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REPORT OF THE MEETING OF EXPERTS ON BASES FOR
ELECTRICITY RATES IN LATIN AMERICA

I. INTRODUCTION

1. A Meeting of Experts on Bases for Electricity Rates in Latin America, sponsored jointly by the Economic Commission for Latin America and the United Nations Bureau of Technical Assistance Operations (BTAO), was held at ECLA headquarters, Santiago, Chile, from 10 to 20 December 1962.

2. The Meeting was the outcome of a recommendation by the Latin American Electric Power Seminar held at Mexico City (July-August 1961), reading as follows:

"That the ECLA secretariat convene, at the earliest opportunity, a meeting of experts to study the problems of electricity rates, so that the respective analyses and conclusions may serve as a basis for the adoption of adequate policies by Latin American electricity enterprises."^{1/}

3. The Meeting was attended by ten experts from Argentina, Chile, Costa Rica, France, Peru and Uruguay, acting in a personal capacity. Five Chilean experts from the Empresa Nacional de Electricidad S.A. (ENDESA), the Compañía Chilena de Electricidad Ltda., the Electricity and Gas Authority and the Faculty of Physics and Mathematics of the University of Chile,^{2/} also attended.

4. Experts having the status of specially invited guests were Mr. Raúl Sáez, General Manager of ENDESA and at present Acting Co-ordinator of the Committee of Nine (Alliance for Progress), and Mr. Charles Barraud, senior official of Electricité de France.

5. Unforeseen circumstances prevented Mr. Flavio H. Lyra of Brazil and Mr. Enrique Vilar of Mexico from attending the Meeting.

6. The secretariat of the meeting was in the hands of the following staff members of ECLA's Energy and Water Resources Programme:

Adolfo Dorfman, Director

Eduardo García

Carlos Plaza

^{1/} See Report of the Latin American Electric Power Seminar (E/CN.12/AC.50/4), paragraph 212 (c).

^{2/} See annex I of this report, giving a list of participants and observers.

7. The Meeting was opened by Mr. Adolfo Dorfman, Director of the above-mentioned Programme, who welcomed the experts and made a preliminary statement on the aims of the Meeting.

8. The participants elected Mr. Renato Salazar (Chile) and Mr. Alberto Kurlat (Argentina) as Chairman and Vice-Chairman respectively. Mr. Alejandro Vegh Villegas (Uruguay) acted as Rapporteur.

9. For the organization of their work, the experts adopted the following agenda:

1. Preliminary statements
2. Election of officers
3. Adoption of the agenda
4. Adoption of guidelines for discussion
5. General discussion

Documentation:

Política y estructura tarifaria en el sector eléctrico, by Alejandro Vegh Villegas (E & WR/WP.2/1)

Introducción al estudio del régimen jurídico e institucional de las tarifas eléctricas en América Latina, by Guillermo J. Cano (E & WR/WP.2/2)

Algunos problemas relacionados con el método de fijación de tarifas de acuerdo con la ley de servicios eléctricos chilena, by Renato E. Salazar (E & WR/WP.2/4)

Principios de tarificación eléctrica, by Eugenio Salazar (E & WR/WP.2/5)

6. Consideration of the report of the Meeting.

10. Apart from the documents included in the above agenda, the participants had occasion to consider the following three documents, the first two presented by Mr. Raúl Schkolnik B. (ENDESA) and the third by Mr. Rodrigo Orozco (Instituto Costarricense de Electricidad): (a) "Algunas consideraciones generales sobre el comportamiento estadístico de los consumidores residenciales"; (b) "Aplicación de un método de tarificación horaria a dos casos sencillos"; (c) "El costo del servicio para el proporcionamiento hidrotérmico."

11. In addition to the agenda adopted, guidelines for discussion were also considered and adopted by the participants. They will be found in annex II.

12. At the closing meeting, held on 20 December 1962, the participants adopted the present report, authorizing the ECLA secretariat to introduce any final changes needed to make the report as complete as possible.

/II. ACCOUNT

II. ACCOUNT OF PROCEEDINGS 3/

1. Principles for a policy on rates: cases in Latin America(a) Rates as an expression of cost per kWh

13. It was generally agreed that the policy in regard to rates should be such as to ensure that the average price for the sale of electric power covers the average cost of the service - under normal operating conditions -, including a reasonable profit. There is no reason why the profit should be different for a State-owned enterprise than for a private enterprise if conditions in the country are similar for both. However, it was recognized that, in the case of some State-owned enterprises whose specific purpose is to promote regional development, the profit rate might be below that recommended in "normal" cases.

14. One of the experts pointed out that there was a strong case to be made out for the principle of high rates as an instrument of capitalization in the electricity sector and of compulsory savings by the community in countries with an extremely primitive capital market and an unsatisfactory tax collection machinery.

15. With respect to unification of electricity rates, it was also agreed that this should only be achieved in those regions, or for those consumer groups, where cost differences are not substantial, so that the convenience of having uniform rates might offset the resulting slight distortions.^{4/} Thus, the principle of covering the actual cost of each zone served should, within certain limits, prevail in the electricity sector.

16. Where an electricity service is extended to a new consumption centre by an enterprise which has a grid, a reasonable principle might be to

3/ The headings and sub-headings follow the order set out in the guidelines for discussion adopted by the participants, changes being indicated in a footnote. See paragraph 11 above and annex II of the present report.

4/ In this case the position would be somewhat similar to the postal service or the sale of liquid fuel in that the difference in the cost of delivery to different parts of the country is not very large, while the opposite is true of solid fuels, where a differential price system is nearly always the rule.

compare the cost of delivering the power transported from the nearest point of the network with the cost of generating the power locally, if the consumption centre is stated, and to charge the user the lower price resulting from the comparison.

(b) Rates as a means of contributing to the expansion of electricity services (self-financing)

17. The possibility was raised that the principle for the general rate level might be that not of the cost of the service, considered in the previous section, but rather of arriving at a pre-determined coefficient of self-financing. In other words, the object of the rate would not be to cover the cost plus a reasonable profit but to provide the enterprise with the funds needed to meet its future expansion requirements.

18. It was generally agreed that the principle laid down in the discussion on the previous point should be restated; and it was decided to reject the point raised, which was felt to be tantamount to a surcharge over the actual cost of power. From this standpoint, analysis of this section is, of course, closely related with that of item 7 of the guidelines for discussion.

19. In the study entitled "Política y estructura tarifaria en el sector eléctrico"^{5/} a clear distinction is made between the funds produced by rates and what are called "contributions to be fixed in the case of new services". A distinction should be made between these contributions, which constitute income received by the enterprise, and the income derived from the sale of power, although both contribute at the same time to financing the expansion of the electricity system.

20. Both in the case of these contributions and of rates which include a percentage aimed specifically at the capital accumulation needed to meet expansion requirements, the problem arises of the ownership of the assets thus financed. This problem is analysed in the paper entitled "Introducción al estudio del régimen jurídico e institucional de las tarifas eléctricas"^{6/} and was the subject of lengthy discussion by the participants.

^{5/} See E & WR/WP.2/1, chapter II.

^{6/} See E & WR/WP.2/2, p.73.

21. The following three basic problems or questions with respect to financed assets should be distinguished:

- (i) Who should own these assets?
- (ii) Should a rate of interest or return be payable on this investment?
- (iii) Who should receive the income, if any?

22. With respect to the first question, it was agreed that the reply will differ according to whether the concession-holder operating the service is a public or private corporation. In the first case, but not in the second, it might be admitted that these assets are part of the net wealth of the enterprise. As an example, reference was made to the Electricity Industry Act N° 12378 of Peru, which lays down the principle that these assets are the property of the State and should be clearly stated as such in the accounts of the concession-holder.^{7/}

23. Opinion was divided on the second point. Some participants considered that depreciation but not a rate of return should be charged against these assets. This is also the principle of the Peruvian law. Others argued that since this investment constitutes actual expenditure of the community's capital it should be recognized as a scarce resource and returns should be allowed and should be reflected in the rates. In connexion with this argument, the view was expressed that it seemed hardly fair to make the user of the service pay first for the cost of the investment and secondly - through the rates - for the servicing of the interest on his own investment.

24. The reply to the third question has some connexion with the answer to the first question. Failure to include in the electricity rates the servicing of the interest on these assets financed by the user might be interpreted to mean that it is the result of two compensatory actions: the setting of the rates as the actual cost of the service which would include this interest, and returning the interest to the owners - i.e. the community of users - through a corresponding reduction in the rates. Still to be resolved would be the problem of a relative inequity in the

^{7/} See articles 132, 133 and 134 of the Act.

distribution of the refund in proportion to the consumption of power, which might differ substantially from the composition of the group of users who actually contributed to the financing of the assets.

25. A distinction should be made between an outright contribution and a contribution which is refunded to the user in various ways, for instance by providing him free of charge with a certain number of kWh over a period of time.

