

2. Transpotech is a subsidiary of the National Research and Development Corporation and is wholly owned by the British Government. It provides clients, on commercial basis, the skill, expertise and products developed by the Department of Transport in the United Kingdom. Transpotech's role in the pilot stage is to coordinate the inputs from a number of consultants and suppliers such as the Plessey Controls Ltd., Marconi Avionics Ltd., Logica Ltd., and MVA Consultancy.
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## ELECTRICITY PRICING IN HONG KONG: A COMMENT

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### INTRODUCTION

China Light and Power Company Limited, Hong Kong (China Light) is a privately owned electricity generating enterprise. China Light and its associated companies (the Group), have exclusive rights to provide electricity to the Kowloon Peninsula and New Territories of Hong Kong, supplying about 70% of the electricity consumed in the Territory of Hong Kong. Power is also sold to Mainland China. This company, quoted on the Hong Kong Stock Exchange, holds controlling interests in the generating companies, Peninsula Electric Power Co. Ltd. and Kowloon Electricity Supply Co. Ltd. A third generating company, Castle Peak Power Co. Ltd., is still to be brought on stream.<sup>1</sup> The other major shareholding in the operating companies is held by Exxon, the US oil major. Exxon has a 30% stake in the operating companies and China Light 70%.<sup>2</sup>

The activities of the Group, including the tariffs set, are regulated under the terms of a Scheme of Control Agreement entered into by China Light and the Hong Kong Government. Such a Scheme of Control for electricity generation was first introduced in 1963. The current Agreement (the Scheme) is similar in important details to that of the original Scheme and was reached in 1978 to apply to 1983. Either party may request modifications of the Scheme in the year ending September 1988.<sup>3</sup>

It will be shown that the expansion of China Light and its associates to meet additional demands for electricity has been financed, to an important degree, through internally-generated cash. The attempt is made here to identify the different sources of finance used for expansion. It will be indicated that satisfying the requirements for internal finance is an integral part of the regulatory scheme. It will be argued that the permitted

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tariffs can only be justified by the Scheme of Control, on the presumption that the internally-generated funds provided through tariffs and used to finance expansion, were indispensable for the purpose of supplying electricity in Hong Kong. Furthermore, the scheme of Control regards the planned internal financing sources as equivalent to a resource cost of producing electricity in Hong Kong, to be covered by tariffs. This paper will show that, regulating electricity supplies and tariffs in this way, has meant that tariffs charged consumers have covered significantly more than the opportunity costs of supplying electricity to them. It will be indicated also that, in the final analysis, the interests of shareholders may not have been well served by such arrangements.

To quote Barrett, "The Scheme of Control governs the financial operations of the group just as though we were one company" (Barrett, p. 2). A consolidated group financial analysis is presented in the annual reports of China Light and set out in terms of the Scheme of Control, which provides much of the information required for the financial and economic analysis of the group. Unfortunately, not all the information required for the purposes of a full analysis is provided. The important notes to the balance sheet apply only to that of China Light and not to those of the associated companies. Therefore, not all statistics are readily available, for example, for group depreciation or deferred taxation, or for financial arrangement between the parent and subsidiaries. The assumptions made about these important components of the Group Accounts will be clearly set out.

#### THE SCHEME OF CONTROL: SOME DETAILS

Under the Scheme of Control Agreement, the shareholders of the group are permitted a return of 13.5% of the average net fixed assets employed plus an additional 1.5% return on shareholders' investments in fixed assets made after 30th September, 1978.<sup>4</sup> In 1985, the average permitted return on net assets was 14.2%. The same return of 13.5% on net assets was specified in the original Scheme of Control Agreement signed in 1963.<sup>5</sup>

The net return available for distribution to shareholders in the Group is obtained by deducting a charge on the "Development Fund" balance and after deducting interest on long term capital, provided the interest charge does not exceed 8% per annum. Interest payments incurred prior to the commissioning of new capacity are incorporated in capital expenditure and so net assets.

