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# CONSTRUCTION PRICE INDEXES FOR HYDRO-ELECTRIC GENERATING STATIONS

1961 - 70

(1961 = 100)

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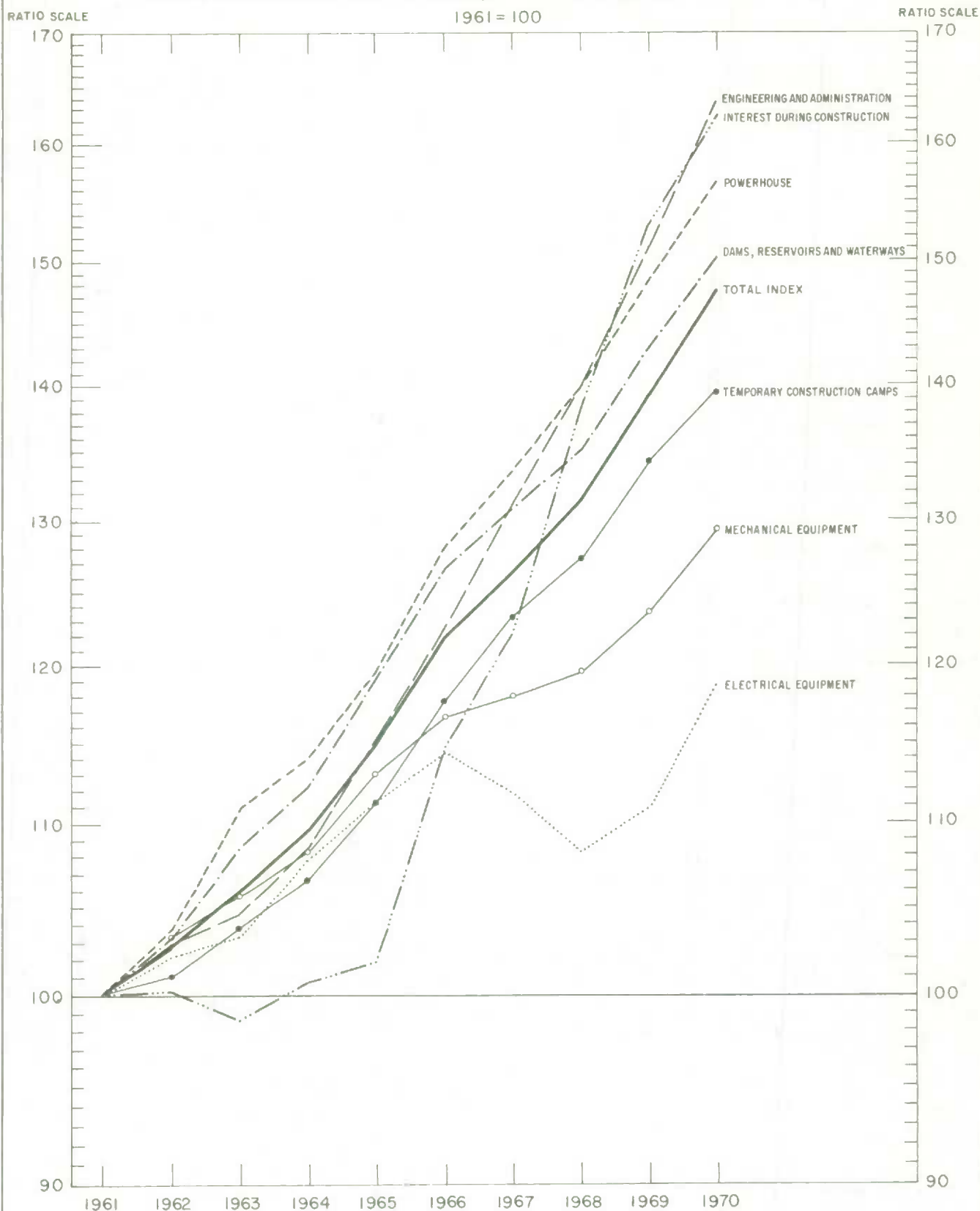


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# HYDRO-ELECTRIC GENERATING STATIONS CONSTRUCTION PRICE INDEX TOTAL AND MAJOR COMPONENTS, CANADA, ANNUALLY 1961 TO 1970



## CONSTRUCTION PRICE INDEXES FOR HYDRO-ELECTRIC GENERATING STATIONS

1961-1970

(1961=100)

## INTRODUCTION

Presented in this publication are new base-weighted prices indexes for the construction and equipping of hydro-electric generating stations. The indexes include both the inputs into construction, viz., materials, labour and construction equipment, and the installed machinery and equipment required for the production of electricity. In some instances, which are described in detail below, it was possible to replace the input prices with more appropriate prices for construction materials in-place. In addition prices are included for some elements of capital cost not previously included in construction price indexes: engineering and administration, interest during construction and temporary accommodation.