26. With respect to a suitable level for the coefficient of self-financing, it was recalled that this point was the subject of a detailed analysis in one of the documents submitted to the Latin American Electric Power Seminar held in Mexico in August 1961.^{8/} It was indicated in that document that by means of depreciation funds, the effect of a reduction of unit costs, the reinvestment of net profits and the help of international financing agencies, it would be feasible to finance a moderate expansion without recourse to high rates equivalent to a real profit in excess of 10 per cent of the enterprise's frozen assets. It should be borne in mind that, on this point, the three chief parameters of the problem are: (i) rate of expansion of the network; (ii) level of net profit (or rate of returns); (iii) rate of depreciation.

27. The problem of the degree of self-financing actually arises in those cases where the rate of expansion is very high, e.g. over 10 per cent. The question was then raised whether the admissible level of profit should not be higher.

28. Some participants favoured a solution of this kind, i.e. based on a flexible profit level bearing some relationship to the rate of expansion of the system. In support of this thesis, it was pointed out that growth of the demand for electricity is related to the gross product of the country concerned. Moreover, it is logical to contend that the rate of profit on capital invested in electricity must have some connexion with the book value of the investment funds of the economic system. If these premises are admitted, a flexible rate of profit on the frozen assets, proportional to the growth rate of demand, would be consistent

^{8/} See ST/ECLA/CONF.7/L.1.30, chapter II.

with the contention of some economists that the book value of capital varies in proportion to the growth rate of the product.

29. It was also stated that this "flexibility thesis" with respect to the rate of profit on investment in electricity is not at variance with the general principle adopted in the discussion of point (a) ^{9/} because acceleration of development calls for a higher real rate of interest, since capital funds become relatively scarcer and it is therefore logical that this increase in the cost of use of such funds should be specifically recognized in establishing the total cost of the provision of the service.

30. If the interest rate does not vary directly with the rate of expansion of electricity demand, the flexibility thesis would clearly be at variance with the principle of a fair return on capital invested.

31. With respect to the choice between the principles of "fair profit" and "adequate self-financing", all the participants were agreed that the International Bank for Reconstruction and Development (IBRD) followed the former principle in its credit negotiations with Latin American electricity enterprises, on the understanding that this fair profit would, in its turn, allow the enterprise to resort more successfully to other sources of financing.

32. In connexion with the tax equity of a specific level of self-financing of expansion, the point was made that there should be a distinction between increases in extension and the intensity of the electricity service, because a high self-financing coefficient was more justifiable in the latter case.

(c) Rates as the basis for a return on capital invested

33. It was admitted that there are essentially two different methods, in legislation governing electricity, for ensuring a return on capital invested. In the interests of simplicity, these methods were referred to as method I and method II throughout the remainder of the discussion.

34. Method I can be described as "the principle of a fair return on the enterprise's net frozen investment", and method II as the "principle of a fair return on the stock or risk capital invested".

^{9/} See paragraphs 13 to 16 above.

35. Under legislation in which method II is applied, interest on commitments entered into, or debts contracted by the enterprise, form part of operating costs. Under method I they are not included in these costs.

36. In accounting terms it may be said that method I starts out from the entries under the enterprise's assets, while method II starts out from the entries under its liabilities.

37. In essence, the relative level of the rates, according to the methods referred to, will depend upon the following parameters:

- (i) The structure of the enterprise's capital liability can be measured, inter alia, by the debt-equity ratio or the borrowing coefficient which is defined as the ratio between the enterprise's liabilities and assets;
- (ii) The rate of interest paid on the instruments of borrowing;
- (iii) The levels of profit fixed (under method I on total net frozen assets and under method II on risk capital invested).

38. By way of illustration it was pointed out that the principle of method I is adopted under Chilean law and in the agreement between SEGBA and the Argentine Executive. On the other hand, method II is adopted in the Peruvian Act mentioned above. Under Panamanian law, the rate of return is related to the frozen assets in the ratio of capital owned to capital borrowed. In the case of Costa Rica, method I is used for the State-owned enterprise and method II for the privately-owned enterprise.

39. With respect to this point, there are two quite different problems although the result of the solution of the two combined is, in the final analysis, what matters to the concession-holder: (i) determination of the rate base on which the return is calculated; (ii) fixing of the rate of return.

40. With regard to the financing of the enterprise's assets, it was agreed that this could be done by three different means which should also be treated differently in legislation, particularly if method I is adopted: (i) equity capital; (ii) loan capital; (iii) contributions. Even if method I should be adopted in legislation regulating the electricity industry, this would naturally not prevent the enterprise from distributing

/the operating

the operating surplus, at varying rates, among those who make the capital available, provided that this is done within the provisions of the law and regulations concerned.

41. Generally speaking, this distribution is also treated differently under the law. Thus, for example, in the case of Chile, electricity enterprises - both State-owned and private - must pay the 30 per cent tax on net profits, but this tax is not applied to remittances in payment of interest on loans contracted abroad.

42. Some participants pointed out that method I would not be appropriate if an electricity enterprise has loans secured by the State or making use of the country's credit capacity and financial prestige. In such cases, the return on the frozen assets would enable a substantial profit to be made on loans at a low rate of interest, and it would seem only natural that this should be given back in some way to the community.

43. It was also pointed out, as a criticism of method I, that the return on investment is basically a price for a scarce resource plus a risk premium. Thus, from a theoretical standpoint, there is no adequate basis for a standard return on capital varying considerably in type.

44. The following arguments were adduced in support of method I:

(i) it encourages the enterprise to seek loans under the most advantageous conditions possible (in theory, this incentive would not exist under method II); (ii) it has the psychological advantage of allowing a relatively high return on risk capital invested without a specific statutory provision to that effect, which might produce unfavourable reactions on the part of the legislator or user; (iii) it constitutes an incentive to greater efficiency and better management in the enterprise since the latter is placed in a better financial position to approach capital markets.

45. With respect to the first point mentioned above it was pointed out that under article 121 (f) of the Peruvian law a ceiling of 8.5 per cent was set on the total interest and expenditure which might come under the heading of expenditure for the servicing of debts contracted.

46. As an interesting point in this connexion, mention was also made of the fact that during the negotiations which preceded the granting of

/a loan

a loan to SEGBA, IBRD preferred to replace method II, which appeared in an earlier agreement, by method I, and it was this method which was finally adopted.

47. It was pointed out that in some cases the enterprise's liability structure was distorted by the fact that electricity legislation grants preferential treatment to debts contracted by the enterprise, particularly abroad. This encourages misrepresentation, capital property being made to appear as a loan when in actual fact the lender is also the borrower. This might also have an unfavourable effect on the balance of payments where there is a tendency to reinvest profits on stock capital. When a loan is fictitious and the lender is also the borrower - which can also happen for reasons other than that already mentioned - the enterprise's liability structure might give a false picture of its financial stability and make the contracting of loans from other foreign or domestic lenders more difficult.

48. With respect to the rate of return on capital invested, most of the participants reiterated their agreement that in general the rate for State-owned and private capital should be the same. The minority view was also repeated that the rate for State-owned capital should be higher as a means of capturing private savings.

49. The "business profit" for which provision is made under Peruvian and Colombian legislation is, in essence, a bonus on the return. In the case of the Peruvian system, the flexibility of this extra, up to a 3 per cent ceiling, constitutes an incentive, but it is only effective when there is no inflation.

50. There was a lengthy discussion on what should be the minimum and maximum legal rate of return (or the average or normal rate where a measure of flexibility is provided for). These figures should be related to the extreme points of the interest spectrum or differential. This spectrum is obviously broader as the rate of inflation rises. It was generally agreed that a reasonable minimum would be the rate of interest at which the State contracts its debts.

51. It was suggested that the maximum figure might be the opportunity cost, although some doubts were expressed on the possibility of determining

/this parameter

this parameter and its accuracy. This was countered by the argument that the difficulty was not insurmountable; if it was merely a question of setting a ceiling on the legal rate of return, it need merely be calculated with a margin of error not to exceed, say, 20 per cent. Another point of reference would be the ratio of business profit to public utilities profit in other countries.

52. It was agreed that a clear distinction should be made between the question of the legal rate of return on investment and the opportunity cost or accounting level for investment decisions by the electricity enterprise. As a rule, the second figure should be higher than the first, as stated earlier.

53. It was suggested that, as regards the ceiling for the legal return, account should be taken, in the case of enterprises with public capital or private enterprises exempt from certain taxes, of an additional revenue item, corresponding to what in the United States is known as income in lieu of taxes, intended to redress the legal inequality existing in that country between public and private enterprises.

54. Throughout the whole of the above discussion there were constant references to the "real rate of return", that is, the rate already corrected to take account of increases in the general price level; and it was also suggested that, where the legislation permitted a certain flexibility in this rate, and laid down only a "normal" value, there should be a clear definition of normal conditions, and of the way in which the rate would vary with changes in those conditions.

55. With respect to the desirability and fairness of establishing a "business profit" in addition, as provided for in the Peruvian law, it was indicated that when the legislation adopts method I and the enterprise contracts debts at a rate of interest lower than the legal return, there is already an addition gain that would appear to include a business or management profit. Looked at from this standpoint, method I amounts to the application of method II plus a certain business profit, although in the first case this profit would vary according to the structure of the enterprise's liabilities and the financial conditions in which it contracted its debts.