In 1983, 1984 and 1985, \$ 299.5 million, \$ 390 million and \$ 477 million were charged to Fixed Assets respectively, representing 42% of the long term interest incurred over the 3 years.<sup>6</sup>

The Development Fund is augmented if revenues exceed the sum of operating costs, the permitted return and taxation. The development fund is drawn down, should revenues fall short of these charges on operating profits.<sup>7</sup> Over the ten years, 1976-1985, the Development Fund grew every year, except in 1979 and 1980. The development fund is, to quote the Scheme, "to assist in the acquisition of fixed assets".<sup>8</sup> An amount equal to 8% of the average of the opening and closing balances of the development fund is deducted from the 'permitted return' and credited to a Rate Reduction Reserve, which is used to provide discounts or rebates to tariffs in the following year, and to smooth changes in tariffs.<sup>9</sup> It will be understood that such arrangements represent internal accounting methods and do not involve outflows of cash from the Group. The Development Fund and the Rate Reduction Reserve are a part of the internal financial resources available to the Group.

The Scheme of Control makes provision for the valuation of net fixed assets, the date of commissioning of fixed assets, as well as for depreciation. Depreciation is allowed on a straight line basis, depending on the assumed useful lives of the different assets employed, that is from 25 years for buildings, overhead lines and cables, to 4 years for motor vehicles.<sup>10</sup> Interest on bank overdrafts as well as interest paid on consumer deposits is offset against operating profits. Interest on long-term loans incurred in financing capital expenditure before the commissioning of the equipment is capitalized as part of the cost of capital equipment and is therefore, regarded as an asset to which the permitted return applies.<sup>11</sup> The realized or unrealized accumulated losses on foreign exchange required for transactions in fixed assets are treated as if they were a net asset of the group and are also included in the sum of net assets upon which the permitted return is calculated, i.e. before or after commissioning. Subsequent foreign exchange profits or losses, realized or unrealized, are reflected in the profit and loss account.<sup>12</sup>

Taxation is levied on the basis of profits earned as defined by the Inland Revenue Department. However, the differences between the higher taxes implied by the less generous Scheme of Control depreciation schedules and those of Inland Revenue, upon which the actual tax is assessed, are regarded as deferred taxa-

tion. Thus, it will be appreciated that the deferred taxation reserve is another internal source of finance, but one which apparently cannot be distributed to shareholders, even though the tax authorities have no claim on the group. Such arrangement would seem to add support to the general proposition made in this paper, that the tariffs that provide high nominal and real returns, depending on the rate of inflation, are regarded as acceptable, provided that an agreed part of returns realized is saved for the purposes of financing expansion.<sup>13</sup>

#### A FINANCIAL ANALYSIS

A 10-year history of the production and financial achievements of the Group is summarized in the Annual Reports of the China Light and Power Company Limited. In 1985, the average permitted return of \$2,607 million was 14.2% on the net assets plus the exchange fluctuation account which amounted to \$18,310 million. Net fixed and current assets of the Group in 1985, including the exchange fluctuation account, were worth \$22,250 million and were financed in the following way.<sup>14</sup>

	\$ million
<u>Creditors</u>	
Current Creditors	3,950
Bank loans	9,783
<u>Shareholders</u>	
Capital and retained earnings	6,761
Other shareholders capital (deferred liabilities & reserves including deferred taxation)	1,208
	548
<u>Development Fund</u>	22,250

The Development Fund could be regarded as an asset of consumers and other reserves, available ultimately to shareholders though conditional upon subsequent Schemes of Control. The balance of liabilities represents shareholders' funds which could more straightforwardly be distributed to them.

For the purposes of analyzing the account of the Group, a Group Sources and Applications of Funds Account has been calculated for years 1983-1985. (See Table 1). The cash flows of the Group after 10 years have been identified and financial ratios calculated, as may be seen in Table 2 below.

As previously indicated, information about actual depreciation for the Group is not specified in the Financial Statements provided by the China Light and Power Company Limited.

