 33.6
Commercial Bldg. 325.0
Comm. installation 40.0
Total 686.5