(d) Rates as a means of promoting production and development ^{10/}

56. Within the system of a general tariff level established on the basic principle of allowing for real costs plus a reasonable return on investment, it was considered possible to envisage a rate structure so conceived as to imply certain subsidies, always provided that they were clearly identified and were an expression of an integrated economic policy.

57. In this connexion, any subsidy has two basic features: (i) its direct or indirect character, and (ii) the extent to which it is public. Although economic theory, especially the so-called welfare economics, maintains that direct subsidies are preferable because they do not introduce distortions into the price mechanism, experience shows that this type of subsidy in the form of gifts to particular sectors of the community is not politically acceptable, and that there are few instances of their having been put into effect. Consequently, from the standpoint of the electricity enterprise, an indirect subsidy by means of the electricity rates is admissible, but subject to the requirement that this subsidy should be publicly known and should be part of a general development plan.

58. Two interesting examples were quoted that illustrate some of the above points. The State electricity enterprise in Puerto Rico charges prices that are lower than cost in certain rural areas, but the deficit incurred by the enterprise is covered by a specific expenditure item in the national budget. This meets the requirement that the subsidy shall be made public and that its existence shall not endanger the development of the enterprise as a whole. The second example is the case of an electricity enterprise that was asked to reduce its prices to small mining companies as a means of relieving their economic situation. The enterprise in question refused to alter its rates in this way, but suggested instead that the annual subsidy that it received from the State should be reduced by an equivalent amount, and that this sum should be transferred directly to those whom it was intended to benefit. This arrangement would have had the advantage of not discriminating against the producers who

^{10/} Item 1 (g) of the guidelines for discussion.

did not buy power. However, the State was reluctant to follow this course - which illustrates the serious difficulties in the way of introducing direct subsidies.

59. In some cases - for example when the rates are designed to promote sales in order to bring the production of power into line with an expected increase in capacity, the matter should be regarded as involving not a subsidy, but something similar to the rates of interest payable during the construction of engineering works, before the investment matures. The situation is parallel to that of a manufacturer who scales his production capacity above the initial market demand, and sells during the initial period at a price that does not cover his costs, but which is the price appropriate to a more developed demand forecast for the future, and which could never be attained if the sales prices established at the first stage were strictly related to costs.

60. Some participants stressed the need for any decision in the subsidy sphere to be at the legislative level, as in the case of taxes. It was agreed that this point would be discussed again in relation to the legal, institutional and administrative aspects of electricity rates in Latin America.^{11/}

61. It was suggested that in those industries where electric power was an important cost component and where a substantial proportion of their output was exported, the aim should be to attain more stable unit costs of electric power expressed in foreign currency by means of such expedients as the fixing of prices expressed in dollars in the contracts with the concession-holder for the electricity service. Most of the participants opposed this suggestion on the grounds that it would introduce serious difficulties and discriminations in the rate structure.

62. Another suggestion, which won a greater measure of support from the participants, was that in the case of large industrial consumers there should be an exchange of blocks of shares with the electricity enterprise on conditions to be determined by legislation or in the individually negotiated contracts. This would be a means of offsetting to some extent the risks incurred by both parties in a contract of this type with enterprises in an industry with a high consumption of electricity.

^{11/} Item 8 of the guidelines for discussion.

(e) Rates as a factor in modifying the demand curve ^{12/}

63. There was agreement as to the need to exchange information in the future on price elasticity of demand for electricity and the reactions of consumers to price discriminations, for example with respect to hours of use.

64. Consideration was given to the possibility of staggering the hours of consumption of certain industrial consumers. In traditional industries such staggering would be difficult, but in the so-called dynamic industries there are many technological processes involving high power inputs and low inputs of labour, and where it would be more economic to switch production to a night schedule or to off-peak hours. In such cases the firms concerned would, in addition to staggering their hours of consumption, over-scale their equipment in relation to what would be required for uniform output, and reduce the level of productive activity during the hours of peak demand by arrangement with the electricity enterprise.

65. Some participants indicated that in their own enterprises some study had been devoted to the possibility of making automatic disconnexions from the generating plant by means of a high-frequency carrier wave, although in some cases the passage of such waves through the distribution transformers would give rise to difficulty.

66. It was agreed that what might be called "the pursuit of the ghost consumer" with the aim of improving the load factor should be undertaken in moderation, since otherwise it might lead to dangers and difficulties for the enterprise. In particular, to ensure that the rate structure was conducive to rational decisions by the consumer, discrimination in respect of hours of use should be linked as closely as possible to the additional costs of the service.

(f) Rates as an instrument of energy policy ^{13/}

67. There was unanimous agreement that the prices of energy must be co-ordinated to obviate irrational decisions in their use. Many examples were given of the harmful effects of the lack of such co-ordination, especially in regard to the use of electric power as a source of domestic heating. One example quoted was Bolivia, where 80 per cent of residential consumption of electricity is for this purpose.

^{12/} Item 1 (d) of the guidelines for discussion.

^{13/} Item 1 (e) of the guidelines for discussion.

68. The co-ordination of energy prices can be achieved in two different ways, according to whether decisions are centralized or whether arrangements are made to obtain the same result by decentralized decisions. As indicated in the document under discussion,^{14/} rates that are in line with the principles set forth there will lead to the optimum use of energy resources provided that the prices established in the other energy sectors are also in line with these basic principles.

69. A number of reasons were given why this last requirement is difficult to achieve. These include firstly, the fact that because of the difference in the income elasticity of demand for electricity and liquid fuels, and of the even sharper differences between the respective product-capital ratios, the same degree of self-financing in both types of enterprise (in many Latin American countries the refining enterprise is also a State enterprise) will lead to relative surcharges that are also very different; secondly, the fact that a petroleum refinery also produces at the same time a whole range of products by means of the same technological process, and consequently the allocation of costs between these products is relatively discretionary, and cannot serve as a basis for the establishment of costs strictly in accord with the principles of individual cost.

70. Explicit co-ordination of energy prices on the basis of a centralized decision is faced with a number of difficulties in Latin America. Firstly, there are no studies or data that could serve as a basis of such co-ordination, although at the first stage it would be possible to avoid at least those distortions that result from differences in size and can be easily detected. Secondly, there is the difficulty of the functional autonomy of the enterprises even when, or perhaps especially when, they are State enterprises; if it were considered necessary to establish a central authority in the energy field, certain institutional changes would be required.

71. As an example of the lack of co-ordination between State enterprises the cases of Argentina and Uruguay were referred to, where the electricity consumer subsidizes the consumer of liquid fuels because of the high level of self-financing of the State enterprises that refine crude petroleum and sell the by-products.

^{14/} See E & WR/WP.2/1, chapter VI.

72. It was also stated that anti-economic criteria were used in establishing the prices and conditions of use of natural gas in the Latin American countries that are large-scale producers, namely, Argentina, Mexico and Venezuela.

73. The lack of continuity in energy policy was underlined as a particularly undesirable feature. A certain stability in government criteria in this field, enabling the various enterprises in the sector to adjust their price policy to these criteria, is the least that can be expected from the Governments. Generally speaking this has not been the case, and the frequent and violent changes in government policy have hampered a harmonious development and the proper use of resources.

74. There should also be continuity in the enterprise's business policy, and this is not always found. Examples were given of electricity enterprises which, after conducting intensive campaigns to promote the sale and use of domestic electric appliances, have had to increase their prices and to try to promote the replacement of such appliances by others that consume liquid gas or other fuels, to the detriment both of the consumer and of the supplying enterprise itself.^{15/}

75. In other cases distortion has resulted from the effect of certain taxes on sales of power, which thus tend to promote self-supply even on an anti-economic basis, or from rate structures that encourage the industrial consumer to supply his own power, or to buy reserve power at a rate which is very low for the consumer and constitutes a burden for the electricity enterprise.

(g) Rates as an incentive to a more efficient service ^{16/}

76. There was unanimous agreement that the most serious drawback of electricity legislation in Latin America - including the most recent provisions in Argentina, Chile and Peru - is that it overlooks matters relating to the efficiency of the service rendered. Nevertheless, it was recognized that the introduction of specific provisions aimed at promoting efficiency in the concession-holder's production raises extremely difficult and complex problems.

^{15/} This happened in Argentina, despite the fact that there is an Electrification Fund to which consumers of liquid fuels contribute.

^{16/} Item 1 (d) of the guidelines for discussion.

77. Two types of incentive should be distinguished, (i) those that originate outside the enterprise and (ii) those that originate within. A rate of return that changes with the volume of expansion of the service is an example of an external incentive. The freezing of the electricity rates when prices are stable is an internal incentive to induce the enterprise to reduce its costs and thus increase its profits; but when there is inflation this internal incentive vanishes because it is lost in the welter of increases that must continually take place if the enterprise is to survive.

78. During the discussion reference was made to the document Algunos problemas relacionados con el método de fijación de tarifas de acuerdo con la ley de servicios eléctricos chilena, whose basic aim is to throw doubt on the principle of the "recognized cost" as the rate base. This document refers to a specific type of incentive, consisting of basing the rate on investment costs estimated according to standard criteria, and not on recognition of the costs actually incurred in the past by the enterprise.