These series represent the fourth in a set of five indexes being prepared for electric utility capital additions. Indexes for distribution systems, transmission lines and transformer stations are published annually both in this publication, Prices and Price Indexes, D.B.S. Catalogue 62-002, and in the Energy Statistics Service Bulletin, D.B.S. Catalogue 57-002. A reference document was published upon the release of these indexes and as it provides a more expanded description of concepts and techniques used than is provided here, it is suggested that readers also refer to the earlier publication: Price Indexes of Electric Utility Construction, D.B.S. Catalogue 62-526. Indexes for steam-generating stations are not yet available.

The Prices Division has continued to receive the assistance of the Canadian Electrical Association in the preparation of these indexes. Cost data required for the preparation of the weighting pattern were obtained from a sample of utilities. Tabulations were also reviewed for sensibility and advice was given about suitability of the price samples. Manufacturers of materials and equipment and the variety of organizations providing wage rate data have also been most helpful both in the transmittal of price reports and in providing related technical advice. All such discussions take place within the confidentiality limits of the Statistics Act.

The indexes were prepared in the Capital Expenditure Prices Unit of the Prices Division under the supervision of Mrs. Constance M. Jones.

In the following section a description of index characteristics is given. Tables are included which provide the annual indexes from 1961 to 1970 and the base-period weighting diagram. Definitions of costs, descriptions of price samples and statements about Federal Sales Tax rates are also provided.

In future these indexes will be released with the annual publication of the other electric utility construction indexes in the two publications noted above, viz. 62-002 and 57-002.

## CAPITAL EXPENDITURES FOR HYDRO-ELECTRIC GENERATING STATIONS

## A DESCRIPTION OF ITS COMPOSITION

In an attempt to clarify the concepts used and the location of this index in a larger statistical framework, a definition of hydro-electric capital expenditures is provided together with a diagram which illustrates the origin and the physical and financial destination of the goods and services which are used to create a hydro-electric generating station. The diagram also indicates the points at which index pricing takes place.