TABLE 1  
(million Hong Kong Dollars)

SOURCES & APPLICATION OF GROUP FUNDS	1985	1984	1983
	Profit	2706.00	2292.00
Less Interest	746.00	677.00	536.00
Less Forex	373.00	-1019.00	1058.00
Net Profits	1587.00	2634.00	211.00
New Capital	-24.00	204.00	350.00
Bank Loans	1943.00	297.00	3080.00
Creditors	617.00	919.00	443.00
Deprec.	1090.76	925.93	755.61
TOTAL	5213.76	4979.93	4839.61
USES			
Gross Investment	4375.76	4174.93	3769.01
Curr. Assets	49.00	124.00	201.00
Taxation	624.00	262.00	217.70
Less def. tax & oth.	294.00	200.00	-42.00
Taxes Paid	330.00	62.40	259.70
Dividends	459.00	618.60	609.30
TOTAL	5213.76	4979.93	4839.61
(oth. refers to the change in the other deferred liabilities)			

The Scheme of Control Statement provides information about 'operating expenses including depreciation'. Depreciation allowed for by the China light itself is, however, revealed in the accounts, as is information about the net assets of China Light. Depreciation for the Group was calculated by applying the same ratio of depreciation to net fixed assets allowed for by China Light to the net fixed assets reported by the Group. China Light, however, does not break down the net assets it employs into fixed and current assets, to which depreciation applies. Therefore, as a preliminary step, the net fixed assets of China Light were assumed to have the same ratio to net total assets, as that of the Group as a whole, for which a breakdown is available. The average ratio of Group depreciation, so calculated, to the reported Group fixed assets was a low one, averaging less than 6% per annum over the 10 year period. The figure so obtained for Group depreciation was, in turn, added to the change in net fixed assets employed by the Group, to provide a measure of the gross investment by the Group in fixed and current assets, to be financed from internal or external sources, as reported in Table 2.

TABLE 2  
(million Hong Kong dollars except for ratios)

	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
<b>CASH FLOW ANALYSIS</b>										
New Capital	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
Ret. Earnings	-24.00	204.00	350.00	425.00	775.00	127.00	395.00	97.00	10.00	24.00
	778.00	608.00	473.00	404.00	237.00	190.00	105.00	95.00	89.00	82.00
<b>NON CASH ITEMS (Add Back)</b>										
Chg. Other Res.	294.00	200.00	-168.00	387.00	186.00	171.00	103.00	6.00	2.00	2.00
Chg. Dev. Fund	99.00	126.00	95.00	50.00	14.00	-6.00	-27.00	60.00	43.00	31.00
Depreciation	1090.76	925.93	755.61	547.56	327.86	290.19	209.14	136.33	120.04	104.06
Chg. Forex Acc.	-373.00	1019.00	-1088.00	-79.00	-451.00	0.00	0.00	0.00	0.00	0.00
Chg. Bank Loans	1943.00	297.00	3080.00	854.00	1775.00	1304.00	529.00	11.00	0.00	0.00
Chg. Curr. Liab.	617.00	919.00	443.00	857.00	382.00	233.00	197.00	-13.00	-4.00	-30.00
<b>TOTAL</b>	4424.76	4298.93	3970.61	3445.56	3245.86	2299.19	1511.14	392.33	260.04	213.06
<b>FINANCING REQUIREMENT</b>										
Gross Investment	4375.76	4174.93	3769.61	3228.55	3012.86	2576.19	1213.14	350.33	163.04	186.06
Chg. Curr. Assets	49.00	124.00	201.00	207.00	233.00	-277.00	298.00	42.00	97.00	27.00
<b>TOTAL</b>	4424.76	4298.93	3970.61	3445.56	3245.86	2299.19	1511.14	392.33	260.04	213.06
<b>FINANCE</b>										
Chg. Ext. Debt	2560.00	1216.00	3523.00	1711.00	2157.00	1527.00	726.00	-2.00	-4.00	-30.00
Chg. Equity	754.00	812.00	823.00	829.00	1012.00	317.00	500.00	192.00	99.00	106.00
Chg. Reserves	1110.76	2270.93	-357.39	905.00	76.86	455.19	285.14	202.33	165.04	137.06
<b>TOTAL</b>	4424.76	4298.93	3970.61	3445.56	3245.86	2299.19	1511.14	392.33	260.04	213.06
Cum. Investment	24061.48	19636.72	15337.78	11367.17	7921.62	4675.76	2376.56	856.42	473.10	213.06
Cum. Capital	2383.00	2407.00	2203.00	1853.00	1428.00	663.00	526.00	131.00	34.00	24.00
Cum. Ret. Earn.	3061.00	2283.00	1675.00	1202.00	798.00	561.00	371.00	266.00	171.00	82.00
Cum. Reserves	5233.48	4122.72	1851.78	2227.17	1321.62	124.76	788.56	504.42	302.10	137.06
Cum. Debt	13984.00	10824.00	9608.00	6085.00	4374.00	2217.00	690.00	-36.00	-34.00	-30.00
<b>TOTAL</b>	24061.48	19636.72	15337.78	11367.17	7921.62	4675.76	2376.56	856.42	473.10	213.06
<b>RATIOS</b>										
Debt/Investment	0.56	0.55	0.63	0.54	0.55	0.47	0.29	-0.04	-0.07	-0.14
Cum. Cap./Invest.	0.10	0.12	0.14	0.16	0.18	0.14	0.22	0.15	0.07	0.11
Cum. Int. Fin./Invest	0.34	0.33	0.23	0.30	0.27	0.39	0.49	0.89	1.00	1.03

