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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT ASSOCIATION

TAIWAN POWER COMPANY

APPRAISAL OF THE

TACHIEN HYDROELECTRIC DEVELOPMENT

CHINA

November 5, 1968

Public Utilities Projects Department

CURRENCY EQUIVALENTS

US$1	=	New Taiwan $ (NT$) 40.1
NT$1	=	US$0.0249
NT$1 million	=	US$24,938

MEASURES EQUIVALENTS

kw	=	Kilowatt
MW	=	Megawatt (1,000 kw)
Kwh	=	Kilowatt hour
Gwh	=	Gigawatt hour (1 million Kwh)
kv	=	Kilovolt
One Metric ton (m/ton)	=	2,240 pounds
One meter (m)	=	3.28 feet
One kilometer (km)	=	0.6214 miles
One cubic meter per second (m^3/sec)	=	35.31 cubic ft/sec

LIST OF ABBREVIATIONS

Taipower	Taiwan Power Company
ELECTROCONSULT	ELC - Electroconsult
EHV	Extra High Voltage
JCRR	Joint Commission on Rural Reconstruction
USAID	United States Agency for International Development
SAFED	Sino-American Fund for Economic Development
CIECD	Council for International Economic Cooperation and Development

Taiwan Power Company's Fiscal Year ends December 31.

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SUMMARY

i. Taiwan Power Company has requested a Bank loan to finance the foreign exchange costs of the Tachien hydroelectric development and associated transmission facilities. The Project has been thoroughly engineered, and under current economic conditions represents the least cost means of meeting the requirement for dependable peaking capability in the mid-1970's.

ii. The estimated cost of the Project is the equivalent of about US$89 million including interest, engineering, and an allowance for contingencies. The foreign exchange component is US$50 million. Preparatory work was started early in 1968. The first contracts for major civil engineering works and permanent equipment will be awarded during the second quarter of 1969. Commercial operation is scheduled for mid-1974. The Government has agreed to change legislation and to take executive action to remove restrictions on Taiwan Power Company's earnings. On July 1, 1969 measures will become effective which will be equivalent to increasing tariffs by about 10%. These steps, together with Government-supported arrangements for assuring the availability of adequate local currency funds, were necessary to complete the financing plan for the period of construction of the Project. Furthermore, both the Government and the Company have agreed that the Company's earnings should be sufficient to produce a rate of return of not less than 10%. The estimated future financial performance of the Company is satisfactory.

iii. During the construction of the Project, Taiwan Power Company will also be engaged in other construction activities which will require an investment of about US$470 million equivalent. The Company management and personnel, assisted where appropriate by consultants, is generally capable of executing this large program.

iv. The Project would form a suitable basis for a loan of $50 million for a term of 25 years including about six years of grace on amortization payments.

TAIWAN POWER COMPANY
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CHINA

I. INTRODUCTION

1.01 Taiwan Power Company (Taipower) approached the Bank in late 1965 concerning the possibility of financing the Tachien hydroelectric development on the Tachia River. The Tachia's potential is already being exploited at three sites downstream of the proposed Project's. The possibility of locating a reservoir in the general area of the Project appeared to have considerable merit, and the Bank indicated it would be prepared to consider financing the Project provided Taipower's preliminary design and cost estimate were confirmed by an independent review. In March 1967, Taipower engaged ELC-Electroconsult (ELECTROCONSULT) of Milan to carry out this review, and for engineering services in connection with design and construction.

1.02 ELECTROCONSULT confirmed the Project cost estimate in November 1967, and Taipower submitted a formal request for a loan of US$50 million equivalent to finance the foreign exchange costs of the Tachien dam and powerplant; an extension to the plant immediately downstream; and general extensions to the transmission system. The Bank sent an appraisal mission to Taiwan in mid-January 1968.

1.03 During the course of the appraisal, a site investigation and a detailed review of the cost estimate with ELECTROCONSULT's Chief Engineer revealed that the cost estimate for the Project should contain larger allowances for the treatment of certain difficult geological aspects of the site selected. Accordingly, the estimated cost of the civil works of Tachien proper was increased about 11%. A further review of the Project's economic justification employing the higher estimated costs confirmed that it continues to represent the least cost alternative under current economic conditions in Taiwan. An intensive study of transmission requirements, particularly with respect to the additional peaking capability which Tachien would make available, indicates the need for the construction of extra high voltage (EHV) transmission facilities in connection with Tachien. The total cost of Tachien and these EHV facilities will be about US$89 million equivalent, of which US$50 million equivalent would be foreign exchange.

1.04 Design and planning of the proposed project has been satisfactorily carried out by Taipower and its consultants, and preliminary works were started in March 1968. The consultants estimate the Project should be completed by July 1973, but for planning purposes Taipower is using a target of June 1974. Concurrently, Taipower has underway or will shortly start other works which with Tachien will add an additional 1,400 MW in generating capacity to the system, and which will require average annual investments in plant of about US$95 million equivalent during the next 7-8 years.

1.05 During the course of the field appraisal, it became apparent that the financing plan in Taipower's loan application was unrealistic, in that it relied too heavily upon relatively short-term local borrowings. Arrangements have been made or are underway to (i) raise the legal limit on Taipower's earnings; (ii) increase Taipower's tariffs; and (iii) provide local currency credits at reasonable terms.

1.06 This report was prepared from information collected and analyses made by F. H. Howell and Giovanni Vacchelli, assisted by R. L. Bloor. It is based upon a continuous exchange of views with Taipower since mid-1965; visits to the Bank by key Taipower management personnel; a field appraisal in January and February 1968; and negotiations in August and September 1968.

II. THE BORROWER

2.01 The Taiwan Power Company was organized in 1946 by the Chinese Government to take over and operate the system previously controlled by the Japanese. It is a stock corporation almost wholly owned by the National (61%) and Provincial (33.2%) Governments, and comes under the general supervision of the Ministry of Economic Affairs. An eleven-man Board of Directors is elected for a three-year term and members may be re-elected. The Company's principal officers are the President, and eight vice presidents who have functional responsibilities for administration, commercial activities, engineering, purchasing, personnel, planning, operations, and finance. There were 10,336 employees at the end of 1967.

2.02 Taipower provides the only public electric supply in Taiwan, and operates throughout the entire Island. Some key operating and financial data for 1967 are:

Peak system demand	1417 MW
Sales	7470 Gwh
Electric plant - gross	US$482 million equivalent
Operating revenues	US$ 96 million equivalent
Customers served	1,859,000
of which rural	108,000

2.03 Following World War II, Taipower began an expansion which has increased system capability five-fold in the past 15 years. As the Island's available hydroelectric resources were exploited -- none of which is associated with sizeable storage features -- increasing emphasis was placed upon thermal generation so that the thermal contribution has increased from 13% of production in 1952 to 69% in 1967. The system is operated to optimize to the extent possible the use of water resources, which are variable and difficult to manage owing to the lack of substantial storage. Thus the expense for fuel in a given year is a function not only of market requirements, but also the amount of rainfall from the season's typhoon storms.

2.04 Because thermal production has played an increasingly larger role in meeting market requirements, expenditures for fuel have increased substantially, and at a faster rate than sales. Whereas in 1958 fuel required only 22% of revenues, in 1967 its share had risen to 34%. Fuel oil, light diesel oil, and gas are supplied by the Government's Chinese Petroleum Corporation at prices determined by the Ministry of Economic Affairs. Taipower also burns considerable indigenous coal at its major plants in the northern regions. (Coal occurs only in the north, and transportation costs to the south exceed the differential in price between coal and fuel oil.) Coal resources are, however, limited as are natural gas reserves. Thus the principal fossil fuel in the future will be heavy oil. The Government has recently reduced the price of fuel oil burned by Taipower from US$20.50 equivalent per m/ton to between US$16.50 and US$17.60 equivalent depending upon the volume.

Tariff Regulation

2.05 The Company must annually prepare budgets of both operating expenditures and capital investments, which are subject to the approval of the Legislative Yuan. A review of Taipower's performance to ascertain whether or not the policy guidelines have been met is made by a special Commission of the Executive Yuan. The Commission's function is fact-finding, not making judgments on tariff adequacy.

2.06 The guidelines use the rate of return as the measure of earnings adequacy, and provide for the test to be made on assets whose value is adjusted to presumed current price levels by a wholesale price index.[1/] The rate base employed is the net plant in service adjusted as stated plus an allowance for working capital, less any outstanding debt incurred to finance plant in service. The guidelines establish as a "standard" a six per cent return as measured by dividing net income after taxes and interest by the rate base. Any net income above the six per cent must be credited to a special sequestered surplus account. If the rate of return exceeds eight percent in a given year, the tariffs in the following year will be lowered to a level estimated to produce no more than eight per cent in that year. Should earnings fall below six per cent, the special surplus account is charged an amount equal to the shortfall, but tariffs may not be increased as long as there is any balance in the account. A six per cent return is clearly inadequate in Taiwan's economy, and even the eight per cent return ceiling does not result in an acceptable level of internal cash generation. (See Note 10 to Annex 7 for a discussion of the shortcomings of applying the current formula.) Taipower's historical sales realization and rates of return are shown in Annex 2, page 3.

2.07 The introduction of appropriate reforms in the current tariff policy was one of the major issues of the negotiations. Taipower and the Government agreed to achieve rates-of-return of not less than nine and one-half per cent in 1970 and 10% in later years, measured on the more usual basis of

1/ The book value of assets is not changed.

"operating income"/"net plant in service". The plant values would be adjusted by the price index device for purposes of this calculation. Acceptance of these targets requires changes in the Legislative Yuan's policies, and an increase in tariffs. It is now expected that an existing tax on electricity sales will be allowed to revert to Taipower July 1, 1969. This will be in effect an increase in tariffs of nearly 10% from the Company's viewpoint, although the price to the consumer will remain unchanged. The projections in this report indicate that a further increase in tariffs of about five per cent will be required in 1971 to reach and maintain in the following years the agreed-upon 10% return target.

2.08 Present book values of assets reflect an appraisal in 1954 at then current prices, and a revaluation in 1961 by means of price indices. Further adjustments to book values have not been made since 1961. (Price levels have since been increasing at about two per cent annually.) Depreciation charges are adjusted for changing price levels. Depreciation charges against income and accumulated reserves for depreciation are made up of two components:

(i) Charges related to the book value of assets; and
(ii) Adjustments to such charges according to changes in price levels since the assets were acquired.

During the five years 1963-1967, annual charges have averaged about 2.8 per cent, and reserves about 29%. These levels are satisfactory.

The Present System and Development Plans

2.09 The Taipower system at the end of 1967 had an installed capacity of 1580 MW, in eight thermal plants and 26 hydroelectric installations whose aggregate capacities of 858 MW and 721 MW represent 54% and 46% of the total, respectively. The thermal capacity is concentrated in two plants: 400 MW at Shenao in the north; and 205 MW at Nanpu in the south where 102 MW of diesel-fueled gas turbines are also installed. The hydroelectric installations are located principally in the central and northern regions, the largest being Kukuan on the Tachia River. System capability has frequently been inadequate to meet demands without reserve, even in non-adverse hydro periods. Industrial growth has simply outstripped Taipower's ability to plan, finance, and construct new plant. It is expected that with present construction programs, adequate energy will be available by 1969, but reserve margins will be inadequate until 1970. Annex 4 lists the major powerplants.