79. It was suggested that generally speaking a distinction could be made between administrative efficiency and technology, in that whereas it was not difficult to find incentive formulas in the latter case, it was a complex matter to do so in the former. These problems of practical application have led in many cases to the legislation becoming a dead letter because of the absence of regulations for its application.

80. Thus, in Argentina for example, although article 39 of Act N° 15336 establishes that "reductions in costs resulting from greater technical efficiency shall be allotted in equal proportions to the consumers on the one hand, and to the producing, carrying or distributing enterprise or organization responsible for the reduction, on the other", this rule has not yet been applied. A similar rule was laid down in the old CADE contract (1907), and was likewise never applied.

81. Some participants pointed out that any legislation based on recognized cost has an incentive element merely because the inadequacy of the regulating machinery makes it difficult for the electricity enterprise to reach the legal ceiling rate of return. The inadequacy thus has the favourable result of providing an incentive to the efficiency of the enterprise.

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82. It was suggested that it might be possible to apply some of the stimuli resorted to in the centrally-planned economies, where the elimination of competition between firms leads to the search for ways of measuring efficiency, such as for example the profit levels of firms similarly situated as to markets and prices. In such cases the problem arises not only for monopoly enterprises, but for all enterprises.

83. When there are clauses providing for automatic adjustment for changes in the prices of the principal inputs of the electricity enterprise, a freezing of the technical coefficients that provide the basis for these adjustments amounts to an incentive to the enterprise regardless of whether or not there is inflation in the economic system.

84. In addition to the problems of defining the parameters that serve as the basis for the clauses which act as an incentive to efficiency, there is the problem of whether the incentives, or the parameters themselves, should be temporary or permanent. There was general agreement that both, and more particularly the quantitative values of the standards established for the parameters, should be reviewed after a trial period (for example, five years) has elapsed, so as to preclude the possibility that rapid technological progress, or the fact that the enterprise started at a very low level of efficiency, would be reflected in returns out of proportion to the capital invested.

85. Some typical examples of parameters for incentive clauses cited were the ratios between power sold and generated, on the one hand, and between power generated and fuel input (when generation is mainly thermal) on the other. One parameter for measuring administrative efficiency would be man/hours per kWh produced. But these parameters are, of course, far from providing complete solutions to the problem, and do not have the general character that an incentive clause, in the full sense of the term, should have.

86. It was agreed to recommend the following general guiding rule with respect to the incentive question: from the total decrease in the real unit costs of providing the electricity service should be deducted any benefit resulting from changes not due to the action of the enterprise ^{18/}

^{18/} Exogenous variables, as they are called in modern economic theory.

- such as changes in the prices of inputs - and the benefit resulting from the net decrease thus obtained should be divided between the producer and the consumer. In this case, too, it would be necessary to review at regular intervals the base return established at the beginning of the period.

2. Existing rate systems, and those applied in Latin America

87. It was agreed that there would be no point in making a list of rate systems applied in general; but there should be a critical analysis of some of the major problems in working out a rate schedule, with special reference to experience in Latin America.

88. Some participants spoke first about the distortions produced by certain instances of political interference, of a demagogic type, in the working out of the rates, which goes as far as not allowing in the rates for even a minimum return on the capital invested, especially when the capital is provided from public funds.

89. As regards countries with a federal legislation, such as Argentina, it was suggested as desirable that the national energy legislation should be implemented by means of a rational price structure for bulk (high tension) power, to enable the final sales prices to consumers to remain in line with the real costs of providing the service.

90. Reference was made to a different principle for fixing the rates, that of a "fair return", with the comment that it did not provide the electricity enterprise with stable and normal conditions of access to the capital market for meeting operating or development costs.^{19/} This "principle of a fair return" was considered to have some relation to the "flexibility thesis" discussed at earlier meetings, since obviously the

^{19/} As an example, the decision of the United States Supreme Court in the case of Federal Power Commission v. Hope Natural Gas Co. was cited; by this decision the Court limited its own jurisdiction in this field to cases where the regulatory legislation had the effect of encroaching upon the right of property (see E & WP/WP.2/2, pp. 41 and 51).

more restricted the capital market at the time when the enterprise is offering its bonds for sale, the higher the rates of interest governing access to the market.

91. As regards the effect of the regulatory legislation on the rates system, it was recognized that in general the legislation is directly related to the level of the rates, but not to their structure or to the particular system used by the enterprise in selling power.

92. Nevertheless, it is also generally accepted that the rates schedule is drawn up by the enterprise and expressly approved by the administrative authority, or its representative, the regulatory body provided for in the legislation. There are some exceptions to this system with respect to the permissible categories of the rate schedule. For example, article 272 of the Peruvian Act No. 12378 gives a specific list of these categories.

93. With respect to incentives for improving the power factor, it was said to be impossible in many cases to impose fines representing the real damage caused to the electricity enterprise, since the amount of such fines would be too high. In Chile consideration is being given to the introduction of a system whereby the power factor would be measured at peak hours, and a charge would be made for reactive power on the basis of this measurement.

3. Establishment of the rates schedule: general considerations

94. It was first explained that the principle in item 1 (a) of the guidelines for discussion, namely "rates as an expression of cost per kWh" ^{20/} relates to the level of the rates system. Although this was adopted as a general principle, certain exceptions may be admissible as regards the ratio between the price and the cost per "individual" kWh, so to speak, or at least as regards the costs of bulk power by groups of consumers.

95. Apart from subsidies originating outside the electricity enterprise itself (as in the case of rural electricity in Puerto Rico, already referred to), the application of the principle of a rate level based on the average cost plus a reasonable profit, in conjunction with exceptions for groups of consumers, leads to internal subsidies to the enterprise, which is

^{20/} See paragraphs 13-16 above.

thus made to act as the vehicle for transferring income from one group of consumers to another, or, in some cases, from some members of a given group to other members belonging to the same group but to different levels of income or productive capacity. This is the case of the so-called "social steps" in the residential tariff.

96. There was a discussion of what might be the permissible minimum, or floor, that could be established for prices of bulk power on the assumption that there was a subsidy. According to economic theory, it seems that this minimum would have to be the variable cost, or the short-term incremental cost, but this concept would only apply to predominantly thermal systems. Some participants considered that this minimum would be too low, even for thermal systems, since the incremental cost does not usually amount to more than a third of the total cost. It was suggested that in mainly hydro systems this incremental cost might be linked in real terms with the level of utilization of the plant or plants in question.

97. Reference was made to certain European countries, such as Sweden, in which electricity enterprises had established fairly low rates for the electrochemical and metallurgical industries, and then later, when the system had expanded, had found themselves in a position where a substantial part of their installed capacity was permanently committed to prices that could not be changed without the risk of serious consequences to the consumers, for whom this cost was a major item.

98. There was agreement as to the desirability that electricity enterprises in Latin America should have what might be called a "theory of rate structure" on which criteria for the allocation of costs by consumer could be determined. As regards the distinction between demand costs and power costs, it was pointed out that it is much more obvious for thermal power than for hydro power.

99. Some participants said that, in the experience of their enterprises, the range covered by the results of different types of tariffs was small, and consequently there had been a tendency to adopt the criterion of maximum simplicity in the method used to collect a given revenue for a group of consumers.

100. If there are restrictions on consumption, it is inconsistent at the same time to establish step rates to promote consumption.

101. With respect to methods of rating by hours of consumption, it was agreed that their application is closely bound up with the production structure of the power generating system. For example, the method used by Electricité de France is not applicable to Chile because the proportion of thermal power is much lower in Chile than in France. In Chile rating according to the hours of consumption is an intermediate method that does not reach the consumer in that form, although the introduction of the method in its final form is being considered in two remote consumption centres, one supplied by a hydro source and one by a thermal source.^{21/}

102. In allocating consumer costs the three main parameters of the problem are (i) power; (ii) energy, and (iii) number of consumers. Generally speaking the most difficult problem is the distribution of demand costs. But even if this is solved, such questions arise as whether the tariff is to be two-part, and whether the demand charge should absorb the whole of the fixed cost and the energy charge the whole of the variable cost. The examples cited relating to industrial consumers mainly concerned cases where the demand charge did not cover the whole of the fixed cost, although there was apparently a trend towards achieving this target.

103. The basic feature of the problem was considered to be that there were no absolute principles governing its solution, since the matter was a particular instance of the problems connected with the theory of cost allocation whose solution is arbitrary because there is a simultaneous production of various goods by the same technological process. In the case of electric power, the heterogenous character results from a difference in chronology, whereas in petroleum refining it results from a different combination of processes and equipment. Nevertheless, the basic problem is the same, because of the impossibility of allocating costs to each of the goods produced.

^{21/} See Costo horario del suministro eléctrico en un sistema interconectado (ST/ECLA/CONF.7/L.1.47), paper presented by Mr. Friedmann and Mr. Schkolnik to the Latin American Electric Power Seminar (Mexico, July-August 1961); and Aplicación de un método de tarificación horaria a dos casos sencillos, presented by Mr. Schkolnik to the present meeting.