\* Chg. refers to change in, and cum. to accumulated investment, etc. Cum. cap. refers to new capital accumulated. Accumulated internal finance (Cum. Int. Fin) is the sum of the accumulated retained earnings and reserves.

Details about actual taxes paid, taxation and deferred taxation are reported and utilized in the Sources and Applications of Funds Accounts. It is assumed that the change in the 'Other Deferred Liabilities', that is other than bank loans, referred to in the 10 Years Summary of Group Financial Highlights, constituted a source of cash for the Group generated from internal sources. Much of these additional reserves would have been deferred taxation and the balance, presumably mostly the Rate Reduction Reserve, and other reserves are not specified. The Group 'dividends' reported in the Source and Application of Funds Accounts was calculated as a residual. If the assumed depreciation allowance or assumed actual taxes paid were lower or higher than the outcome, then dividends would, of course, be under or overstated as would gross investment. A comparison of Group dividends so calculated, with dividends paid by China Light can be made for 1983-1985. Over the 3-year period dividends paid by China Light was 70% of the dividends imputed to the Group, a ratio that confirms Barrett's statement about the share of China Light in the Group (see above). The dividends paid by China Light are much less variable than those attributed to the Group. In the Summary Financial Analysis undertaken, all the interest expenses incurred were treated as a deduction from profits. As indicated previously, much of the interest expense incurred was capitalized and so should not be regarded as a deduction from profits. Such interest payments did, presumably, represent cash payments. The losses or profits on foreign exchange were all treated as not involving cash flows but as affecting profits.

As is revealed in Table 2, of the investment in fixed and current assets of \$24,061 million made over the 10 years period, some 34% were financed through internally generated funds, 10% by additional equity issues and 56% through additional debt. In addition to the retained earnings of \$3,061 million and reserves of \$5,234 million accumulated over the period, shareholders in the Group received dividend income. Between 1983 and 1985, these amounted to an assumed \$1,687 million. The percentage of dividends paid to net profits over these 3 years averaged 38%. As may be seen in Table 1, large foreign exchange losses were incurred in the financial year 1983 while profits on the foreign exchange account were earned in 1984, as the Hong Kong dollar fell and rose. Dividends and internally generated cash for the period 1983-1985 amounted to \$6,555 million which may be compared to additional investment in fixed and current assets

made over the period of \$12,694 million.

Such cash flows and internal savings, so apparently favourable to shareholders, cannot be regarded as accidental, Nor, incidentally, can they be regarded as a result of superior efficiency. According to the Scheme, tariffs must be adjusted to reflect operating efficiencies. To quote the Scheme of Control:

'Tariff Limitation

China Light's tariffs will be subject to cost of service adjustments applied on a quarterly basis so as to pass along currently to its consumers the benefits of economies of scale and of improvements in efficiency as achieved, and to take into account changes in the operating costs of the companies including costs of labour and materials, supervision, depreciation, interest, taxes, and the repayment of long term loans which are approved by the Government. Such adjustments shall be determined pursuant to procedures set out herein. The China Light tariff system will include, as hitherto, provision for adjusting charges to offset changes in the costs of fuels consumed by the Companies.'