2.10 The generating plants and load centers are interconnected by an extensive 154-kv transmission network. The market is concentrated in two regions: Northern, including Taipei and Keelung; and Southern, including the Kaohsiung area. By planning capacity additions in such way as to minimize regional load/generation imbalances, the requirements for long-distance, north-south transmission facilities have also been minimized. Subtransmission systems are operated at 34.5 kv and 69 kv. Distribution voltages include 3.3 kv, 5.7 kv, and 11.4 kv. The 34.5-kv systems are being converted to 69-kv operation, and 11.4-kv distribution is replacing the lower voltages. At the end of 1967, rural distribution systems were serving 108,000 customers from 5100 km of line, representing only six per cent of residential customers and 11% of distribution lines.

2.11 A major capacity addition was completed in the summer of 1968 when the system's first 300 MW coal-fired conventional steam unit became operational at Linkou, on the seacoast southwest of Taipei. Another major addition is currently under construction: a 360 MW hydroelectric installation at Lower Tachien just downstream of the proposed Tachien reservoir site. Taipower is also committed to two 300 MW oil-fired steam units for installation at Talin near Kaohsiung and is completing arrangements for another to be installed at Linkou. As a stopgap measure, another 60 MW of gas turbines are also nearing completion.

2.12 The next addition will be the proposed Project, the Tachien peaking development which is discussed in Chapters III and IV. Beyond that, more baseload capacity will be needed, and Taipower is seriously considering a nuclear unit in the 500 MW range for operation in 1974. The decision to install a nuclear plant is not yet firm as the economics cannot be demonstrated in the absence of bona fide commercial offers for the plant. As suggested in 1966 by Lord Hinton, Chinese engineers are being trained in the U. K. and acquiring experience in the evaluation of commercial offers. Taipower has retained as consultant in this connection Bechtel (U. S.) and intends to solicit offers for a nuclear plant. It would then be determined whether the new base load capacity should be nuclear or conventional. Should a nuclear plant appear unattractive, there would remain ample time to procure conventional thermal plant.

2.13 Concurrently with the expansion of generating facilities, there will have to be an expansion of the transmission system. In mid-March 1968 Taipower completed a planning and operating study of bulk transmission requirements which indicated it would be desirable to start an EHV network in connection with Tachien. The logical choice of voltage class is 345 kv, in view of the distances and blocks of power involved, and the considerable operating and manufacturing experience available in this class of equipment. Accordingly, Taipower plans to construct 345-kv circuits from the Tachia valley to the northern and southern load centers of Taipei and Kaohsiung. These transmission lines and appropriate terminal facilities will be included in the Project proposed for Bank financing.

Management

2.14 As noted in paragraph 2.01, Taipower is organized functionally, with the principal functions headed by eight vice presidents. The vice presidents and the heads of several special committees report directly to the President, which gives him a considerable but not unmanageable span of control. Almost all members of top management are career employees. The principal officers on the whole are competent and well-experienced in their respective fields. A clearer definition of the functions of the accounting department and the finance department is desirable. At the present time, insufficient forward financial planning is carried out aside from preparation of the following year's budget. Taipower has agreed to obtain outside assistance to improve financial planning.

2.15 On balance, Taipower's management is capable of carrying out the large and ambitious expansion program now underway. Suitable consulting engineering arrangements exist for assuring the necessary specialized skills will be available in connection with the major construction programs. Taipower has currently retained Harza Engineering Co. International for Lower Tachien; Burns & Roe for Linkou #2; Gibbs & Hill for Talin; Bechtel for the nuclear studies; and ELECTROCONSULT for Tachien. Except for ELECTROCONSULT of Italy, all are American.

III. THE PROJECT

Location and Description

3.01 The Project includes the Tachien generation development, and associated EHV transmission facilities. The Tachien development will be located on the 124 km-long Tachia River, about 87 km upstream from its mouth. The general area is reached by the East-West Highway, which is suitable for delivery of heavy powerplant equipment.

3.02 The site is a narrow gorge 20 m wide where stream-bed is at elevation 1236 m, with the canyon walls reaching to over 2000 m on the right bank, and 1500 m on the ridge forming the left bank at the dam location. The gorge is a good site for a thin arch dam, in spite of difficult geologic conditions. Site investigation was begun under the Japanese occupation, has been quite intensive, and is continuing. Extensive foundation treatment will be required, and the tunnels are likely to require considerable support. The geologic situation is such that generous allowance must be made in the cost estimate, and substantial contingencies provided for. During the field appraisal the site was inspected, and the cost estimate reviewed in detail. Taipower and ELECTROCONSULT increased the estimated cost of the civil works from US$35.9 million equivalent to US$40.2 million equivalent before contingencies.

3.03 The Project will consist of:

(i) a thin arch concrete dam 180 m high with a gated crest spillway and two gated sluiceways;

(ii) a 6.0 m diameter pressure penstock;

(iii) a free-flow tailrace tunnel;

(iv) an 11.7 m diameter free-flow spillway tunnel;

(v) an underground powerhouse in which would be installed three 78 MW turbine-generator units operating under a design head of 143 m;

(vi) an outdoor substation located at the top of the left abutment of the dam, above the powerhouse;

(vii) 17 km of double-circuit 154-kv transmission line, Tachien-Kukuan;

(viii) 120 km of double-circuit 345-kv transmission line from Tienlun (near Kukuan) to Panchiao (near Taipei) with one circuit strung;

(ix) 165 km of double-circuit 345-kv transmission line from Tienlun to Kaohsiung with one circuit strung; and

(x) appropriate 154-kv terminal facilities, and 345/154-kv transformers, located at Tienlun, Panchiao and Kaohsiung.

3.04 The dam will create a reservoir with a gross capacity of 232 million m^3, with live storage of 175 million m^3 at maximum water level. This reservoir will provide the only storage on the Tachia River, and so will enhance the value of downstream installations. The average annual flow at the site including the diversion of Chiloh Creek, whose natural outlet is downstream of Tachien, is about 35 m^3/sec based upon observations since October 1953, but monthly flows vary widely from the annual average. The complex spillway system is required to develop adequate capacity without exceeding the safe limit of discharge through the gorge downstream of the dam. The maximum design flood of 6400 m^3/sec is based upon severe criteria for typhoon rains derived from 60 years' rainfall records and 30 years' river flow records. It corresponds to a flood frequency of less than once in 10,000 years. The maximum flood recorded at the site has been 2500 m^3/sec.

Cost Estimate

3.05 The estimated cost of the Project is shown below in condensed form, and in more detail in Annex 3. The cost estimate was prepared by ELECTROCONSULT and Taipower from quantities based upon the preliminary design, unit prices developed for the specific works, and the proposed construction schedule.

Estimated Cost

Tachien Reservoir and Powerplant	NT$ Millions			US$ Millions (NT$40.1 = US$1)		
	Local	Foreign	Total	Local	Foreign	Total
Civil Works	838.1	773.9	1612.0	20.9	19.3	40.2
Permanent Equipment	184.5	352.9	537.4	4.6	8.8	13.4
	1022.6	1126.8	2149.4	25.5	28.1	53.6
Engineering/ Supervision	164.4	60.2	224.6	4.1	1.5	5.6
Contingencies	240.1	224.6	464.7	6.0	5.6	11.6
	1427.1	1411.6	2838.7	35.6	35.2	70.8
Interest	-	232.6	232.6	-	5.8	5.8
Total	1427.1	1644.2	3071.3	35.6	41.0	76.6
Transmission Facilities						
154-kv Line	4.0	8.0	12.0	0.1	0.2	0.3
345-kv Lines	72.2	176.4	248.6	1.8	4.4	6.2
Terminals	44.1	108.3	152.4	1.1	2.7	3.8
	120.3	292.7	413.0	3.0	7.3	10.3
Engineering/ Supervision	12.0	8.0	20.0	0.3	0.2	0.5
Contingencies	12.0	28.1	40.1	0.3	0.7	1.0
				3.6	8.2	11.8
Interest	-	32.1	32.1	-	0.8	0.8
Total	144.3	360.9	505.2	3.6	9.0	12.6
PROJECT TOTAL	1571.4	2005.1	3576.5	39.2	50.0	89.2

The direct civil works cost of Tachien includes US$5.6 million equivalent for foundation treatment. The contingency allowance includes a provision for increases in price levels during construction, and is equivalent to almost 22% of the direct cost of US$53.6 million equivalent. This is prudent in view of the geologic conditions at the site, and the estimate is reasonable under the circumstances. The estimated costs of the transmission facilities assume that the line elements will be imported and erected by Chinese labor under the supervision of a foreign contractor. The contingency allowance is modest but adequate.

Construction Methods and Schedule

3.06 The construction, and to a certain extent the design, of the Tachien reservoir and dam are governed by the restricted work area, the need for extensive foundation treatment, and the weather. Work was started in 1968 with a local contractor extending access roads and beginning preliminary work at the portals of the access and diversion tunnels. After international bidding, a general contract would be placed about May 1969 for all the civil engineering works. This contract would be placed among bidders selected after prequalification, and would have a value of about US$40 million equivalent. It is estimated it would be completed by mid-1973.

3.07 The permanent powerplant equipment for Tachien will be procured after international competitive bidding. Erection of this equipment will be by Taipower force account under manufacturers' supervision. Taipower personnel

are well qualified to carry out this work, having erected all equipment in the hydroelectric plants constructed since 1952. All transmission system materials and equipment included in the Project will be procured through international competitive bidding. Scheduling of engineering, design, procurement, etc. is coordinated with that for Tachien dam.

Engineering Arrangements

3.08 In March 1967 Taipower retained ELECTROCONSULT of Milan as consulting engineer, with general responsibility for design, procurement advice, and construction supervision in connection with Tachien. The estimated cost of these services is reasonable, ELECTROCONSULT having arranged to make considerable use of appropriate Taipower design and engineering personnel while accepting full engineering responsibility. Engineering and supervision for the transmission works will be carried out principally by Taipower staff, who are competent to do so. A modest provision has been made in the cost estimate for foreign engineering services of a specialized nature which might be necessary.

Tachien Operation and Contribution

3.09 By 1974, when the proposed Tachien plant would be in operation, there will be three other hydroelectric plants in operation downstream, as follows:

	Installed Capacity	Initial Operation
Lower Tachien	2 x 90 MW	1970
Kukuan	4 x 45 MW	1962
Tienlun	3 x 26.5 MW	1952
	439.5 MW	

Two additional 90 MW units are scheduled for installation at Lower Tachien in 1973, and a fourth 26.5 MW unit at Tienlun in 1976. The Lower Tachien and Tienlun headponds are suitable only for daily regulation. Kukuan has a sizeable headpond, which would permit operation of the full 180 MW installed capacity for a five-hour period for five days. Taipower must also respect the rights of agricultural interests downstream of Tienlun where a re-regulating afterbay has been provided. The present lack of storage and the wide fluctuations in river flow make water resource management a complex problem. During the wet season, the plants are generally operated as run-of-river to minimize water spillage. During the dry season they are operated at the top of the load curve during peak hours. Dispatching must also be coordinated with water conditions on the other watersheds, and with the scheduled maintenance of thermal plant.