104. In establishing prices, elasticity of demand takes on a special significance, and there is a situation of special import in the case of large industrial consumers, who have the choice of generating their own electric power, often to the detriment of the coefficient of diversity of the public supply systems, and with a consequent inefficiency in the use of national resources.

105. Clearly economic considerations impose some limits on the arbitrary or discretionary nature of cost allocation, and if these limits are exceeded, there will be irrational substitutions and an inefficient use of energy resources.

106. In view of the importance of the subject, and the lack of clear-cut rules in this connexion in the literature on electricity rates, it was agreed to recommend the establishment of a working group, to collaborate with Electricité de France, for the purpose of formulating a criterion for what might be called "principles for a tarif vert", or the rules for establishing the prices of high tension electric power in an interconnected system of generating plants and consumer centres.

4. Establishment of the rates schedule: accounting aspects

107. A revision was made of the tariff definitions formulated at the Meeting of Experts on Electricity Statistics and Terminology held at Santiago, Chile, in September 1962, and contained in the relevant report.^{22/} Some changes were introduced, but though they were in keeping with the views expressed by the experts at the meeting, it was nevertheless recognized that the definitions would have to be revised more extensively before they were presented for general approval (see annex III).

108. Several participants pointed out that the accounts classified of the United States Federal Power Commission adopted by the electricity legislation of their respective countries and by the regulatory mechanisms for administrative purposes was inadequate for making a rational study of tariffs from the standpoint of enterprises.

^{22/} See Informe Provisional de la Reunión de Expertos sobre estadística y terminología eléctrica, containing the terminology glossary and the statistical tables approved (E & WR/WP.1/3).

109. It was observed that there is a certain inconsistency between electricity and tax legislation in regard to the classification of accounts. In Argentina, for instance, the standards for revaluing SEGBA assets differ from the one to the other, which means that separate accounts have to be kept for each. From the practical point of view, the problem is solved by the fact that the respective agreement states that profits shall be "net of tax". In Chile there are three fundamental discrepancies between the two types of legislation: (i) for tax purposes, interest on loans is regarded as expenditure, whereas electricity legislation adopts the principle of method I;^{23/} (ii) the charges admissible for depreciation are not the same in both; and (iii) different criteria are used for the valuation of assets. The last two disparities were eliminated a short while ago.

110. With respect to the accounting methods used for fixing electricity rates, the suggestions made in a paper presented at the meeting ^{24/} were considered at length. Three are of fundamental importance:

- (i) The possibility of applying the concept of "average useful lifetime" to the whole functional body of assets involved in the provision of services, thus making it unnecessary to have an individual register for each of the thousands of component items;
- (ii) The possibility of replacing the method of linear depreciation of assets by that of "capital recovery", which embodies the concept of accrued depreciation or sinking fund; and
- (iii) The possibility of estimating frozen investments without making a historical appraisal, proceeding instead on the basis of standard specifications for designs and materials, valued at unit costs such as the index cost per installed kW and the guaranteed annual amount of energy available, etc.

^{23/} See item 1 (c), paragraph 34 above.

^{24/} See Algunos problemas relacionados con el método de fijación de tarifas de acuerdo con la ley de servicios eléctricos chilena (E & WR/WP.2/4).

111. In so far as the first suggestion is concerned, it was generally thought that it would be feasible to introduce the concept into regulatory legislation in order to simplify the work and administrative duties of the enterprise regulated and the regulating agency. It was argued as a proof of the theoretical validity of the concept that the useful lifetime of an asset forming part of a technological unit was linked up with that of the other components, and that the "average useful life" of the whole group was therefore not merely an academic consideration but possessed practical significance as well.

112. Regarding the second suggestion, some objections were made to the idea of applying the sinking fund method to rate regulation. To begin with, it was pointed out that the method of linear depreciation enabled depreciation to take place more rapidly, which redounded to the good of the enterprise. Thus, in a dynamic enterprise, the accrued depreciation fund is always greater when estimated by the linear method than by the sinking fund method. Then, too, so long as the rates and valuations are the same under both sets of laws, the linear method brings the accounting of frozen net assets in tax legislation into line with their accounting under rate regulation laws. Some participants pointed out that that would give the investor greater protection in the event of expropriation of his assets, because of the similarity between the rate base and the book value of the assets.

113. As regards the third suggestion, it was agreed that the idea was attractive since it tended to make the determination of the rate base more automatic and replaced records of expenditure incurred by the principle of the "reasonable investment standard". Even so, there were considerable stumbling-blocks to its practical application. They included the wide disparities in unit costs even in a single country and the variations in the price of machinery from different markets, or occasionally from one and the same market, in a relatively short space of time.

114. From the theoretical point of view, it was feared that by establishing an incentive for reducing costs, the procedure in question would lead to the use of lower levels of technology since the returns on a rate base that exceeded real investment might compensate for higher operating costs.

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It was remarked that the effect would then be the very opposite of an incentive as regards direct operational expenditure, and might indeed lead to the adoption of too advanced technologies that would be an unduly heavy drain on investment funds and therefore anti-economic for the economy as a whole.

115. As a result, it was concluded that if the method suggested for determining the investment base came to be applied, this should be done in conjunction with norms for operating costs.

116. It was observed that traditional business accounting is primarily designed to show: (i) the evolution of net wealth over a year; and (ii) the aggregate results of business activities during the same period. The former is determined for reasons of commercial or tax law and on strictly financial grounds on the other hand. It is rare for a rational system of analytical cost accounting to be adopted to show the results of an enterprise's activities. Similarly, the use of an accounting plan designed to value assets, operational and non-operational income and operating costs for purposes of control has not found sufficiently widespread acceptance.

117. It was agreed that it would be desirable to establish a standard accounting plan primarily to value assets by physio-functional groups characteristic of the electric power industry and, secondly, to record utility costs by function, irrespective of the existence of other accounting systems to satisfy the legal requirements by showing the evolution of net wealth and the aggregate financial statement, to supply the need for information and internal management control (cost control), and to meet other requirements. The main purpose of such a standard plan would be to establish a basis of comparison for Latin American statistics.

118. It was therefore decided that a Working Group should be set up to make specific recommendations on those lines to electricity companies and regulatory agencies in Latin America. The participants were requested to send in any comments they might wish to make on definitions and questions of terminology to the ECLA Energy and Water Resources Programme so that they could be taken into account at subsequent meetings or in the above-mentioned revision of the glossary.^{25/}

^{25/} See paragraph 107 and footnote 22.

5. Establishment of the rates schedule: financial aspects

119. It was generally agreed that the need should be stressed for electricity companies to include in their annual reports to stock and bondholders a balance-sheet drawn up in accordance with corporation regulations and also with the regulations set by the electric power industry so that a better appraisal of the situation could be made.

120. Endorsing that recommendation, some participants pointed out that certain State-owned industrial companies or public utilities are improperly inclined to make their balance-sheets deliberately vague in order to gloss over deficits or unduly high profits.

121. As regards evaluation coefficients, the need for realistic figures as a basis for investment decisions was emphasized. Although most electricity legislation empower regulating agencies, either explicitly or implicitly, to review investment plants of undertakings, in practice this does not happen, because the majority of the agencies lack the requisite technical staff to do the work properly. Consequently, the responsibility for taking decisions lies entirely on the concession-holding enterprise.

122. It was thought necessary to define some technical and economic coefficients that would serve to assess both the internal efficiency of a company, on the basis of its trend of development, and its external efficiency on the basis of a comparison with other enterprises in Latin America. It was pointed out that such definitions are not easy to make, since most of the coefficients used by enterprises are influenced by variables subject to the play of chance or completely unrelated to the factors under consideration.

(a) Interest and the structure of capital ^{26/}

123. Consideration was given to the suggestion made in one of the papers presented at the meeting that net operational income should not be less than double the charge for servicing loans,^{27/} Some participants remarked that

^{26/} Item 5 (c) of the guidelines for discussion. Paragraphs 119-122 sum up the debate on items 5 (a) and (b). See again annex II.

^{27/} See Eugenio Salazar, Principios de tarificación eléctrica (E & WR/WP.2/5).

that rule could be applied only if the borrowing coefficient did not exceed a certain figure, since it would otherwise lead to extremely high rates of return on the undertaking's capital stock.

124. When the question of loans contracted by the electricity company with the assistance of the State was again taken up, the general opinion of the meeting was still that the undertaking should not monopolize the benefits to be obtained from such loans. A few participants pointed out, however, that State loans did not always carry a lower rate of interest, although that was more often than not the case. The example was cited of an electricity undertaking which obtained a loan at a decidedly lower rate of interest than that applied to credit offered by the State in the same capital market.

125. With respect to the increase in profits on equity capital when loans are floated at a rate of interest that undercuts the acknowledged legal rate of return under method I of the regulatory legislation, it was noted that an automatic stabilization factor exists - a built-in stabilizer as it is called in the theory of economic cycles. In other words, an increase in the borrowing coefficient is matched by an increase in the rate of interest levied on new loans, in view of the enhanced risk for the person lending the money and thus becoming one of the company's bondholders, until the point is reached at which the capital stock no longer obtains any additional benefit therefrom.