(Scheme 3, 1, 6)

The financial results must surely be considered as a planned outcome of the Scheme of Control. The returns to shareholders, in the form of ploughbacks and dividends, have allowed for, and in effect costed into, the tariffs set. That is to say, the 'permitted return' on 'net capital' employed and so the tariffs have been planned for successive five-year periods to realize a preferred ratio of internal to external finance agreed to by the company and the government. Thus the savings of the Group have been regarded as equivalent to a cost of production to be covered by tariffs. In order to plan for tariffs in this way, it become necessary to estimate the growth in demand for power and the capital expenditure required to generate the estimated supplies. Thus it follows also, that other thing being equal including costs of fuel and labour, the higher the rate of growth of demand, the larger the amounts of capital expenditure, the higher the level of borrowings and the higher the required rate of internal savings necessary to satisfy the target debt-equity ratio. That is to say, the higher the expected level of demand, the higher must be the tariffs to cover internal financing requirements.

The objectives of the Scheme of Control for internal financial resources are indicated by Schedule 3. To quote the 'Procedures for Reviewing Financial Plans and for Tariff

Adjustments':

'A. Financing Reviews

1. In order to establish agreement concerning the levels of projected tariffs and the methods to be adopted in the financing of capital expenditure, a Financing Review will be conducted jointly by the Government and the Companies —

(a) Whenever financing plans for major additions to the Companies' system have been finalized;

(b) before the period covered by the previous Financing Review expires; and/or

(c) when required in accordance with sub-paragraph (2) (c) of Section B hereof.

2. For each Financing Review, the Companies will make available their revenue and capital budgets, as well as financial models covering the preceding, the current and at least four subsequent years.

3. In each Financing Review, the following components of the overall plan shall be examined:

(a) the pattern of demand and sales of electricity, together with the appropriate revenues;

(b) all operating and capital expenditures, estimated in accordance with the most probable escalation values available, as well as appropriate tax item;

(c) the amount of new capital, if any, to be raised as equity;

(d) the amount of export credit arranged or to be arranged in respect of generation or other equipment or other long term debt, and the corresponding repayment figures covering both principal and interest;

(e) the amount of retained earnings to be reinvested by the Companies;

(f) annual tariff adjustments, to be so calculated that they are spread fairly evenly over the whole period referred to in paragraph (2) hereof and that over the said period the Companies will have a positive but not excessive cash and bank balance in accordance with sub-paragraph (2) (a) (ii) of Section B hereof;

(g) for each year in the period under review, the estimated excess of the Scheme of Control net revenue over the Permitted Return, arising from the assumptions in sub-paragraphs (a) to (e) hereof and following from the calculation in sub-paragraph (f) hereof will represent the "budgeted Development Fund transfer". Such budgeted Development Fund transfers together with all other available funds shall at all times be sufficient to meet

the Companies' full financial commitments.  
(The Scheme, pp. 17-18) .

The requirement (2) that the company makes available their revenue and capital budgets, etc. and the reference in 3(c) to new capital and in 3(e) to retained earnings are of particular importance in supporting the interpretation provided by the paper.

#### THE USE OF INTERNAL FINANCE — CRITICAL ASSESSMENT

Clearly, internal financial sources or corporate savings are alternatives to external finance as methods for financing capital expenditure. It is, however, not legitimate to regard internal sources any more than it would be to regard external finance as equivalent to an operating or financial cost which has therefore to be covered by tariffs. The normal justification for internal finance is that by reducing the risks associated with an enterprise, fresh capital can be attracted at lower costs (interest rates) to the ultimate benefit of shareholders. Normally, however, the forces of competition are present to constrain the behaviour of the firm in setting prices. Prices set and internal savings generated have to be consistent with the survival of the enterprise against competition. If prices are set too high, with debt management objectives in mind, markets may be lost and the desire for internal savings frustrated. The case for regulation, in the first instance, is based upon the presumption that these competitive forces do not apply. The returns of shareholders in a natural monopoly have to be regulated, so it is thought, in the public interest, to prevent the monopoly from abusing its monopoly power though charging higher than necessary prices. The regulations, therefore, permit prices that the regulators judge would have been charged, had the competitive forces been in place, that is to say, prices sufficient to cover operating costs and the costs of raising financial capital. Such costs would also presumably allow for the influence of taxation and the risks for shareholders or lenders providing equity or loan capital.