3.10 The proposed Tachien reservoir would permit Taipower to operate the Tachia River plants with greater freedom from restrictions imposed by natural flow conditions, and to concentrate their production into the actual system peak hours. During both wet and dry seasons they would operate at the top of the load curve. Initially, they would provide a considerable portion

of system spinning reserve, but as system load grows they will occupy an increasingly smaller proportion of the system peak and operate for fewer hours. This changing mode of operation has been taken into account in the operation and economic studies discussed in the following chapter. The ultimate capability of the Tachia valley system after the expansion of Tienlun and Lower Tachien will be over 800 MW dependable peaking of which some 600 MW are attributable to the reservoir. Average annual energy production will be about 2100 Gwh, about 700 of which are attributable to the reservoir.

IV. PROJECT JUSTIFICATION

The Power Market

4.01 As of December 31, 1967, Taipower was serving about 1,859,000 customers of whom 1,786,000 were residential or small businesses, 72,000 industrial with contracts for demands less than 500 kw, and 370 were larger industries with demands in excess of 500 kw. Sales to all industrial consumers accounted for 79.1% of all sales, and produced about 61% of all revenues. Sales to large power customers alone were 64% of all sales but produced only 36% of all revenues. It is apparent that although over 95% of Taiwan's population has electric power, market requirements (if not revenues) are determined principally by the major industries. Large power sales have grown at an average compound rate of nearly 16% during the past 10 years, and became a slightly greater proportion of all sales, a trend expected to continue.

4.02 The use of electric power is clearly in support of industrial development. GNP stated in real terms and adjusted for changed terms of trade has been growing at about eight-nine per cent per annum over the past 10 years, while industrial production has been increasing at nearly 14% per annum, and industrial use of electric power at 16% per annum as noted. Since the proportion of future electricity production expected to be required by commerce and industry is not less than at present, there is a prima facie case for power system expansion provided the country's general economic development is soundly conceived. Both peak demand and energy sales are forecast to increase at about 10-1/2% during the next five years and at about nine per cent the following five years. In view of the present level of economic activity in Taiwan, and the almost universal failure of past market forecasts to anticipate real growth achieved, it is likely the current projections understate future demand.

4.03 The system annual load factor has been high -- 65 to 70% during 1958-1966 -- and was 67.8% last year. To a minor extent this high level results from curtailment during peak hours from time to time (particularly in adverse water years) but is fundamentally due to the overwhelmingly industrial nature of the market. Historical and forecast data on sales, generation and peak loads are presented in Annex 2, page 1.

Tariff Structure

4.04 Taipower's tariff structure distinguishes between customers according to the amounts of power and energy they consume, and the voltage at which service is rendered. Smaller consumers are billed only for energy consumed, residential customers at a level rate, and small businesses at a stepped rate.

Industrial and commercial consumers pay both a demand charge and a stepped-rate energy charge. In 1967 the current tariff structure, shown in Annex 2, page 2,[1/] resulted in a realization on industrial sales equivalent to US 1.0 cent, and a realization on residential sales the equivalent of about US 2.2 cents. The average realization was US 1.2 cents. (Sales classified as commercial accounted for less than three per cent of all sales.) While it is imprudent to make comparisons with other public utilities in other societies, it can be said that the price for electric energy in Taiwan is, by global standards, low rather than high. Nevertheless, it would appear that the prices paid by the several classes of consumers do bear a close relationship to Taipower's costs to serve them.

4.05 A very crude calculation taking into account Taipower's gross investment in different types of facilities (i.e., generation, transmission, and distribution) and expenditures for operation and maintenance, but excluding depreciation, indicates that the average revenues from residential and large industrial customers are in line with the average costs to supply them. Thus the calculated cost of serving the average residential load (assuming 25% load factor) comes to US 2.1 cents equivalent, and the average large industrial load (at 80% load factor) to US 1.1 cent. The calculation assumes that all investment in distribution facilities is allocable to residential customers, and that out-of-pocket operating expenses are invariant with the customer class or the volume of sales. Capital costs based upon an average 35-year life for plant and eight per cent return on investment were used, reflecting Taipower's depreciation policy and recent earnings record. It is to be appreciated that the assumptions inevitably introduce distortion, neglecting as they do the effects of economies of scale, etc. The general level of revenues might be considered somewhat low in view of the eight per cent return being earned, but there would not appear to be any substantial amount of inter-class subsidization.

The Role of Tachien

4.06 Just prior to mid-1974 when the Tachien reservoir will be completed, the system will have the following capabilities:

	MW		
	Hydro	Thermal	Total
Installed	1081	2109	3190
Continuous	248	1748	1996
Dependable Peaking	593	2052	2645

Currently under construction, or firmly planned, are 360 MW at Lower Tachien; 56 MW of gas turbines; and 900 MW of new 300 MW steam units at two new sites.

1/ In Taipower's nomenclature, "Lighting", "Combined Lighting & Power", and "Power" correspond closely to the more common "Residential", "Commercial" and "Industrial".

Thus the 1973 system before completion of the Tachien reservoir will have over 1700 MW in modern large steam units, and 214 MW in gas turbine units. The system average and peak loads are estimated to be 1973 MW and 2570 MW, respectively. There will be an excess of energy available, but a shortage of peaking capability taking into account the need for 300 MW of reserve against the loss of one of the large new steam units. The need in the mid-1970's is first more peaking capability followed by more energy capability. Tachien will fulfill the requirement for short-duration peaking capability and initially spinning reserve and frequency control. Towards the end of the 1970's, it will be primarily peaking, with frequency control probably being shifted to steam units. The peaking capability of the Tachia River plants, as increased by Tachien reservoir, will be wholly utilized by the end of the 1970's.

4.07 The alternative to the Tachien reservoir development could be either more gas turbines for peaking coupled with some more base-load units, or base-load units alone which would allow some older, smaller and higher cost steam units to be operated for peaking purposes only. There is apparently not a marked initial cost advantage in either choice since Taipower's experience with buying large (33 MW) gas turbines under competitive bidding has been about US$110 per kw including customs and taxes. The 300 MW series of steam units has cost about US$125 per kw on the same basis. A study carried out by Taipower in November 1967 to determine the least-cost choice between Tachien and base-load steam units indicated that the present values of the costs of the alternatives were equal at a discount rate of nearly 12%. However, when the cost estimate for Tachien is increased as discussed during the field appraisal, the discount rate is reduced to about 10.5%. Substitution of part of the alternative base-load capacity by gas turbines assumed to cost US$90 per kw, and using the revised cost estimate for Tachien still does not reduce the equalizing discount rate below nine per cent. The Tachien development, including appropriate transmission facilities, can be considered to be a practical least-cost solution to the mid-1970's peaking requirement if capital costs in Taiwan's economy are less than about nine per cent.

4.08 An estimate of the economic return on the investment in Tachien and the EHV facilities was made, based upon the Project's contributions to system energy requirements, and to system peaking capability and spinning reserves. These latter will vary with time and with growth in the power market. When this effect is taken into account and the contributions valued at present tariffs, the return is somewhat greater than 12%. This understates the true economic return insofar as consumers are in all likelihood prepared to pay more than the prices resulting from the current tariff structure.

V. FINANCIAL ASPECTS

The Current Situation

Auditing Arrangements

5.01 Taipower's accounts are subject to the control of the Ministry of Audit. At present, the Ministry's audit is cursory, and while the quality of Taipower's accounting is generally acceptable, the accounting department would benefit from the advice of experienced auditors. As noted in paragraph 2.14, financial planning should be improved. Taipower has agreed to retain external auditors not only for regular audits, but also for advice on accounting practices.

Fixed Assets and Depreciation Policy

5.02 Gross Fixed Assets in Operation as of December 31, 1967 were NT$19.4 billion, about US$484 million equivalent. Taipower calculates depreciation on a straight-line basis according to realistic estimates of the life of specific classes of assets. The composite rate was 2.74 per cent in 1967. Although assets have not been revalued since 1962, additional depreciation (recorded separately) is calculated on "unrecorded appreciation" as measured by the ratio between the current level of the wholesale price index, and the level prevailing in the year of acquisition of assets. In determining the Net Fixed Assets Taipower subtracts both the actual depreciation and additional depreciation reserves. Only the actual depreciation reserve is deducted from Gross Plant in the projections in this report, and in calculations of rate of return.

Customers' Contributions

5.03 All new customers are required to pay a modest connection charge, unless construction of substantial new facilities is required to provide service. In such cases, the customer must contribute 70% of the actual cost of the new facilities, plus a fixed fee based upon Taipower's overheads. On the other hand, rural electrification, which was started in 1954, has been supported by the Joint Commission on Rural Reconstruction (JCRR) and, later, the Provincial Government. Consumers could borrow from JCRR to reduce their initial cash outlay. In recent years customers have contributed 35% and the Company 50% of the cost of facilities, the balance being grants from the Provincial Government. In 1967 sales to rural customers represented 0.87 per cent of total sales and provided 1.5 per cent of total revenues.

Capitalization

5.04 Taipower's presently authorized capital is NT$2.0 billion represented by 40 million common stock shares of NT$50 par value. It has been the policy of the Government under a 1953 agreement with Taipower to reinvest dividends received on its shareholdings, as well as taxes on income, and some other taxes. These amounts are accrued in an account called "Advances to be Converted to Capital Stock", together with 2-1/2 per cent interest in lieu of dividends on the unconverted "Advances". At the end of 1967 this account totaled about

NT$2.8 billion. It is planned to convert these "Advances" to capital stock during 1969, offering the few private shareholders a proportional amount of shares at par value. This procedure will be followed from year to year in the future.

5.05 Another Balance Sheet account, "Revaluation Surplus, Grants and Others" (NT$3.0 billion at 1967 year end), is composed principally of amounts which arose from the asset revaluations mentioned in paragraph 2.08, as well as from U. S. grants, and some special contributions such as the Provincial Government's subsidy for rural electrification. Three "Reserve" accounts, totaling at year end about NT$1.3 billion (described in more detail in Note 7 to Annex 7) complete Taipower's equity. The following table summarizes the capitalization as of December 31, 1967:

	NT$ Millions	US$ Millions Equiv.	Per cent
Capital and Reserves			
Common shares, NT$50 par	2,000	49.8	10
Advances to be converted	2,789	69.6	15
Surplus and reserves	4,306	107.4	23
Subtotal	9,095	226.8	48
Provision for additional depreciation	227	5.7	1
Long-term debt (including current portion)			
Foreign exchange	6,111	152.4	32
Local currency	3,655	91.1	19
Subtotal	9,766	243.5	51
Total capitalization	19,088	476.0	100

Long-Term Debt

5.06 At December 31, 1967, Taipower's long-term debt amounted to about NT$9.2 billion (US$230 million equivalent) net of a current portion of some NT$521 million (US$13 million equivalent). NT$7.9 billion consists of obligations under various US aid program financings. The U. S. Agency for International Development (AID) and its predecessor agencies, have made three types of credits available:

(i) U. S. dollar loans repayable in local currency with Taipower bearing the exchange risk;

(ii) Local currency loans (from the proceeds of counterpart operations and repayments of (i) above) repayable in local currency; and

(iii) U. S. dollar loans repayable in U. S. dollars.