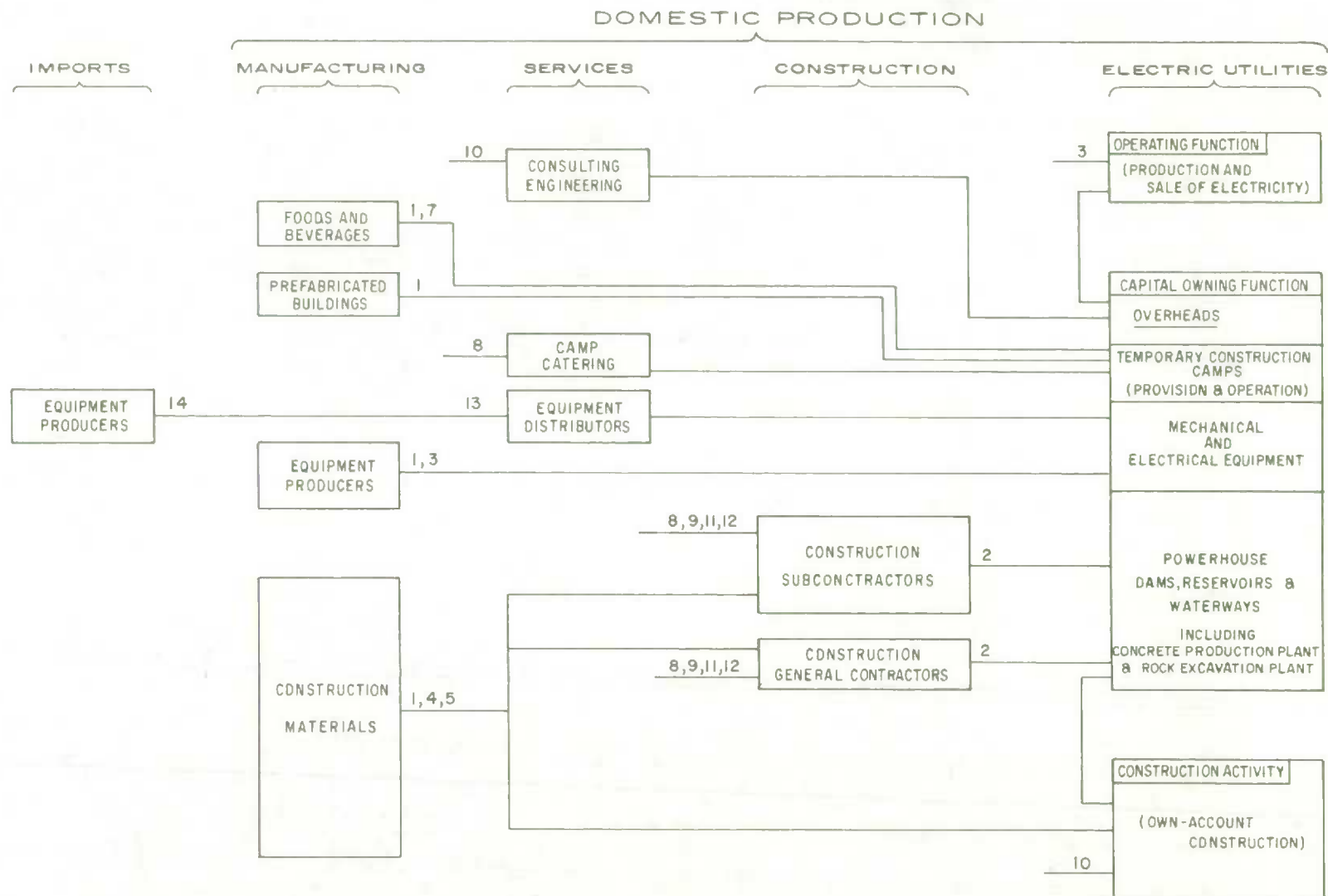
Conceptually, the need is to prepare a price index relating to annual gross additions to capital for hydro-electric generating stations. For the sake of convenience, capital additions for such things as permanent houses and step-up transformer stations were excluded because other indexes are available relating to these portions of capital additions. Also excluded were expenditures relating to such things as logging facilities and irrigation works which do not occur on all projects and which are ancillary to the production of electric power.

The remaining capital additions were subdivided as follows: the powerhouse, and the dams, reservoirs and waterways (often referred to as the construction components) and the mechanical and electrical equipment (often referred to as the equipment components). Included in this portion of capital was the expense necessary to produce the concrete used. Capitalized expenditure for the provision of temporary construction camp accommodation was included as was the expenditure for engineering and administrative services and interest during construction.

Diagram I is provided to illustrate in a simplified fashion the physical origin of goods and services for hydro-electric construction. Notation is provided which indicates the points at which pricing takes place. For example the output of the construction material manufacturing industry is priced through commodities such as plywood and ready-mix concrete. Equipment manufacturers provide selling prices for such things as metalclad switchgear. Input prices in the form of wage rates are provided by contractors and engineering firms. The numbers shown beside the blocks in the diagram correspond to those shown in the column "Source of Price Data" shown in Table 1, page ix and in the text following Table 1.

DIAGRAM I

# FLows OF GOODS AND SERVICES INTO HYDRO-ELECTRIC GENERATING STATIONS CONSTRUCTION AND THE POINTS AT WHICH INDEX PRICING TOOK PLACE



The numbers shown indicates both pricing points and cross reference numbers to the descriptions of the indexes provided in the text from pages X to XII  
Numbers placed to the left of the block refer to input prices; those placed to the right of the block refer to output prices.



## CAPITAL EXPENDITURES PRICE INDEXES — THE NECESSITY FOR COMPROMISE

The essential elements of any aggregate price index are prices of items and weights representing the relative importance which should be attached to the movement through time of prices of individual items or groups of items. In addition a time base period, during which prices are defined as equal to 100, and a weight base period, for establishing weights to be assigned to the items, are required.