The regulators of China Light have, it is suggested, over-estimated these costs of capital for the purposes of generating electricity in Hong Kong. They have raised the effective cost of capital by setting unnecessarily low debt-equity ratios and by wrongly regarding the internal savings necessary to meet those ratios as part of the cost of capital to be covered by tariffs. China Light could have borrowed a much larger proportion of the funds necessary to finance their expansion, at least over the latest

10 year period under review, and that if it had done so, consumers would have enjoyed the benefits of lower prices for electricity. Given the product and the underlying growth of the economy, and so the predictability of demand, electricity generation in Hong Kong would surely have been regarded by the suppliers of finance as a low risk activity. Furthermore, the Government of Hong Kong could always have assumed more of these risks by guaranteeing the debt or by financing the expansion itself.

One of the axioms of modern financial economics is the necessity for the investing firm to separate calculations about the worth of an investment from calculations about how best to finance such an investment. Furthermore, the investment decision is regarded as the primary one and methods of financing investments, that are justifiable on their merits, are regarded as secondary.<sup>15</sup>

Regarding the internal savings required to meet financial objectives, for example in the form of planned debt-equity ratios, as constituting a part of the cost of any planned investment, is logically inconsistent. That is to say, a debt management driven system of regulation has no justification in economic analysis, because it confuses investment and financing decisions. Allowing tariffs to be debt management driven implies artificially high costs of capital, higher tariffs and so less investment than would be economically justifiable on the basis of standard present value calculations. Since interest expenses are normally deducted from taxable income, the tax shield implicit in debt may make additional debt, rather than equity, the preferred means of raising finance.

The savings a firm may plan to make, by retaining part of the cash flows expected from an investment, should be regarded as a financial decision and not as part of the cost of the investment. However, if a lower debt-equity ratio did reduce the costs of raising additional capital, such benefits would be realized in the form of lower borrowing costs. Thus, if less debt did mean lower risk and so lower costs of capital, one would expect such lower costs to be reflected in the tariffs of a regulated utility. There is no apparent feedback of this kind in the Scheme of Control applied to China Light.

An investment is justified quite simply, if the present value of the expected operating profits after taxes, but before financial charges, exceeds the money-of-the-day costs of the investment. In such calculations, expected net operating profits, after taxation but ignoring depreciation, except to the extent that

depreciation allowances affect actual taxes paid, are discounted by the market-determined, risk-adjusted, opportunity cost of capital, to establish the present value of the investment. Present value calculations assume that the asset has a limited physical life. This present value is then compared to the money-of-the-same-day costs of investment. For any regulatory authority, attempting to simulate competitive market solutions, the appropriate tariff would be those that were expected to equalize the present value and the costs of the marginal investment. If charged in this way and assuming other costs were not artificially high, consumers would be paying no more than necessary to cover operating and financial costs.

### INFLATION AND PUBLIC UTILITY PRICING

Inflation may raise particular problems for public utilities subject to regulation. With inflation, the costs of capital equipment as well as operating costs and nominal costs of finance (interest rates) rise. However, public utilities, if they have been fixed interest borrowers, will enjoy windfall gains from unexpectedly high inflation. Gross operating margins, especially after financial charges, are likely to improve dramatically with inflation-adjusted tariffs. Therefore, in historic accounting terms, public utilities will appear very profitable and such profitability, through its influence on public opinion, may inhibit the ability of the utility to adjust its prices. However, the utility will not be able to sustain such profitability over time. Assets will have to be replaced at market-related prices. Such concerns became an argument for inflation-adjusted accounting systems and for inflation-adjusted costs.

Following inflating-adjusted accounting systems, sometimes called current-cost, or replacement-cost accounting systems, assets in use are revalued in line with the inflation rate and such revaluations are then regarded as a charge on current income, as would ordinary depreciation allowances. Clearly, such accounting for inflation would mean larger allowances and make the firm appear less profitable, making the case for inflation-adjusted price increases easier to sustain. The replacement or current cost allowances may be credited in the books to a Reserve Fund or to a Loan Account, but in effect, they represent a form of internal savings which may be used to finance capital expenditure. The economic justification for regulating tariffs, according to replacement costs of capital, is that the consumer is charged according to the opportunity costs of supplying a service,

Demand for the service would not then be artificially encouraged by low tariffs, which would require further increases in capital expenditure to meet this demand.