The AID program was terminated in 1966. Funds accruing from repayments of U. S. aid financing are now known as the Sino-American Fund for Economic Development (SAFED), and are administered by the Council for International Economic Cooperation and Development (CIECD), the Chinese Government's agency for administering foreign-aid programs in Taiwan. These funds will play a major role in Taipower's future financing plans as discussed below in paragraphs 5.10 - 5.18. The debt structure as of December 31, 1967, is summarized as follows:

(a) Local currency loans, payable to CIECD, with maintenance of value: about NT$2.9 billion (US$72 million) outstanding; interest is five per cent, repayment 20 years.

(b) Local currency loans, payable to CIECD and SAFED, under a number of different accounts corresponding to various U. S. aid programs. Interest is 10.08% and terms of payment are 25 to 30 years. The total outstanding was NT$3.0 billion (US$75 million);

(c) U. S. dollar loans, four from AID (terms varying between 15 and 30 years, interest three and one-half per cent) and two from U. S. Export-Import Bank (10 to 14 years, interest five and one-half - six per cent). The aggregate outstanding was about NT$2.4 billion (US$60 million); and

(d) Foreign currency credits from U. S., Japanese, German and Italian suppliers, repayable over 5 to 10 years at six per cent. The total outstanding was about NT$470 million (US$12 million).

5.07 Taipower is liable for customs duties on imported materials and equipment, but is permitted to pay its obligations over a long period, in monthly installments of not more than NT$1 million. At December 31, 1967 these obligations amounted to NT$460 million.

Current Position

5.08 The ratio of current assets to current liabilities has been satisfactory. Taipower maintains regular accounts with the more important local banks including the Bank of Communications, the Bank of Taiwan, and the Land Bank of Taiwan.

Billing and Collection

5.09 Taipower maintains customer relations through 14 district offices. The Company is gradually applying electronic data processing to customer accounting and billing, and conversion is scheduled to be completed by the end of 1969. Five districts (about 350,000 accounts) are now handled in this way. Taipower's record of collections is excellent: at the end of 1967, accumulated uncollected bills amounted to less than 0.2 per cent of revenues for the year. With the authorization of the Ministry of Audit, uncollected bills are written off after three years.

Financing Plan

5.10 Taipower's expansion program for the eight-year period 1968-1975 requires investments totaling NT$30.2 billion, or about US$750 million equivalent, excluding interest during construction (see Annex 6). The Company's original plan for financing this program was found unsatisfactory on a number of counts, all related to the constraint imposed on earnings by the regulations described in paragraph 2.06. Net cash generation would have been equivalent to less than 11% of construction expenditures. Taipower proposed to finance construction by borrowing over 80% of its requirements: the foreign exchange requirements in toto (which is not unreasonable); and unrealistically large amounts from domestic sources. From the viewpoint of both the Company's financial management and that of the national economy, Taipower's investment was not earning a reasonable return.

5.11 As noted in paragraph 2.07, agreement was reached during negotiations that the Government would take measures to provide Taipower with adequate revenues. Assurances were also obtained as to the availability of funds needed from domestic lending sources. The resulting satisfactory financing plan is summarized below.

Condensed Financing Plan 1968-1975

	NT$ (in Millions)	US$ Equivalent (in Millions)	Per cent
Applications of Funds			
Construction expenditures	30,180	753	89.6
Increase in working capital	3,509	87	10.4
Total	33,689	840	100.0
Sources of Funds			
Own Resources			
Internal cash generation[1/]	27,699	691	82.2
Less: Debt service & cash dividends	(16,471)	(411)	(48.9)
Net internal cash generation	11,228	280	33.3
Salvage value of retired assets	979	24	2.9
Subtotal	12,207	304	36.2
Equity & Contributions			
Reinvested income tax	2,481	62	7.4
Private shareholders	635	16	1.9
Contributions	802	20	2.4
Subtotal	3,918	98	11.7
Borrowings			
Proposed Bank loan	2,005	50	6.0
Other foreign loans/credits	10,132	253	30.1
SAFED	2,000	50	5.9
Bank of Taiwan	1,400	35	4.2
Deferred customs duties	2,027	50	5.9
Subtotal	17,564	438	52.1
Total	33,689	840	100.0

1/ Includes about NT$6,170 million of reinvested Government dividends.

5.12 Internal cash generation net of debt service and payment of cash dividends to private shareholders represents 37% of construction expenditures. This is a satisfactory level of self-financing. New equity will be obtained from sales of stock to private shareholders and reinvestment of income taxes (see paragraph 5.04). The reinvestment of dividends on Government shareholdings has been considered as part of internal cash generation.

5.13 Foreign borrowings would include:

(i) the proposed Bank loan of US$50 million equivalent, for a term of 25 years, including about six years of grace (a rate of 6-1/2 per cent has been assumed);

(ii) drawings under existing loans and suppliers' credits; and

(iii) new loans and suppliers' credits at terms comparable to the existing ones.

5.14 The financing plan includes local borrowings from SAFED and the Bank of Taiwan. SAFED funds will be available at 10% interest, with amortization over 25 years after one year of grace. The original arrangements between the U. S. and Chinese Governments which brought SAFED into existence expire in 1972, and although it is likely that they would be renewed, no commitments have been assumed for later years. Taipower has negotiated a substantial line of credit with the Bank of Taiwan, with an interest rate of 10% and a term -- subject to the approval of the Minister of Finance -- of 15 years. The forecast in this report shows that with the increased level of earnings projected, only modest use of this credit facility will be required. Debt financing would be completed by the deferred payment of customs duties, in line with current policy of the Ministry of Finance (see paragraph 5.07).

5.15 The financing plan would be completed by modest contributions from customers and the Provincial Government, as well as the expected salvage value of retired assets. Provisions have been made in the plan for maintaining an adequate level of supplies and materials and for increased fuel inventories, commensurate with expanding thermal operations. During the latter years covered by the projections, what appears to be surplus cash is generated. This situation reflects the inability accurately to forecast future construction expenditures, which are very likely understated in the projections.

5.16 The rate of return test required by the Loan Agreement would be calculated on a base which includes currently-valued net average fixed assets in operation plus a working capital allowance. This test will be met throughout the period, although by a quite narrow margin. On the other hand the market forecast, which appears reasonable, may well be exceeded and hence revenues may be higher than projected.

5.17 As a consequence of higher revenues and reduced borrowings, equity is expected to increase substantially and debt as a percentage of total capitalization would fall from 54% in 1968 to 41% by 1975. The ratio of current assets to current liabilities would be satisfactory, averaging 1.4. Taipower has agreed not to borrow unless it meets an objective current earnings/maximum debt service coverage test of 1.5 times. Forecast annual debt service coverage would be acceptable, with the average coverage estimated at 1.7 times for the period.

5.18 In summary, as a result of the tariff reforms requiring a higher level of earnings, together with the arrangements for local borrowings, Taipower's projected financial performance may be considered satisfactory from all viewpoints: earnings, debt service coverage, and liquidity.

VI. CONCLUSIONS

6.01 The Project has been soundly conceived and carefully designed following exhaustive site investigations, and remains economically attractive in spite of the increase in estimated cost to cover possible foundation difficulties. The economic rate of return is estimated to be greater than 12%.

6.02 Taipower's management assisted by consultants is capable of executing the Project as well as the concurrent program described in Chapter II.

6.03 Past financial performance has been satisfactory, and the current position is acceptable. The Company's projected performance is also satisfactory, and suitable arrangements are underway for financing the ambitious expansion program of the next several years.

6.04 The Project would be a suitable basis for a Bank loan of US$50 million equivalent, for a term of 25 years including a grace period of 6 years. During negotiations in August and September 1968 agreement was reached on the following major issues:

(i) A rate of return of 10% on currently-valued net assets has been established as the principal performance criterion for 1971 and later years. The requirement for the transitional year of 1970 is 9.5 per cent.

(ii) Appropriate reforms will be instituted in the Government's regulatory policy to assure that Taipower will achieve these performance criteria.

(iii) The present tax on electricity sales will revert to Taipower beginning July 1, 1969. This is equivalent to an increase of nearly 10% in average tariffs.

(iv) Independent auditors will be retained to carry out the usual review of accounts; assistance in improving coordination between accounting and financial planning will be provided by the auditors or other qualified consultants.

Tachien Site

1. The Tachia River rises in the Central Mountains and flows 124 km west to the Formosa Straits. The steepness of the drop from headwaters to discharge; the lack of vegetation in the upper catchment area; and the extremely heavy concentration of rainfall accompanying the seasonal typhoon storms all combine to produce exaggerated variations in flow and sharply peaked floods. Model studies have demonstrated that the safe evacuation capacity of the gorge below the damsite is somewhat less than half the design flood. This requires an elaborate spillway system, the principal feature of which is a 700 m long 11.6 m free-flow tunnel in the left bank discharging downstream of the Lower Tachien pond located immediately below the Tachien Dam.

2. A considerable amount of subsurface exploration has been carried out -- dating back to the Japanese occupation -- and more is currently proceeding under the consultant's direction, focused at the site now selected. The Pitan Creek enters the river from the left just above the damsite, and forms by a sharp left turn of the river proper downstream of the damsite a narrow spur known as the Pitan Ridge, which will serve as the left abutment. The Ridge imposes a limit on the height of the dam, fixed at 1411 m after geomechanical bi-dimensional structural model tests. Riverbed level at the site is 1236 m.

3. The rock systems in the damsite area are primarily quartzite formations, and slate formations. The quartzite is interbedded with slate in places, and the slate contains clay seams. The dam will be founded on quartzite layers separated by thin beds of slate. The strata strike normal to the gorge axis, and dip upstream at about 60°. These conditions are favorable to the thin arch structure. Below about 1300 meters the gorge walls are fresh and compact, but above there are weathered joints and stress relief cracks which penetrate deeper into the abutments with increasing height. There is a fault in the right bank running parallel to the river, and the thrust of the dam. This fault and the stress relief cracks will require extensive treatment. This has been provided for in the revised cost estimate.

4. There is a fault in the left bank running along Pitan Creek, as well as a wide zone of fractured rock crossing the alignment of the spillway tunnel. This major tunnel will be excavated by driving a pilot tunnel along the upper alignment, supporting where necessary and concreting the roof. The remaining section will then be mined out and concreted. Considerable difficulty has been experienced in a smaller tunnel at the Lower Tachien site, and the cost estimate for the Tachien spillway assumes 50 percent supporting, and 50 percent bolting. The intake structures for both the spillway and the pressure tunnels are located on the upstream face of Pitan Ridge, the stability of which is marginal. Provisions have been made for additional excavation, bolting, and backfilling to assure sound seating of the intakes. The estimate reflects this extra work. Pitan Ridge itself will be treated by establishing a drainage curtain using existing exploratory audits, and additional drill holes. An extensive grouting program is anticipated.