126. When the flexibility of the rate of return on electricity capital again came up for discussion, it was recalled that in Argentina the rate is fixed by law at a certain number of points above the percentage of actual returns on government securities.

(b) Valuation of fixed assets ^{28/}

127. With respect to the machinery for revaluing fixed assets in the most recent electricity legislation, it was suggested that preferential treatment should be accorded - especially during periods of acute inflation - to enterprises that had succeeded in thoroughly compensating for a lower rate of return. The suggestion was rejected, on the grounds that it had

^{28/} Item 5 (d) of the guidelines for discussion.

been demonstrated in some countries suffering from severe inflation that stock exchange quotations of industrial shares kept in line with the revaluation of the enterprise's assets whatever the valuation criterion adopted in tax legislation and in the other legal regulations governing enterprises. Some participants pointed out that that was not generally true of Latin America, since in certain countries market quotations of shares had lagged behind the rise in their nominal value in accordance with the over-all trend of prices.

128. As regards the efficacy of the mechanisms for revaluing assets in electricity legislation, the need for rapidity of action was stressed since, with an annual inflation of about 20 per cent, the time factor was essential if the undertaking was to enjoy the benefits of the relevant legal provisions.

129. It was decided that it would be advisable to make new individual revaluations at reasonable intervals, say, every five years, during which an automatic revaluation system on the basis of an appropriate index would have been operating. One of the possible indices mentioned was the general price index (Chilean legislation); dollar quotations (SECBA agreement) or a special index composed of the prices of the property forming part of the electricity company's assets. It was agreed that the question which index was chosen was not of prime importance, since they all evolved along the same lines over the medium and long term, and that there was some virtue in employing an index that was also used for other purposes, so as to avoid any likelihood of hesitation or delay in drawing it up solely for the purpose of electricity regulation.

130. Reference was made to the problem of applying the criterion of "new replacement value" on the part of the regulating agency as a basis for the periodic valuation of the company's assets. It was pointed out that when technical or organizational improvements had been introduced in construction methods, the use of such a criterion might lead to a reduction in the values of the assets forming the investment basis on which the tariff was determined.

131. In that connexion the question was asked whether a more just and logical criterion would not be the "cost of replacement" of the asset

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in its original state. Most of the participants did not agree, and it was remarked that if the purpose of the regulatory legislation was to replace the market conditions normally produced by free competition, the assets should be valued at their replacement cost, since the value of a production good in a competitive market was inevitably affected by the higher production capacity of its substitutes.

132. None the less it was acknowledged that in some cases the criterion of new replacement value was liable to be extremely detrimental to electricity undertakings, which usually had a lower rate of return than other enterprises faced with the same risk of their equipment becoming obsolescent. To remedy the situation, it was suggested that a mechanism for accelerated depreciation should be established. Reference was made to the case of the SEGBA agreement in Argentina, whereby the electricity undertaking is allowed an additional 2 per cent depreciation provided that the sinking fund does not exceed two-fifths of the cumulative assets; in other words, accelerated depreciation is permitted when the company is going through a period of rapid expansion.

133. It was also pointed out that the criterion of new replacement value could operate in the company's favour when construction or production costs increase. A typical example would be a civil works project when wages or social security increase in real terms or when new customs duties are levied on imports of capital goods.

134. A discussion took place on the relationship between the mechanisms for revaluing fixed assets and methods I and II for rate-fixing. For example, when a fixed asset is revalued, the enterprise receives an additional benefit if the loan has no clause for adjustment under the head of depreciation. Admittedly that seldom happens in Latin America where loans are mainly floated in foreign currency, except for loans from local investment banks and other official institutions. It was agreed that the local lender should benefit by the revaluation - in fact that was the only way of preventing decapitalization of development institutions of the kind. It was pointed out that the same problem arose with respect to method II, since the way in which the increase in value of the proportion of the fixed assets that had been financed by a loan without the gold clause was treated in the accounts had to be specified.

135. The paper presented at the meeting by Eugenio Salazar ^{29/} refers to the need for revaluing the depreciation fund as well. When this cannot be done in individual cases, the ratio applied should be similar to that existing prior to revaluation between assets and depreciation fund.^{30/}

(c) Influence of inflation on electricity costs and methods of offsetting it ^{31/}

136. It was generally stressed that adjustment clauses to allow for price increases in respect of electric power inputs are essential in countries where high rates of inflation prevail, but it was pointed out that there are drawbacks attaching to such clauses - apart from those already discussed in connexion with the lack of incentives to efficiency ^{32/} - which should be borne in mind both by the enterprise and by the regulating agency.

137. One of those drawbacks is the failure to provide the enterprise with any incentive to bargain with the trade union on wage increases. If the burden of every such increase automatically fell on the consumer, there would be a risk of establishing a privileged group of workers at the expense of the community. One suggestion discussed was that the automatic application of the adjustment clause should be limited to price increments resulting from a "normal" rise in wages, and that the express approval of the regulating agency should be required for any larger increase.^{33/} Another was that consumers' representatives should participate in the collective agreements of the companies concerned, as was the practice in the United Kingdom.

6. Electricity rates and the financing of electricity
development in Latin America

138. There was a consensus of opinion to the effect that, after a long period during which excessively low rates had been tending to stifle electricity development, a salutary reaction had taken place in recent years. Under the aegis of new electric power legislation, the confidence of investors

^{29/} E & WR/WP.2/4, op.cit.

^{30/} On this point, see also E & WR/WP.2/2, p .52.

^{31/} Item 5 (e) of the guidelines for discussion.

^{32/} See above, section 1 (g), paragraphs 76-86.

^{33/} E & WR/WP/2/1, chapter VII.

and the financial stability of State and private companies had been restored in several countries. The various comments on the new type of legislation formulated in the course of the discussion could not fail to reveal that it had represented a considerable improvement upon the previous state of affairs, the ill-effects of which were still making themselves felt in relation to present expansion requirements.

139. The advantages and disadvantages of rates which included surcharges specifically intended for the financing of expansion were discussed at length. It was recognized that four different types of surcharge existed for that purpose:

- (i) Surcharge designed to increase the company's net worth;
- (ii) Surcharge whose product was deposited in a State-administered electrification fund;
- (iii) Surcharge whose product went to a special fund administered by the concession-holder having the use of goods purchased against that fund, although they were the property of the State; and
- (vi) Surcharge in return for which the electricity company surrendered bonds or shares to the consumer.

140. It was stressed that in the third case - when the concessionary company operated on the basis of private capital - the growth of the expansion fund might induce the State to insist on taking an active part in the management of the company. In Peru, article 131 of the relevant Act restricts the amount of the annual allocation to the fund.

141. Some participants questioned the validity of the principle of surcharges itself, adducing the argument, inter alia, that the company and/or the Government thus assume the power to establish taxes and to alter rates, and that the application of the principle in the case of electric power would lead to the introduction of similar surcharges on other public utilities, with the result that a whole tax system would be set up, parallel to that of the central administration and difficult to justify in theory. The underlying aim of the new electric power legislation was to ensure the financial stability of the company and see that it obtained a satisfactory rate of return on investment, so that it could

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safely and confidently approach the capital market. That aim would be frustrated if the company were supposed to procure all the resources it needed through the electric power tariff, while at the same time the morale and drive of the enterprise would be weakened. In addition, too heavy a burden would be laid on the consumer, who would thus be financing an unduly large proportion of future expansion projects.

142. Apart from the distortion of the tax system, there was the danger that the existence of taxes or surcharges on electricity tariffs - when the rate base itself was unrealistic - might constitute a subterfuge leading to disguised expropriation of the concession-holder's assets.

7. Electricity rates and their relation to problems of fiscal policy

143. Attention was drawn to the close resemblance between the opinions expressed by the participants at the Meeting in progress and those put forward at the Conference on Fiscal Policy which was being held concurrently in Santiago, to the effect that it was inexpedient for the central administration's budget to contribute to the financing of semi-public services such as the provision of electric power. The reduction of rates to a level lower than that of real costs by virtue of fiscal contributions, besides aggravating the shortage of financial resources in the public sector, introduced all sorts of harmful distortions in the structure of electric power consumption.

144. It was likewise agreed that the opposite attitude - the tendency to use electric power as an instrument for tax collection by the State - was censurable. If anti-economic effects were to be averted, the taxes concerned would have to be co-ordinated with those levied on other kinds of energy, which was unlikely to happen in practice.

145. Broadly speaking, taxes affecting the electric power industry can be grouped in two categories: i) taxes on the company itself; and (ii) taxes on the supply of power. The first group includes the rates paid by the company for the use of public assets, such as streets or water resources. The second comprises all indirect taxation on the sale of power, which is usually provincial or municipal in origin, and in some cases, through the cumulative effect of various taxes, reaches a high percentage of the total cost of the electricity supply.