In a competitive environment, prices will adjust to inflation and higher replacement or opportunity costs automatically. However, under regulation, inflation accounting provides a temptation for the utility and its regulators to regard the expected increases in the costs of replacing or expanding the capital stock, as part of the costs of any current investment. If so, tariffs may be planned to cover, not only the inflation-adjusted direct costs of production, including the costs of finance, but also to provide internal savings with which to finance the replacement or physical capital, without having to incur proportionate increases in borrowings. In other words, as in Hong Kong's Scheme of Control, the regulated tariffs may become debt management driven with tariffs planned to generate savings and such savings are then regarded as cost of production to be covered by tariffs.

When the current Scheme of Control agreement was reached in 1978, the issue of how best to cope with inflation was surely raised. However, such procedures are not logically consistent and create a bias against investment. Quite simply, if such procedures are adopted, consumers will pay too much and will be under-supplied. Also the real debt of the utility would decline with increases in the rate of inflation.

Inflation can be fully allowed for, and consumers charged the full cost of producing electricity, by applying standard investment calculations adapted for inflation. If inflation proceeds as expected and utility prices rise in line with inflation, consumers and producers will be neither subsidized nor penalized. Furthermore, if in the extreme case, all investments were financed through debt issues, the nominal amount of debt and tariffs would rise in line with capital expenditure. If all investments were financed through debt issues, the nominal amount of debt would rise in line with inflation, but real debt would only increase with real expansion. The taxation of nominal profits on the basis of historic depreciation allowances might however prevent such outcomes. Higher effective tax rates, the result of inadequate depreciation allowances, can be avoided if the depreciation allowances are inflation-adjusted so that real income or 'economic' income becomes the basis for taxation. Such arrangement for depreciation would avoid artificially high costs of capital.<sup>16</sup>

When inflation rises faster than expected and tariffs are

inflation linked, then the utility, as a fixed interest borrower, will enjoy windfall gains from inflation. Such gains could be reinvested to finance the expansion of the system or paid out as dividends to shareholders. In the case of government-owned utilities, the government may be regarded as a shareholder entitled to its share of the windfall. There can be no presumption that such windfalls are best retained by the utility. The replacement or expansion of capacity has to be continuously justified on its economic merits. How such investment are best financed, whether with internally or externally generated equity capital, or with debt finance, is a further and secondary issue, but there can be no presumption that internal finance is the preferred option. If current consumers are expected to finance the real expansion of the system, they will be overcharged. They will be forced to pay more than the true opportunity costs of providing the service. Such outcomes would not be sustained in a competitive market. Under competition, excess charges will be competed away. When freedom of entry is denied, excess charge can be permanent. The benefits can accrue to managers, workers, shareholders or perhaps to future consumers.

#### THE CONSUMERS AND SHAREHOLDERS OF CHINA LIGHT

The return to shareholders of China Light has taken the form of dividends and accumulated savings. However, it would appear that the internal savings generated by the Group, in compliance with the Scheme of Control, are not regarded as available to shareholders. It is by no means clear when, or if, such accumulated savings could be released to shareholders in the form of capital repayments or dividends. The market performance of the shares of China Light suggests that only dividends and dividend growth and not the growth in cash flows generated and mostly reinvested, have been considered of value to shareholders. The dividend yield at financial year end has been as follows<sup>17</sup>:

1978 -	4.96%
1979 -	5.75%
1980 -	5.5%
1981 -	6.4%
1982 -	5.7%
1983 -	7.3%
1984 -	5.8%
1985 -	4.8%