5. Excavation for the dam will be kept to a minimum. A grout curtain will be placed upstream, and a drainage curtain downstream. A total of some 37 km of grout holes will be involved in foundation treatment, and the cost estimate reflects this.

6. It is apparent that the geologic conditions at the site leave much to be desired. As a matter of fact, geology has been difficult throughout the Tachia valley, and in other valleys as well. The Tachien gorge is situated so as to produce a sizable reservoir, situated on a relatively impermeable and thick slate formation. The strata orientation at the gorge is eminently suitable for seating an arch structure. The need to take such extensive foundation and abutment treatment measures inevitably increased the cost, but the allowances for contingencies included in addition to conservative estimates should assure adequate fund availabilities.

7. Studies of alternative structure designs have indicated a thin arch to be the optimum choice. For example, a rockfill structure which would not require such extensive foundation and abutment treatment would be quite expensive due to cramped work space. A major technical problem of spillway capacity will also exist, and a tunnel would probably be involved in any event.

July 31, 1968

TAIWAN POWER COMPANY
Sales and Generation - Millions of KWH
Actual and Estimated - 1963 - 1975

	ACTUAL					ESTIMATED							
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
SALES CLASSIFICATION													
Lighting	805	917	1115	1291	1528	1762	1915	2164	2437	2737	3065	3427	3825
Small Power	1021	1065	1264	1455	1695	1899	2037	2243	2463	2696	2946	3217	3511
Large Power	2541	3203	3293	3735	4247	5090	5471	6001	6522	7054	7623	8237	8893
Total	4367	5185	5672	6481	7470	8751	9423	10408	11422	12487	13634	14881	16229
Losses and Company Use	652	729	783	859	942	1073	1237	1379	1528	1639	1807	1934	2109
Generation	5019	5914	6455	7340	8412	9824	10660	11787	12950	14126	15441	16815	18338
Peak Load - MW	857	986	1066	1243	1417	1630	1771	1959	2151	2341	2570	2799	3051

"Lighting" = Residential/Commercial

"Small Power" = Industrial Less Than 500 KW

"Large Power" = Industrial More Than 500 KW

October 25, 1968

EXTRACTS FROM TAIWAN POWER COMPANY TARIFF SCHEDULES (1968)

LIGHTING

Non-Commercial:	NT 79¢/kwh
Commercial:	
First 200 kwh/month	NT$1.88/kwh
Next 400 " "	NT$1.78/kwh
Over 600 " "	NT$1.66/kwh

COMBINED LIGHTING & POWER

Demand Charge:*/	
Low-Tension	NT$33 per kw per month
High-Tension	NT$30 per kw per month
Energy Charge:	
First 1,000 kwh/month	NT87¢/kwh
Next 9,000 " "	NT 63¢/kwh
Next 90,000 " "	NT 44¢/kwh
Over 100,000 " "	NT 29¢/kwh

POWER

Low-Tension:
Demand Charge*/ NT$33 per month

Energy Charge:	
First 1,000 kwh/month	NT 37¢/kwh
Next 9,000 " "	NT 34¢/kwh
Over 10,000	NT 29¢/kwh

High-Tension:
Demand Charge*/ NT$30 per kw per month

Energy Charge:	
First 10,000 kwh/month	NT 34¢/kwh
Next 90,000 " "	NT 29¢/kwh
Next 900,000 " "	NT 26¢/kwh
Next 4,000,000 " "	NT 25¢/kwh
Over 5,000,000 " "	NT 23¢/kwh

*/ Based upon installed capacity. For high-tension service, demand charge is 30 percent higher if measured by contract demand instead of installed capacity.

July 31, 1968

TAIWAN POWER COMPANY
Tariff History and Rate of Return

Year	Realization NT¢/kwh	Per cent Rate of Return 1/ Taipower	Standard
1958	32.3	3.7	5.3
1959	31.6	2.0	5.9
1960	41.0	3.6	7.4
1961	43.2	5.2	6.8
1962	45.5	5.7	7.8
1963	48.1	6.4	7.4
1964	49.5	7.8	8.9
1965	50.5	8.9	9.0
1966	49.6	7.4	8.3
1967	49.5	7.3	8.2

1/ Rates of return measured as follows: "Taipower": as defined in paragraph 2.06; "Standard": operating income/net plant in service.

October 25, 1968

TAIWAN POWER COMPANY
EHV Transmission Facilities
Estimated Cost
(US$ Thousands)

	Foreign Exchange	Local Currency	Total
DIRECT COSTS			
Transmission Lines			
Land Acquisition & Clearing	-	250	250
Materials & Equipment			
Towers	950	-	950
Wire	2,500	-	2,500
Hardware & Insulators	800	150	950
Erection	350	1,500	1,850
	4,600	1,900	6,500
Substations			
Equipment			
Switchgear & Transformers	2,400	500	2,900
Communication & Control	300	100	400
Erection & Civil Works	-	500	500
	2,700	1,100	3,800
INDIRECT COSTS			
Contingencies	700	300	1,000
Engineering & Supervision	200	300	500
	900	600	1,500
TOTAL	8,200	3,600	11,800

October 25, 1968

TAIWAN POWER COMPANY
TACHIEN DAM & RESERVOIR
Estimated Cost
(US$ Thousands)

	Foreign Exchange	Local Currency	Total
DIRECT COSTS			
CIVIL WORKS			
Access Roads	325.1	444.9	770.0
Camps	-	212.0	212.0
General Site Preparation	-	50.0	50.0
Pitan Ridge Excavation	2948.0	1437.0	4385.0
Access Tunnel	219.0	378.0	597.0
Diversion Works	1046.0	1604.0	2650.0
Dam	6738.0	6608.0	13346.0
Foundation & Ridge Treatment	2530.0	3122.0	5652.0
Spillway System	2977.5	3294.5	6272.0
Intake	325.0	471.0	796.0
Penstock	191.0	223.0	414.0
Powerhouse	1402.0	2160.0	3562.0
Tailrace	75.0	128.0	203.0
Switchyard & Building	100.0	400.0	500.0
Reservoir & Rim Treatment	399.0	401.0	800.0
	19275.6	20933.4	40209.0
PERMANENT E&M EQUIPMENT			
Dam & Spillways	975.0	417.0	1392.0
Power Intake & Penstock	1218.0	608.0	1826.0
Powerplant & Switchyard	6610.0	3590.0	10200.0
	8803.0	4615.0	13418.0
TOTAL DIRECT COSTS	28078.6	25548.4	53627.0
INDIRECT COSTS			
Engineering Services	1400.0	100.0	1500.0
Laboratory & Model Tests	85.0	235.0	320.0
Supervision & Administration	-	3760.0	3760.0
TOTAL INDIRECT COSTS	1485.0	4095.0	5580.0
TOTAL DIRECT & INDIRECT COSTS	29563.6	29643.4	59207.0
Contingency Provisions			
Civil Works @ 25%	4723.1	5503.1	10226.2
Permanent Equipment @ 10%	880.3	461.5	1341.8
	5603.4	5964.6	11568.0
TOTAL PROJECT COST ESTIMATE	35167.0	35608.0	70775.0

June 10, 1968
Revised October 17, 1968

TAIWAN POWER COMPANY
Existing Generating Plant
December 1967

HYDRO PLANTS	Type	Fuel	Rated Capacity - MW Installed	Continuous	Dependable Peaking
16 Small Plants	Run-of-River		76.1	33.5	29.4
Wulai	Pondage		22.5	5.0	22.5
Kueishan	"		13.0	3.7	13.5
Kukuan 1/	"		180.0	16.9	51.4
Tienlun 1/	"		79.5	17.6	54.7
Wanta	"		15.2	5.1	13.5
Lungchien	"		48.6	4.2	19.9
Liwu	"		32.0	12.7	27.1
Shihmen 2/	Storage		90.0	14.3	73.6
Sun Moon Lake	"		143.5	80.4	148.5
Wusheh	"		20.7	9.9	10.4
			721.1	203.3	464.5
THERMAL PLANTS					
2 Isolated Plants	Diesel	Diesel	5.7	3.0	4.5
Sungshan	Steam	Coal	5.0	4.0	4.5
Kaohsiung	"	"	10.0	7.0	8.0
Peipu (#1)	"	"	35.0	30.0	32.0
" (#2)	"	"	40.0	37.0	39.0
Nanpu (#1)	"	Oil/Coal	40.0	40.0	41.0
" (#2)	"	"	40.0	40.0	41.0
" (#3)	"	"	125.0	125.0	132.0
Nanpu Extension	Gas Turbine	Diesel	101.7	87.0	94.5
Shenao (#1)	Steam	Coal	75.0	70.0	74.0
" (#2)	"	"	125.0	125.0	132.0
" (#3)	"	Oil/Coal	200.0	180.0	190.0
Tunghsiao	Gas Turbine	Natural Gas	56.0	40.0	42.0
			858.4	788.0	834.5
TOTAL SYSTEM			1579.5	991.3	1299.0

1/ Tachia River Installations
2/ Multi-purpose facility owned by Shihmen Development Commission

July 31, 1968

TAIWAN POWER COMPANY
New Generating Plant
1968 - 1976

Plant	Type/Fuel	In-Service Date	Rated Capacity - MW		
			Installed	Continuous	Dependable Peaking
Tunghsiao	Gas Turbine Natural Gas	2/3-68	60.4	52.2	56.4
Linkou #1	Steam Oil/Coal	7-68	300.0	270.0	285.0
Talin #1	Steam Oil	6-69	300.0	270.0	285.0
Talin #2	"	6-70	300.0	270.0	285.0
Lower Tachien #1-2	Hydro Pondage	8-70	180.0	20.2	79.4
Linkou #2	Steam Oil	8-71	300.0	285.0	315.0
Lower Tachien #3-4	Hydro Pondage	3-73	180.0	-	-
Tachien Reservoir #1-2-3	Hydro Storage	6-73 3-74	234.0	94.1	628.7 1/
Tsengwen 2/	Hydro Storage	6-74	100.0	23.0	50.7
Nuclear North		12-74	500.0	434.0	475.0
Tienlun #4	Hydro Pondage	4-76	26.5	-	13.0
Other Hydro		76	382.0	96.1	230.3

1/ Includes capability developed downstream at Lower Tachien, Kukuan, and Tienlun

2/ Multi-purpose facility owned by Provincial Government

July 31, 1968

ANNEX 5

TAIWAN POWER COMPANY

Load/Capacity Forecast

Year	YEAR-END MW			MW ENERGY BALANCE	
	Peak Load	Dependable Peak Cap.	Gross Reserve	Load 1/	Capacity 2/
1968	1546	1644	98	1062	1316
1969	1771	1917	146	1217	1396
1970	1959	2281	322	1346	1687
1971	2151	2645	494	1478	1996
1972	2341	2645	304	1608	1996
1973	2570	3205	635	1763	2090
1974	2799	3767	968	1920	2517
1975	3051	3767	716	2093	2517
1976	3321	4011	690	2278	2613