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146. If the sales tax on electric power is established on a percentage or ad valorem basis, it has the drawback of rising in proportion to the cost of power, or, in other words, consumers in areas where the price of electricity is high have also to pay the heaviest taxes, which seems unfair. The specific tax is also inequitable, particularly in relation to large-scale consumers for whom the unit price of electricity is low. Furthermore, where a rising inflationary trend exists, the absolute incidence of such a tax is very quickly weakened. A middle way would be to establish a percentage tax, but to fix a reasonable ceiling, so as not to lay an undue burden on the consumer who is already penalized by high electricity costs.

147. Agreement was reached on the need to co-ordinate the structures of the various tax jurisdictions in order to prevent the superimposition of national, provincial, municipal and local electricity taxes, the results of which might conflict with the Government's energy policy.

148. Some participants pointed out that the existence of a tax affecting the sale and purchase of electric power creates an incentive to self-generation, even when the power thus produced costs more, in real terms, than that supplied by the electricity company. The effect of the tax runs counter to the general interests of the community, in that it encourages anti-economic production.

149. Lastly, mention was made of the fact that double taxation on dividends accruing from capital stock might have an unfavourable effect on the external financing of expansion of the electric power industry, when the company concerned operated with foreign private capital.

8. Legal, institutional and administrative issues in Latin America

150. Legal provisions in general, and those relating to the electric power industry in particular, may be divided into four categories: (i) the Constitution, which is relevant to many of the problems discussed at the Meeting, as, for instance, subsidies or mechanisms for financing new services, which may violate the constitutional principles of equality of persons or limit powers of establishing new taxes; (ii) international treaties,

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for example, that of Salto Grande or that of Lake Titicaca; (iii) Acts of Parliament; and (iv) regulations, which are also legal provisions, but are laid down by the Executive in virtue of the powers conferred upon it by the law.

151. Emphasis was laid on the need for prior compilation of electric power legislation in Latin America, most of it not constituting laws properly so-called, but contracts signed by the municipalities. For the purposes of such a compilation, research on the degree of compliance with the law would have to be conducted in the field.

152. In relation to the electric power industry, State activities may be classified as follows: (i) normative or legislative; (ii) supervisory; (iii) entrepreneurial; and (iv) concerned with the provision of assistance. The first two types of activity relate to the essential aims of the State, i.e., to those which admit of no discussion; the last two are optional, and depend upon the attitude adopted by the State.

153. Within the normative activity of the State, a distinction may be drawn between various levels at which decisions or norms are adopted, such as those relating to the determination of policy, which have to do both with the relation between administrator or concession-holder and consumers, and with relations among the consumers themselves.

154. Supervision, too, is exercised at different levels, relating, for example, to the use of net wealth, control of price abuses and utilization of energy resources.

155. Some of the participants indicated that in their opinion basic decisions of policy with respect to electricity rates ought to be adopted at a higher level than that of the regulating agency, since they affect the unification of the Government's energy policy with its over-all economic policy.

156. It was agreed that the legislation regulating the electricity service ought not to enter into too much detail, but should be confined to safeguarding constitutional rights and establishing a mechanism whereby the policy principles of the administrative authorities could be implemented.

157. Stress was laid on the desirability of studying the establishment of new types of institutions and juridical forms in keeping with expansion

/requirements in

requirements in respect of electricity services. A case in point is afforded by the so-called "consortia" which came into being in Argentina in connexion with rural electrification and irrigation areas.

158. Among the components of the economic system which, in addition to the concession-holder, the consumers and the regulating agency, are concerned with electricity rates, mention was made of those producer or consumer units which are not connected to the network at the time of the Meeting, but which benefit by its extension. Some participants considered that in certain cases part of the cost of extending the network ought to be financed by a procedure similar to the "betterment tax", within an area of influence demarcated by the increase in the value of immovable property deriving from the availability of a given public utility.

159. Another sector concerned with rates is that of future consumers; in some instances, the most equitable procedure would be to capitalize initial deficits, since it is not fair that present consumers should pay for the expansion of which future consumers will enjoy the benefit.

160. Yet another interested sector is the Government, not only because of the direct incidence of electricity rates as the price of an important energy resource, but also in connexion with the use of certain natural resources. The charge for their use represents royalties, which must be clearly differentiated from taxes and rates. An example of a royalty would be the 2 per cent "entero" in Mexican legislation.

161. Some participants advocated the separation of the regulating agency from the agency responsible for fixing rates. The latter should include a representative of consumers. Chilean legislation might be taken as exemplifying that position. Some doubts were voiced as to the distinction between normative and regulatory activities in view of the modern tendency to delegate normative and legislative powers to the Executive. As a general rule, the latter delegates normative powers to the regulating agency, at least as regards authority to interpret the legal provisions in force.

162. With regard to subsidies, it was pointed out by some participants that although in theory it may seem logical to reserve for the Legislative Power the right to establish them and alter their amount, the modern

/trend is

trend is in the reverse direction, and it is increasingly common for funds to be placed at the disposal of the administrative authorities and distributed by them at their discretion within the ample limits established by law.

163. Attention was drawn to the need for more care to be devoted, in the formulation and practical application of electric power legislation, to the safeguarding of consumer rights, with respect to both the reliability and the quality of the service.

164. It was agreed that it was undesirable for provinces or municipalities to establish independent norms in relation to electricity services which extend beyond their jurisdiction.

165. Emphasis was laid on the difference between State electricity enterprises acting under the authority of the Executive and those which, although based on public capital, operate in the form of juridical persons in private law - for example, corporations like ENDESA in Chile, SEGBA in Argentina and FURNAS in Brazil. In the first case, the enterprises concerned are subject to the regulations governing the use of public capital, and there is a risk that elements of rigidity prejudicial to the development of their activities may thus be established. The fact that it has no legally-established administrative organization and is not a direct dependency of the Executive allows the second type of State enterprise greater freedom of movement.

166. With respect to the first of these groups of enterprises, it should be made clear that the degree of functional autonomy which a concession-holder operating with public capital may enjoy varies very widely. At all events, the statutes of the company must allow it the freedom of movement referred to above.

Annex I

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Annex II

GUIDELINES FOR DISCUSSION

1. Principles for a policy on rates: cases in Latin America
 - (a) Rates as an expression of cost per kWh
 - (b) Rates as a means of contributing to the expansion of electricity services (self-financing)
 - (c) Rates as the basis for a return on capital invested
 - (d) Rates as a factor in modifying the demand curve
 - (e) Rates as an instrument of energy policy
 - (f) Rates and the social importance of the electricity services
 - (g) Rates as a means of promoting production and development
 - (h) Rates as an incentive to a more efficient service
2. Existing rate systems and those applied in Latin America
 - (a) The principal rate systems in force in the world today
 - (b) Systems applied in Latin America and experience gained
3. Establishment of the rates schedule: general considerations
 - (a) Application of general principles in working out the tariff structure
 - (b) Adaptation of general principles to concrete or exceptional cases
4. Establishment of the rates schedule: accounting aspects
 - (a) Definition of the main terms and concepts used in the accounting systems of electricity undertakings
 - (b) Accounting systems actually used in Latin America. Desirability of standardized accounting systems
 - (c) Determination of cost per kWh
5. Establishment of the rates schedule: financial aspects
 - (a) Analysis of balance-sheets and financial management
 - (b) Cost items covered by tariff returns
 - (c) Interest and structure of capital
 - (d) Valuation of fixed assets
 - (e) Influence of inflation on electricity costs and methods of offsetting it

6. Electricity rates and the financing of electricity development in Latin America
 - (a) Have the rates in force in Latin America been favourable to the financing of electricity development?
 - (b) Forms of financing through the rates
7. Electricity rates and their relation to problems of fiscal policy
8. Legal, institutional and administrative issues in Latin America
 - (a) The legal system governing electricity rates. The pertinent laws and regulations; service concessions, taxation, etc.
 - (b) Bodies concerned with the establishment and supervision of rates
 - (c) Administrative machinery for the formation, establishment and supervision of rates

Annex III

GLOSSARY OF TERMS

Administrative, financial and accounting aspects
of electricity enterprises

Electricity enterprise. Individual or corporation engaged in the production, transmission and/or distribution of electric power.

- (a) Enterprises are divided, according to the main destination of the power, into public utilities, self-suppliers and co-operatives. Public utilities are those whose main object is one or more of the following activities: production, transmission and distribution of electricity for the purpose of providing a regular supply for community use.

Self-suppliers are those which, in addition to the main function of the company concerned, themselves produce, either individually or jointly, electric power intended wholly or partly to meet their own needs.

Co-operatives are those bodies, whatever their titles, that are exclusively engaged in generating and/or distributing electric power to their members.

- (b) Electricity enterprises are classified, according to the origin of the majority capital, as private or public.
- (c) With respect to organization, they are classified as corporations, partnerships, limited liability companies, co-operatives, State enterprises controlled by central or local governments), and others. State enterprises are any of the following:

Agencies under the authority of the Government (national, local or municipal);

Autonomous agencies of the central Government;

Agencies organized as enterprises but subject to rules different from those of the usual civil or business corporation, and societies organized in accordance with the normal civil or business legislation but in which the majority capital is State-owned.