It is therefore suggested that the Scheme of Control has not been particularly well received by the share market. The

recent attitude of the company to further expansion and its method of finance supports such a conclusion. The current plan is to provide increased supplies of electricity through the Daya Bay nuclear power plant in Southern Guangdong of Mainland China. Such expansion will be a joint project of Chain Light with the Government of China to be financed 90% by loans and 10% equity, a much larger proportion of debt than utilized by China Light hitherto. A wholly owned subsidiary of China Light will have a 25% interest in the project expected to cost HK \$ 27,300 million. A China Light subsidiary will invest US \$ 100 million of which HK \$ 300 million will be contributed by China Light and the balance borrowed under guarantee of the Hong Kong Government. 70% of the output of the new station will be sold to China Light which, in addition, will have to invest HK \$ 3,000 million in a transmission network. How this investment in a transmission network is to be financed is not clear. What is clear that significant additional capital expenditure, which might otherwise have been financed within the usual Scheme of Control arrangements, has been postponed. The Chairman and management of China Light have made it perfectly clear that they regard such expansion as capital savings.<sup>18</sup> With the future of Hong Kong more uncertain, internal finance would appear to have lost some of its attractions.

#### CONCLUSION

This study is of the financial arrangements under the Scheme of Control. It has been argued that these cannot be regarded as in the interest of consumers. The author is in no position at all to evaluate the technical or production achievements of China Light and its subsidiaries.

Besides the artificially high cost of capital implied by the Scheme of Control, there are, in principle, a number of other unsatisfactory features of the Scheme of Control. There is no direct benefit to shareholders from operating efficiencies since such benefits, when revealed, are passed on automatically to consumers. Thus, the useful discipline exercised by shareholders over managers, whose interest are not necessarily the same as those of shareholders, might not be present in the usual degree. Tariff reductions themselves may be regarded by shareholders as something of a mixed blessing. Clearly they are helpful in a public relation sense, but lower tariffs bring increases in demand and so expansion. Expansion means, in turn, pressures on the Group to generate internal and external sources of finance that



compete with divided payments for the cash resources of the Group. The Scheme of Control also gives management little incentive to hold down financing charges or to minimize foreign exchange losses.

The general case for regulating a so-called "natural monopoly" has long been an arguable one.<sup>19</sup> A single supplier can be inhibited by potential, if not actual competition. As Demsetz explained, the right to be a sole supplier can be put out to a competitive tender on a regular basis. Also the ownership of production and distribution facilities can be separated. Furthermore, there is competition at the margin, in the choices electricity consumers, especially large consumers, can exercise in their locations. Such choices will be influenced by expected electricity charges. Any monopoly will be concerned, therefore, with long-run demands and competition from other supplies outside their own immediate area for actual and potential customers. For example, the Hong Kong Mass Transit system would have benefited from such competition. There would appear a particularly strong case for deregulating electricity pricing in Hong Kong where alternative electricity supplies already operate in close proximity to each other. The change in the political status of Hong Kong has, perhaps, now precluded such a development. A scheme that facilitates the transfer of real income from the present generation of electricity consumers to future generations is surely unlikely to be discarded by the Chinese authorities.

#### NOTES

1. See Chairman's Review, China Light & Power Annual Report, 1985.
2. See Barrett (1985), and Cameron, (1982), pp. 183-205.
3. See China Light and Power Ltd., Scheme of Control Agreement, in *The Schemes of Control*, 1982, Section 7, Para. 3, p. 9. All references to the "Scheme" will be identified by section, paragraph and page numbers, e.g., Scheme 4, 1, 1.
4. See Scheme, 4, 1, 1.
5. See Cameron, 1982, p. 202.
6. See Scheme 2, E, 15 and China Light Annual Reports, Scheme of Control Statements 1984 and 1985. Unless otherwise stated, all references are to Hong Kong dollars.
7. Scheme 5, 1, 7.
8. Scheme 5, 2, 7.
9. Scheme 5, 5, 8.
10. Scheme 2, B, 13-14.
11. Scheme 2, E, 15.
12. Scheme, 2, B, 14.
13. Scheme, 2, 7, 15.
14. China Light Annual Report, 1985, p. 28.
15. See, for example, Brearley and Myers, (1981).
16. See Auerbach (1983).
17. I am indebted to Mr. Eddie Wong of Vickers Da Costa, Hong Kong for these statistics.
18. See Chairman's Report, 1985, and Barrett, (1985).
19. See Demetz, (1986).

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