1/ Energy requirement expressed as average MW

2/ Average continuous MW available

June 10, 1968

TAIWAN POWER COMPANY

ESTIMATED CONSTRUCTION EXPENDITURES

Equivalent NT$ Millions

(Excluding Interest)

	1968	1969	1970	1971	1972	1973	1974	1975
TACHIEN RESERVOIR PROJECT								
Foreign Exchange	-	96.2	212.5	369.0	601.6	296.7	164.4	-
Local Currency	-	169.8	197.2	375.0	523.7	175.1	130.6	-
	-	266.0	409.7	744.0	1,125.3	471.8	295.0	-
LOWER TACHIEN 1-4								
Foreign Exchange	16.9	309.8	22.1	198.9	-	-	-	-
Local Currency	264.8	304.6	19.1	49.7	112.9	51.9	-	-
	281.7	614.4	41.2	248.6	112.9	51.9	-	-
LINKOU 1-2								
Foreign Exchange	481.2	200.5	100.3	20.0	-	-	-	-
Local Currency	418.8	92.6	110.9	171.6	-	-	-	-
	900.0	293.1	211.2	191.6	-	-	-	-
TALIN 1-2 & 3								
Foreign Exchange	441.7	626.7	448.0	-	-	-	710.2	295.9
Local Currency	333.4	340.6	212.6	-	-	-	66.3	136.9
	775.1	967.3	660.6	-	-	-	776.5	432.8
NUCLEAR 1-2								
Foreign Exchange	-	23.1	236.2	547.4	657.2	1,367.9	462.7	547.4
Local Currency	-	87.2	121.1	151.9	156.6	149.0	122.1	168.8
		110.3	357.3	699.3	813.8	1,516.9	584.8	716.2
OTHER GENERATING DEVELOPMENTS								
Foreign Exchange	144.4	-	-	-	40.1	285.5	362.1	34.9
Local Currency	145.8	37.5	100.0	112.5	54.0	433.8	543.0	621.4
	290.2	37.5	100.0	112.5	94.1	719.3	905.1	656.3
TRANSMISSION & DISTRIBUTION								
Foreign Exchange	453.1	240.5	167.0	95.1	98.6	84.2	197.3	225.6
Local Currency	544.0	839.9	836.9	626.1	626.0	631.9	511.6	522.6
	997.1	1,080.4	1,003.9	721.2	724.6	716.1	708.9	778.2
OTHER ADDITIONS TO PLANT								
Local Currency	665.4	581.3	609.5	655.3	731.5	722.4	829.3	1,000.2
TOTAL EXPENDITURE								
Foreign Exchange	1,537.3	1,496.8	1,186.1	1,230.4	1,397.5	2,034.3	1,896.7	1,103.8
Local Currency	2,372.2	2,453.5	2,207.3	2,142.1	2,204.7	2,234.1	2,202.7	2,480.6
GRAND TOTAL	3,909.5	3,950.3	3,393.4	3,372.5	3,602.2	4,268.4	4,099.6	3,584.4

October 25, 1968

ANNEX 6

TAIWAN POWER COMPANY

Actual and Forecast Income Statements, 1963-1975

(in millions of NT$, unless otherwise indicated)

Fiscal year ending December 31,	ACTUAL 1963	1964	1965	1966	1967	FORECAST 1968	1969	1970	1971	1972	1973	1974	1975
Average net plant in service	10,068.1	10,776.4	11,130.5	11,904.4	12,754.5	14,025.0	16,172.1	19,446.8	22,771.3	23,975.6	25,747.3	29,085.3	30,528.1
Sales of energy, in millions of kwh	4,367	5,185	5,672	6,481	7,470	8,751	9,423	10,408	11,422	12,487	13,634	14,881	16,229
Average revenue per kwh, in NT$	0.4806	0.4950	0.5046	0.4956	0.4946	.49	.51	.54	.56	.56	.56	.56	.56
Operating Revenues													
Sales of electricity	2,098.9	2,566.8	2,862.4	3,212.3	3,694.6	4,325.5	4,832.0	5,572.0	6,417.6	7,013.0	7,651.3	8,344.3	9,094.1
Other 1/	123.6	122.5	176.2	128.3	146.9	175.4	191.9	207.8	224.4	241.6	259.4	278.0	297.0
Total	2,222.5	2,689.3	3,038.6	3,340.6	3,841.5	4,500.9	5,023.9	5,779.8	6,642.0	7,254.6	7,910.7	8,622.3	9,391.1
Operating Expenses													
Salaries, wages and social benefits	200.5	236.2	265.6	306.8	339.3	427.5	448.0	465.4	483.2	499.8	517.8	541.7	568.3
Fuel	518.8	586.1	837.3	953.9	1,242.2	1,399.1	1,659.4	1,519.4	1,665.8	1,746.8	1,954.0	2,136.1	2,067.0
Maintenance 2/	124.6	137.9	131.7	169.1	190.2	208.5	264.0	308.5	355.5	382.6	416.2	466.9	500.6
Taxes, other than income taxes 3/	45.4	67.2	68.8	68.7	77.2	92.6	98.5	112.7	124.1	132.6	146.8	161.5	171.5
Income taxes 4/	74.2	104.5	115.3	104.2	113.4	141.0	145.2	246.7	304.6	361.0	381.7	413.4	487.5
Other operating expenses	109.0	148.9	163.5	188.0	200.2	290.7	304.6	317.4	335.6	343.5	426.0	442.7	452.9
Depreciation (excl. coal mine) 5/	382.6	414.0	417.2	518.9	584.6	648.4	737.1	884.6	1,015.3	1,113.4	1,159.8	1,324.0	1,461.7
Total	1,455.1	1,694.8	1,999.4	2,309.6	2,747.1	3,207.8	3,656.8	3,854.7	4,284.1	4,579.7	5,002.3	5,486.3	5,732.5
Operating Income	767.4	994.5	1,039.2	1,031.0	1,094.4	1,293.1	1,367.1	1,925.1	2,357.9	2,674.9	2,908.4	3,136.0	3,658.6
Interest on long-term debt	346.0	419.3	420.1	462.7	523.3	615.9	810.7	882.9	983.5	1,003.7	1,053.3	1,115.7	1,145.1
Less: Capitalized interest 6/	(10.6)	(19.9)	(41.9)	(47.8)	(103.9)	(148.8)	(240.0)	(303.0)	(286.0)	(297.0)	(226.0)	(233.0)	(144.0)
Interest on Government advances to be converted in stock	18.5	27.5	38.6	49.7	60.1	70.0	-	-	-	-	-	-	-
Total	353.9	426.9	416.8	464.6	479.5	537.1	570.7	579.9	697.5	706.7	827.3	882.7	1,001.1
Net Income	413.5	567.6	622.4	566.4	614.9	756.0	796.4	1,345.2	1,660.4	1,968.2	2,081.1	2,253.3	2,657.5
Appropriations of Net Income 7/													
Legal Reserve	48.8	67.2	73.8	67.1	72.8	89.7	90.7	159.2	196.5	232.9	246.3	266.7	314.5
Reserve for Exchange Adjustment	69.8	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Reserve for Rate Equalization	24.6	129.6	201.3	107.9	112.1	158.1	111.4	520.0	708.2	874.9	853.3	869.7	1,073.8
Stock Dividends on Government Shares	281.6	310.8	292.6	333.9	379.0	452.0	534.7	602.7	687.7	786.9	901.7	1,030.0	1,174.4
Cash Dividends on Private Shares	27.2	30.0	24.7	27.5	21.0	26.2	29.6	33.3	38.0	43.5	49.8	56.9	64.8
Total	452.0 8/	567.6	622.4	566.4	614.9	756.0	796.4	1,345.2	1,660.4	1,968.2	2,081.1	2,253.3	2,657.5
Rate of Return, % 9/,10/	7.4	8.9	9.0	8.3	8.2	8.8	8.1	9.5	10.0	10.7	10.9	10.4	11.5

October 25, 1968

Notes to Income Statement

1/ The principal components of this item are meter rentals and 5% of accrued customers' contributions, including the year's addition; only net amounts are therefore shown in the Funds Statement and the Balance Sheet.

2/ "Maintenance" is inclusive of materials, labor, and other allocated costs; they represented about 67%, 22% and 11% respectively of the whole, in 1967.

3/ The principal taxes paid by Taipower are:

(a) Sales tax: 0.6% of revenues from power and other sales, plus 1.5% of other revenues, plus an additional 30% of the amount of the tax so determined;

(b) Stamp tax: 0.4% on all revenues and customers' contributions;

(c) A number of property taxes on land, buildings, and net fixed assets, at rates varying between 6% and 2%.

(d) Taxes and surtaxes at various rates on motor vehicles.

4/ Income tax is paid at an effective rate after adjustments of 15-16% of net income. The proceeds of the tax accrue 80% to the National Government and 20% to the Provincial Government. They are reinvested in Taipower.

5/ The figures shown in the Income Statement for depreciation include the additional depreciation for unrecorded appreciation of assets described in paragraph 5.03. Depreciation allowances for the coal mine are treated as part of the coal cost and therefore included under "Fuel". They are properly taken into account in the funds statement and in the balance sheet.

6/ Taipower charges to plant the interest accruing during construction on the loans financing the specific projects; the amounts so determined are added to the work in progress at year end.

7/ Taipower follows rather rigid rules for the appropriation of net income. The legal reserve is credited 10% of the sum of net income and income

tax. All income above the 6% return as defined by existing regulations of the Legislative Yuan must be allocated to a special "Reserve for Rate Equalization". (See paragraph 2.06) The balance, after deduction of the Reserve for Exchange Adjustment, is available for distribution as dividends to private stockholders (in cash) and to the National and Provincial Governments and is in fact all distributed. Distributions equal to 6% of par value are called "regular", and that portion above 6%, "bonus". In the period 1963-67 the total distribution has been between 15% and 20% of par value, but would sharply decrease in the future, if all appropriations would continue to be made out of the 6% return. It is expected that this feature of the present regulations will be abolished, and, therefore, for the purpose of this forecast, it has been assumed that, starting from 1969, dividends would be distributed at 10% of par value, and that only the residual income would be allocated to the "Reserve for Rate Equalization".

8/ Includes NT$38.5 million of unappropriated earned surplus carried over from 1962.

9/ The formula used to calculate the rate of return is very similar to the one used by Taipower in preparing internal statements for management information according to what they call "F.P.C." method, a reference to the U.S. Federal Power Commission. It consists of comparing operating income to the average net plant in service increased by a working capital allowance (2.5% of average net plant in service and 11.5% of cash operating expenses). It differs from the system followed by Taipower in the definition of cash operating expenses, but primarily in not subtracting from gross assets the additional depreciation for unrecorded appreciation.

10/ Taipower's formula is described in detail in paragraph 2.06. The main argument against this concept of rate of return is based on the fact that the rate base is substantially affected by past financing patterns. A high proportion of debt financing would result in a smaller rate base, thus limiting permitted earnings and creating the need for continuing heavy reliance on borrowings to finance expansion. On the other hand, no relation is maintained between permitted earnings and the size of the venture as represented by its net fixed assets in operation. Consequently, earnings are unlikely to provide a reasonable proportion of selfinancing. This has proven to be the case for Taipower.