/Regulatory and

Regulatory and supervisory authorities. The bodies which are responsible for laying down rules for and supervising the electricity trade economically and technically, in accordance with the relevant legislation, and which study and control the profits of undertakings (service inspection).

Fixed capital. The sum of the non-depreciated values of the physical plant in service required for the specific activity of the enterprise, including certain intangibles representing legitimate and verifiable expenditure, together with interest on investment during the period of construction of engineering works and installation of equipment, until such time as production begins (interest during construction). Engineering works in course of construction or planning and research studies for future projects are excluded as far as the current financial year is concerned.

Depreciated fixed capital. The value represented by investments in goods, rights, etc., and engineering works in service in their existing condition. This is the difference between fixed capital and accumulated depreciation.

Fixed capital in the form of engineering works under construction. The value of the investment in goods, rights, etc., and engineering works that have not yet come into service, including interest during construction.

Frozen capital. The total investment of capital (equity or creditor) tied up by the enterprise in the work of supplying electric power. From the accounting standpoint, it is the sum of the depreciated fixed capital and the working capital.

Working or operating capital. This comprises the value of the operation, consumption and replacement materials that the enterprise has to keep in stock to maintain the service, and the funds required for the operation of the enterprise. In some countries the relevant regulations limit this type of capital to one quarter of the enterprise's direct operating costs.

Construction investment for the financial year. Expenditure (including interest charged to construction) for construction including additions to and betterments, renewals, and replacements of utility plant (including land and land rights) during a specific period, but not money spent for maintenance or for the acquisition of existing utility plant.

Financial structure of frozen capital. With respect to the origin of the resources in question, a distinction is made between:

- (a) Equity capital, which is the paid-up capital stock, capital reserves and undistributed profits;
- (b) Debts and liabilities, including resources contributed by third parties that have to be returned and that the enterprise has used in its electricity supply operations, and
- (c) Non-reimbursable contributions not included in equity capital.

Operating costs. These represent part of the cost of supplying electric power. They include direct operating costs, depreciation reserve and taxes (excluding taxes on profits). They also include interest on debt when the rate base does not allow for borrowed capital.

Direct operating costs. These include:

- (a) Costs of operation, maintenance, technical supervision and local administration of the equipment for the processes of generation (and/or purchase of power), transmission and distribution.
- (b) Costs of meter reading, billing, accounting, collection and all costs directly related to the supply of power to the enterprise's customers.
- (c) Costs of sales promotion, including publicity, technical advice to customers and demonstrations of appliances to increase consumption.
- (d) Administrative and overhead costs common to all the activities referred to above.

Maintenance costs. These include labour, materials, overhead, and other expenses incurred in preserving the operating efficiency or physical condition of the plant.

Depreciation. The loss in service value, of plant forming part of the assets, not restored by current maintenance, incurred in connexion with the consumption or prospective retirement of electric plant in the course of service from causes which are known to be in current operation and against which the enterprise is not protected by insurance. Among the causes to be given consideration are wear and tear, action of the elements, inadequacy, obsolescence, technological changes and changes in the requirements of public authorities.

/Depreciation reserve.

Depreciation reserve. This is intended to cover the value of the goods in question at the end of their serviceable lifetime in the light of the estimated net salvage. The following methods can be used:

Straight-line method. Equal annual amounts are set aside, obtained by dividing the depreciable value by the estimated number of years of serviceable life.

Sinking-fund method. This method involves setting aside at the end of each year a fixed sum, deposited at compound interest, so calculated that at the end of period for which the renewable plant is expected to last the total accumulated will equal the amount of the depreciation. The annual sum in question is obtained by multiplying the amount for depreciation by

$\frac{i}{(1+i)^n - 1}$, where i is the rate of interest per unit and

n is the period in years.

Declining balance method. Under this method the depreciation rate is a fixed annual percentage. The annual charge is a decreasing quantity, and is obtained by applying the rate to the net plant balance to be depreciated. This balance is determined by subtracting the accumulated depreciation deductions of previous periods from the cost of the property. When the property is almost fully depreciated, it is necessary to add to the reserve the small remaining amount required to bring the reserve up to 100 per cent of the value, otherwise depreciation charges would continue on in decreasingly smaller amounts to infinity. The sum of the annual deductions constitutes the accrued depreciation.

Amortization. The gradual extinguishment (or accumulated provision or reserve therefore) of an amount in an account by prorating such amount over a predetermined period of years.

Sinking fund. Cash (or other assets) and interest thereon accrued over a given number of years, in the form of an annual reserve, for the purpose of liquidating a liability.

Reversion fund. A fund accruing from the annual allocation of a portion of income for the purpose of refunding to the investor of capital the

/amount he

amount he has contributed to the enterprise, at the expiry of a concession that provides for the free transfer of the assets of the enterprise to the State.

Taxes. This term covers the charges under the heading of taxes proper or dues of various kinds payable to the State, to municipalities, or to other public authorities.

Interest charges. A group of accounts representing the cost of servicing borrowed funds. It includes interest on long-term debt, amortization of debt discount and expense, interest on debt to associated companies, interest charged to construction - credit and other interest expenses.

Plant acquisition adjustments. These represent the difference between the book cost of electric plant or systems acquired as operating units and the assessed value at a given moment.

Operating revenues. The amounts billed by the enterprise for electricity services provided during the year and for other services directly related to the supply of power, minus those charges for which the enterprise alone is the retaining agent.

Net operating revenues. The total return on frozen capital; this is the difference between operating revenues and operating expenses, after subtracting from the latter interest on debts contracted, when the rate base does not include the capital borrowed.

Net revenues. The income on the enterprise's proprietary capital, and represents the difference between operating revenues and operating expenses after adding to the latter interest on debts contracted, when the rate base includes the capital borrowed.

Operating ratio. The ratio, generally expressed as a percentage, between operating expenses (minus interest on debts contracted, when the rate base does not include the capital borrowed) and operating revenues.

Intangible plant. Represents the value of organization, franchises and consents, patent rights, licences, privileges, and other intangible property necessary or valuable in the conduct of the utility's operations.

Original cost. The cost of utility property paid or invested at the time of putting it into service.

/Replacement value.

Replacement value. Estimated value of plant at current prices.^{1/}

Incremental costs (energy). The cost of generating, transmitting or distributing additional electricity above some previously determined base amount.

Retirements. Cost of utility plant retired from service whether or not it has been physically removed or replaced.

Debt:

Short-term debt. Payable within one year.

Medium-term debt. Payable within a period of from one to five years.

Long-term debt. Payable over more than five years.

Average annual bill per customer. Annual revenue (excluding penalties and taxes applying to the sale of power for which the enterprise is the sole retaining agent) from a class of service, divided by the average number of consumers in this category during a period of twelve months (usually refers to residential customers).

Utility rate structure (rate schedule or tariff). A utility's approved schedules establishing conditions and charges for rendering supply and services to various classes of its customers.

Demand charge. The specified charge to be billed on the basis of the billing demand under an applicable rate schedule or contract.

Energy charge. Charge based upon electric energy supplied.

Furnished without charge (energy). Represents electric energy in kWh furnished by a utility without charge.

Rate base. The value, specified by a regulatory authority, upon which a utility is permitted to earn a specified rate of interest or return.

Demand rates. The term "demand rate" applies to any method of charge for electric service which is based upon, or is a function of the rate of use or size of, the customer's installation or maximum demand expressed in kW or kVA:

Flat. The term "flat demand rate" applies to a charge for electric service at a flat monthly or annual rate based upon the customer's installation of energy-consuming devices. This rate can be applied

^{1/} See "rate base", below.

when the use of the equipment is known and consequently consumption can be estimated. The flat rate may be combined with the "block" or "step" methods.

Meter rates. The term "meter rate" is applicable to any method of charge for electric service based solely on the energy consumed. This rate may be combined with the "block" or "step" methods:

Straight-line. The term "straight-line" indicates that the price charged per unit is constant, i.e., does not vary on account of an increase or decrease in the number of power units consumed (kWh).

Step. The term "step" indicates that a certain specified price per unit is charged for the entire consumption, the rate or price depending on the particular step within which the total consumption falls.

Block. The term "block" indicates that the price charged per unit is charged for all or any part of the energy falling between two limits of consumption, and different unit prices are charged for all or any part of the energy included in each of the blocks established.

Mixed rates (based on both demand and consumption):

Hopkinson. This term applies to a method of charge which consists of a demand charge plus an energy charge.

Block Hopkinson. This term applies when the block form is established for either the demand charge or the energy charge, or both, in a Hopkinson demand rate.

Three-part or three-charge. Either of the foregoing types of rates may be modified by the addition of a customer or meter charge.

Wright. This term applies to mixed rates providing for different unit prices for the consumption of a certain volume of energy per unit of demand (hours of use) in the different blocks or steps.

Escalator clause. This is a clause in a rate schedule that provides for adjustment of the amount of the bill as the cost of labour, fuel or any other cost component varies from a specified base amount per unit.

Energy factor clause. A surcharge based on energy consumption which is applied if certain established limits of consumption are exceeded.