TAIWAN POWER COMPANY

Forecast Sources and Applications of Funds, 1968-1975

(in millions of NT$)

Fiscal Year Ending December 31,	1968	1969	1970	1971	1972	1973	1974	1975	Total 1968-1975	Total 1968-1975 in US$ millions equivalent
SOURCES OF FUNDS										
Internal Cash Generation										
Operating Income	1,293.1	1,367.1	1,925.1	2,357.9	2,674.9	2,908.4	3,136.0	3,658.6	19,321.1	481.8
Depreciation	652.6	741.3	888.8	1,019.5	1,117.6	1,164.0	1,328.2	1,465.9	8,377.9	208.9
Total	1,945.7	2,108.4	2,813.9	3,377.4	3,792.5	4,072.4	4,464.2	5,124.5	27,699.0	690.7
Equity										
Income Tax Reinvested	141.0	145.2	246.7	304.6	361.0	381.7	413.4	487.5	2,481.1	61.9
Issuance of Stock to Private Shareholders	-	228.4	46.6	54.7	63.4	70.7	79.6	91.4	634.8	15.8
Total	141.0	373.6	293.3	359.3	424.4	452.4	493.0	578.9	3,115.9	77.7
Borrowings										
Foreign Exchange										
Proposed IBRD Loan	-	100.2	224.5	397.1	653.7	372.9	256.7	-	2,005.1	50.0
CIECD (Japanese Loans)	153.0	130.8	-	-	-	-	-	-	283.8	7.1
AID	214.7	179.0	22.1	-	-	-	-	-	415.8	10.4
Eximbank	364.6	339.5	317.0	-	-	-	-	-	1,021.1	25.5
Existing Suppliers' Credits	50.5	130.9	51.1	-	-	-	-	-	232.5	5.8
Japanese Loan T&D	132.3	-	-	-	-	-	-	-	132.3	3.3
Expected Suppliers' Credits (1968-1975)	753.7	441.0	267.3	296.0	144.6	133.5	214.6	225.6	2,476.3	61.7
Other Sources	-	23.1	236.2	547.4	697.3	1,653.4	1,535.1	878.2	5,570.7	138.9
Subtotal	1,668.8	1,344.5	1,118.2	1,240.5	1,495.6	2,159.8	2,006.4	1,103.8	12,137.6	302.7
Local Currency										
SAFED	500.0	500.0	400.0	350.0	250.0	-	-	-	2,000.0	49.9
Bank of Taiwan	300.0	750.0	350.0	-	-	-	-	-	1,400.0	34.9
Deferred Custom Duties	362.6	402.3	201.5	281.7	290.7	202.2	84.2	201.7	2,026.9	50.5
Subtotal	1,162.6	1,652.3	951.5	631.7	540.7	202.2	84.2	201.7	5,426.9	135.3
Total	2,831.4	2,996.8	2,069.7	1,872.2	2,036.3	2,362.0	2,090.6	1,305.5	17,564.5	438.0
Contributions in Aid of Construction										
Customers' Contributions	95.6	96.7	98.7	100.0	99.8	99.9	99.5	98.5	788.7	19.7
Provincial Govt. Contributions (Rural Electrif.)	4.5	4.5	4.5	-	-	-	-	-	13.5	.3
Total	100.1	101.2	103.2	100.0	99.8	99.9	99.5	98.5	802.2	20.0
Salvage Value of Retired Assets	77.6	88.2	99.6	119.9	132.5	136.4	153.8	170.8	978.8	24.4
TOTAL SOURCES	5,095.8	5,668.2	5,379.7	5,828.8	6,485.5	7,123.1	7,301.1	7,278.2	50,160.4	1,250.9

October 25, 1968

TAIWAN POWER COMPANY

Forecast Sources and Applications of Funds, 1968-1975

(in millions of NT$)

Fiscal Year Ending December 31,	1968	1969	1970	1971	1972	1973	1974	1975	Total 1968-1975	Total 1968-1975 in US$ millions equivalent
APPLICATIONS OF FUNDS										
Construction Expenditure										
Foreign Exchange	1,537.3	1,496.8	1,186.1	1,230.4	1,397.5	2,034.3	1,896.7	1,103.8	11,882.9	296.3
Local Currency	2,372.2	2,453.5	2,207.3	2,142.1	2,204.7	2,234.1	2,202.9	2,480.6	18,297.4	456.3
Total	3,909.5	3,950.3	3,393.4	3,372.5	3,602.2	4,268.4	4,099.6	3,584.4	30,180.3	752.6
Debt Service										
Interest										
Proposed IBRD Loan	-	4.0	12.0	28.1	52.1	76.2	112.0	127.7	412.1	
CIECD (Foreign Exchange)	150.0	146.9	149.5	137.7	125.7	113.2	100.2	86.9	1,010.1	
AID	82.3	82.3	84.7	81.6	77.9	73.9	70.0	61.9	614.6	
Eximbank	46.4	63.1	77.6	71.1	64.7	58.2	50.6	45.3	477.0	
Existing Suppliers' Credits	17.2	15.3	20.2	25.9	24.6	20.2	17.1	14.0	154.5	
Japanese Loan T&D	-	3.8	7.6	7.0	6.1	5.3	4.5	3.6	37.9	
Expected Suppliers' Credits (1968-1975)	-	30.2	53.6	61.7	69.0	67.5	62.3	60.1	404.4	
Other Sources	-	.7	8.4	32.0	69.4	139.9	229.5	305.6	785.5	
CIECD (Local Currency)	280.0	321.9	228.3	246.9	199.2	178.8	157.8	137.4	1,750.3	
SAFED (1968-1972)	25.0	75.0	119.5	155.9	184.3	194.6	192.1	189.4	1,135.8	
Bank of Taiwan	15.0	67.5	121.5	135.6	130.7	125.5	119.6	113.2	828.6	
Total	615.9	810.7	882.9	983.5	1,003.7	1,053.3	1,115.7	1,145.1	7,610.8	189.8
Amortization										
Proposed IBRD Loan	-	-	-	-	-	-	26.2	55.1	81.3	
Ministry of Economic Affairs	1.3	1.2	1.2	1.2	1.2	1.5	-	-	7.6	
CIECD (Foreign Exchange)	155.6	176.1	221.8	229.7	238.0	246.8	256.0	265.7	1,789.7	
AID	67.3	80.5	98.3	105.7	109.4	113.3	117.3	121.4	813.2	
Eximbank	30.7	30.7	114.4	114.4	114.4	114.4	114.4	114.4	747.8	
Existing Suppliers' Credits	82.6	107.4	115.5	88.8	81.0	52.1	52.1	51.8	631.3	
Japanese Loan T&D	-	-	7.3	14.7	14.7	14.7	14.7	14.7	80.8	
Expected Suppliers' Credits (1968-1975)	-	175.6	174.2	206.6	210.0	217.4	246.8	270.6	1,501.2	
Other Sources	-	-	-	-	-	-	-	151.7	151.7	
CIECD (Local Currency)	144.9	164.6	183.2	195.7	208.5	214.6	217.1	179.3	1,507.9	
SAFED (1968-1972)	-	5.1	10.7	15.9	21.1	25.8	28.3	31.0	137.9	
Bank of Taiwan	-	9.4	34.0	48.4	53.3	58.5	64.4	70.8	338.8	
Deferred Custom Duties	38.6	62.5	56.9	78.7	100.9	109.1	128.7	153.7	729.1	
Total	521.0	813.1	1,017.5	1,099.8	1,152.5	1,168.2	1,266.0	1,480.2	8,518.3	212.4
Total Debt Service	1,136.9	1,623.8	1,900.4	2,083.3	2,156.2	2,221.5	2,381.7	2,625.3	16,129.1	402.2
Cash Dividends (Private Shareholders)	26.2	29.6	33.3	38.0	43.5	49.8	56.9	64.8	342.1	8.5
Net Variations in Working Capital										
Net Cash/Overdraft	(90.3)	(59.6)	(112.6)	231.8	592.4	474.2	660.0	871.4	2,567.3	64.0
Net Accounts Receivable/Payable	(38.0)	16.6	56.0	(2.1)	14.4	(15.0)	(1.6)	39.8	70.1	1.8
Fuel, Materials and Other	151.5	107.5	109.2	105.3	76.8	124.2	104.5	92.5	871.5	21.7
Net Increase in Working Capital	23.2	64.5	52.6	335.0	683.6	583.4	762.9	1,003.7	3,508.9	87.5
TOTAL APPLICATIONS	5,095.8	5,668.2	5,379.7	5,828.8	6,485.5	7,123.1	7,301.1	7,278.2	50,160.4	1,250.9
Times Total Debt Service Covered by Internal Cash Generation	1.7	1.3	1.5	1.6	1.8	1.8	1.9	2.0	1.7	
Net Internal Cash Generation as % of Construction Expenditure	21	12	27	38	44	43	51	70	37	

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TAIWAN POWER COMPANY

Actual and Forecast Balance Sheets, 1963-1975

(in millions of NT$)

As of December 31,	ACTUAL 1963	1964	1965	1966	1967	FORECAST 1968	1969	1970	1971	1972	1973	1974	1975
ASSETS													
Fixed Assets													
Fixed Assets in Operation	15,387.8	16,077.8	16,778.3	18,455.5	19,407.9	22,057.5	24,897.9	29,980.1	33,119.4	34,104.4	38,464.6	42,710.2	43,482.7
Less: Depreciation	(4,189.7)	(4,384.8)	(4,666.2)	(4,995.6)	(5,365.2)	(5,836.5)	(6,368.5)	(7,014.5)	(7,742.3)	(8,530.4)	(9,344.3)	(10,268.0)	(11,278.8)
Customers' Contributions	(622.9)	(715.6)	(828.6)	(934.7)	(1,059.0)	(1,154.6)	(1,251.3)	(1,350.0)	(1,450.0)	(1,549.8)	(1,649.7)	(1,749.2)	(1,847.7)
Net Fixed Assets	10,575.2	10,977.4	11,283.5	12,525.2	12,983.7	15,066.4	17,278.1	21,615.6	23,927.1	24,024.2	27,470.6	30,693.0	30,356.2
Work in Progress	1,017.5	1,426.7	2,395.8	2,720.8	4,911.9	6,126.5	7,255.8	5,621.0	5,840.4	8,423.4	8,216.6	7,919.0	10,447.8
Total	11,592.7	12,404.1	13,679.3	15,246.0	17,895.6	21,192.9	24,533.9	27,236.6	29,767.5	32,447.6	35,687.2	38,612.0	40,804.0
Other Assets	27.0	4.6	47.6	100.1	151.0	151.0	151.0	151.0	151.0	151.0	151.0	151.0	151.0
Current Assets													
Cash	258.6	290.7	372.0	339.9	266.3	176.0	216.4	203.8	335.6	828.0	1,302.2	1,962.2	2,833.6
Accounts Receivable (Net)	151.3	183.9	196.8	217.1	212.1	242.8	304.4	352.7	386.7	422.3	460.6	502.2	547.2
Fuel	64.8	60.0	89.6	33.6	95.2	105.0	110.0	125.0	135.0	140.0	160.0	170.0	180.0
Materials and Operating Supplies	436.5	476.8	474.7	568.1	589.5	712.5	815.0	909.2	1,004.5	1,076.3	1,180.5	1,275.0	1,357.5
Prepayments	311.4	310.1	236.5	285.9	281.6	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Other	35.0	23.6	120.7	17.5	52.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Total	1,257.6	1,345.1	1,490.3	1,462.1	1,496.7	1,596.3	1,805.8	1,950.7	2,221.8	2,826.6	3,463.3	4,269.4	5,278.3
Deferred Debits	2.9	24.2	27.5	29.1	50.5	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0
TOTAL ASSETS	12,880.2	13,778.0	15,244.7	16,837.3	19,593.8	22,995.2	26,545.7	29,393.3	32,195.3	35,480.2	39,356.5	43,087.4	46,288.3

October 25, 1968

ANNEX 9
Page 1

TAIWAN POWER COMPANY

Actual and Forecast Balance Sheets, 1963-1975

(in millions of NT$)

As of December 31,	ACTUAL 1963	1964	1965	1966	1967	FORECAST 1968	1969	1970	1971	1972	1973	1974	1975
LIABILITIES													
Capital and Reserves 1/													
Capital Stock	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	6,360.5	7,256.5	8,303.5	9,514.8	10,868.9	12,391.9	14,145.2
Advances to be Converted in Capital Stock	1,101.1	1,543.5	1,989.7	2,404.8	2,789.2	3,452.2	-	-	-	-	-	-	-
Surplus and Reserves	3,121.7	3,562.1	3,875.8	4,086.8	4,305.9	4,588.2	4,824.8	5,538.5	6,473.2	7,611.0	8,740.6	9,907.0	11,325.3
Total	6,222.8	7,105.6	7,865.5	8,491.6	9,095.1	10,040.4	11,185.3	12,795.0	14,776.7	17,125.8	19,609.5	22,298.9	25,470.5
Provision for Depreciation of Unrecorded Appreciation of Electric Plant	54.1	102.1	132.1	172.6	226.8	291.6	368.5	461.9	573.7	704.5	850.0	1,023.7	1,222.5
Long-term Debt													
Foreign Exchange													
Proposed IBRD Loan	-	-	-	-	-	-	100.2	324.7	721.8	1,375.5	1,722.2	1,923.8	1,865.1
Ministry of Economic Affairs	11.3	10.1	8.8	7.6	6.3	5.1	3.9	2.7	1.5	-	-	-	-
CIECD 2/	2,967.5	3,037.4	2,814.3	2,795.2	2,862.0	2,837.9	2,746.9	2,517.2	2,279.2	2,032.4	1,776.4	1,510.7	1,234.8
AID	467.7	487.1	1,045.7	1,391.0	2,010.7	2,144.9	2,225.6	2,142.0	2,032.6	1,919.3	1,802.0	1,680.6	1,554.7
Eximbank	-	-	-	8.0	427.2	761.1	986.2	1,188.8	1,074.4	960.0	845.6	731.2	616.8
Existing Suppliers' Credits	38.4	190.0	145.5	109.9	468.6	411.7	427.1	389.4	308.4	256.3	204.2	152.4	100.4
Japanese Loan T&D	-	-	-	-	-	132.3	125.0	110.3	95.6	80.9	66.2	51.5	36.8
Expected Suppliers' Credits (1968-1975)	-	-	-	-	-	578.1	844.9	905.6	991.6	918.8	805.5	749.5	673.7
Other Sources	-	-	-	-	-	-	23.1	259.3	806.7	1,504.0	3,157.4	4,540.8	5,263.1
Subtotal	3,484.9	3,724.6	4,014.3	4,311.7	5,773.8	6,871.1	7,482.9	7,840.0	8,311.8	9,047.2	10,379.5	11,340.5	11,353.6
Local Currency													
CIECD and SAFED (1965-1967)	1,948.7	2,028.9	2,115.2	2,445.6	3,012.4	2,847.8	2,664.6	2,468.9	2,260.4	2,045.8	1,828.7	1,649.4	1,513.1
SAFED (1968-1975)	-	-	-	-	-	494.9	984.2	1,368.3	1,697.2	1,921.4	1,893.1	1,862.1	1,828.0
Bank of Taiwan	-	-	-	-	-	290.6	1,006.6	1,308.2	1,254.9	1,196.4	1,132.0	1,061.2	983.3
Deferred Custom Duties	153.1	78.2	283.8	498.0	459.4	759.5	1,104.9	1,227.7	1,408.5	1,590.1	1,663.6	1,594.1	1,628.1
Subtotal	2,101.8	2,107.1	2,399.0	2,943.6	3,471.8	4,392.8	5,760.3	6,373.1	6,621.0	6,753.7	6,517.4	6,166.8	5,952.5
Total	5,586.7	5,831.7	6,413.3	7,255.3	9,245.6	11,263.9	13,243.2	14,213.1	14,932.8	15,800.9	16,896.9	17,507.3	17,306.1
Current Liabilities													
Accounts Payable	155.5	226.7	259.5	249.6	302.5	371.2	416.2	408.5	444.6	465.8	519.1	562.3	567.5
Bank Overdraft	-	-	-	-	-	-	100.0	200.0	100.0	-	-	-	-
Other	69.8	78.1	86.2	71.2	188.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
Current Portion of Long-term Debt	783.4	428.5	480.2	588.7	521.0	813.1	1,017.5	1,099.8	1,152.5	1,168.2	1,266.0	1,480.2	1,506.7
Total	1,008.7	733.3	825.9	909.5	1,011.5	1,384.3	1,733.7	1,908.3	1,897.1	1,834.0	1,985.1	2,242.5	2,274.2
Deferred Credits	7.9	5.3	7.9	8.3	14.8	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
TOTAL LIABILITIES	12,880.2	13,778.0	15,244.7	16,837.3	19,593.8	22,995.2	26,545.7	29,393.3	32,195.3	35,480.2	39,356.5	43,087.4	46,288.3
Debt as % of Total Capitalization	50	46	46	48	51	54	55	54	51	49	47	45	41
Current Assets to Current Liabilities	1.2	1.8	1.8	1.6	1.5	1.2	1.0	1.0	1.2	1.5	1.7	1.9	2.3

October 25, 1968

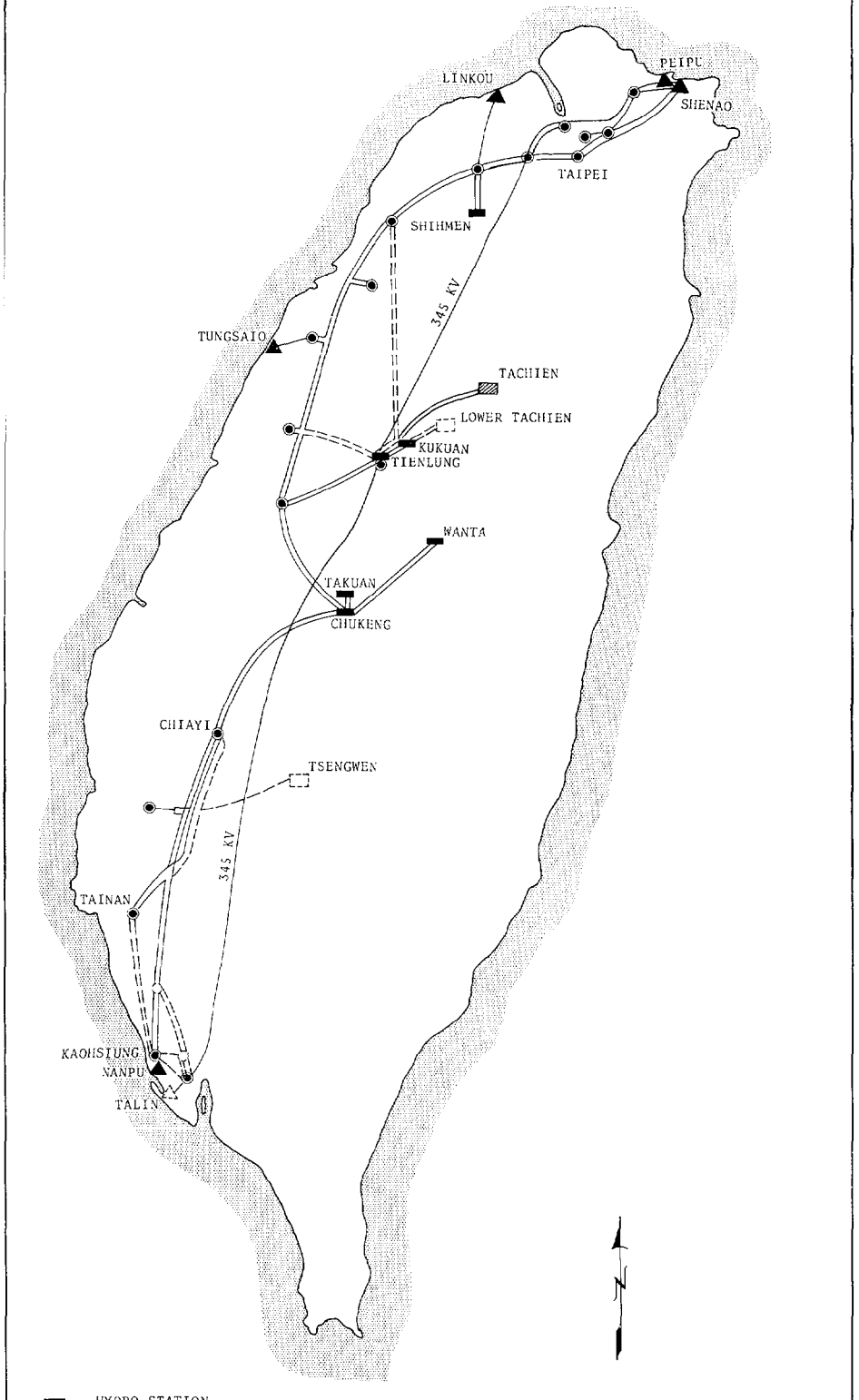
Notes to Balance Sheet

1/ It has been assumed that the Government Advances as of December 31, 1968, would be converted in Capital Stock during 1969, and that further Government equity (equal to the dividends on its shareholdings plus the reinvested income tax) would be converted in stock at the end of each year. Consequently, additional shares would be offered at the same time at par to private shareholders, so as to maintain unchanged the proportion between public and private ownership (about 95% and 5% respectively in 1967).

2/ Although these loans, counterpart of U.S. aid, are repayable in local currency, Taipower bears the exchange risk. Therefore, from the Company's point of view, they are to be considered as foreign exchange liabilities.

TAIWAN POWER COMPANY

PROPOSED TACHIEN HYDROELECTRIC AND EHV TRANSMISSION SYSTEM PROJECT



JULY 1968

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