The price component is the most important and difficult element of any index but particularly so in an area such as construction which rarely produces standard products which are reproduced in other time periods. The need to deal with the problem of lack of comparability over time conditions decisions about all elements of the indexes, but particularly the selection of prices for the indexes. A thorough understanding of the prices used is, therefore, of first importance in the interpretation and use of the indexes.

Price is by definition, the value in exchange of a specified unit of a commodity or service, involved in a transaction at a specific time and location, and under given conditions of purchase or sale. Further, for measurement of price change over time, it is essential that the prices being compared relate to the identical or equivalent quantity and quality of commodity or service.

It is obvious that electric utility facilities, like most other engineering construction projects, are unique and complex aggregations of commodities and services for which the collection of directly comparable prices through time is a practical impossibility. The derivation of reasonable approximations to the unobservable ideal, therefore, is required.

The traditional approach, and indeed, the only presently feasible approach, for this area of construction has been to generally utilize the input approach for pricing capital goods in-place. A review of the electric utility construction reference document will show that the indexes heretofore published for the construction components are, for all practical purposes, input indexes. For the production equipment components, selling prices of completed goods are utilized.

The main deficiency of the input approach (as opposed to an appropriate selling price for a completed structure) is that any effect of changed efficiency in fabrication which may be handed on to the purchaser in the form of altered price levels is excluded from the index. It is generally believed, on the basis of logic, which is supported by empirical evidence at some aggregative levels, that input indexes show a faster rate of increase than would the related completed goods index. Available empirical data permit statements to be made about the possible differences in some broad areas of construction but not relating to specific types of construction.

Within this context, the possible alternatives were as follows. One could continue the traditional construction index approach and create an input price index. This approach would have the advantage of conceptual purity but would be difficult to produce because of a lack of detailed cost data necessary to create the weighting diagrams. In addition, as has been suggested above, it is an imperfect solution if one wishes an index for capital goods in-place.

The available alternative was to utilize in-place prices wherever possible to more closely approximate construction in-place. For example price indexes are available for highway contractors prices for embankment in-place and to ready-mix concrete manufacturers' selling prices for ready-mix concrete. The utilization of such large-weighted prices would have the advantage of reducing the relative importance of the remaining elements where only input prices are available. It follows however that it must be possible to assume that the indexes selected are reliable indicators of price change for hydro-electric construction.

Upon consideration of the alternatives the limited pure input approach was rejected and a closer approximation to the ideal completed structure index was attained by use of in-place prices. As can be seen from Table 1 these prices are given a weight of about one-fifth of the total index. Provision has been made to substitute in-place prices for such things as fabricated steel and temporary accommodation as soon as these indexes become available. When this process is completed the weight of the in-place prices will rise from one-fifth to about 60 per cent of the total index.

For the remainder, excluding utility production equipment and interest during construction, the traditional input approach has been utilized; labour, materials and construction equipment prices are combined with fixed weights to represent selling prices of such things as steel in-place, clearing, or engineering services. Embedded in this approach is an assumption of no changes in efficiency of putting materials in place and no changes in contractors profit margins. The former assumption leads one to question a trend of the indexes, the latter the validity of turning points. For electric utility users the latter is of less importance. Studies of an experimental nature are currently under way to determine the relevancy of the fixed-efficiency assumption for electric utility construction(1). In the interim, basic union wage rates, as opposed to rates which include fringe benefits, have been utilized because of evidence suggesting that for construction basic wage rates rise less sharply than do rates including those fringe benefits which are readily evaluated.

For equipment components of the indexes, manufacturers' selling prices for appropriate classes of goods are utilized as they are available, as can be seen from the descriptive material provided below. For generators, turbines and gates, where the model pricing projects have not matured sufficiently to provide usable series, proxy indexes have been utilized. If the model prices prove suitable, they will be introduced into the indexes from about 1968. In the interim, the best available substitutes have been selected.

(1) This study consists of the recosting of a selected sample of projects for distribution systems and transmission lines. The materials bill and the design is held constant for short periods of time. Machine and labour inputs are identified and costed out at prevailing unit costs to the contractor or utility. Changes in material inputs and changes in quantities and cost of labour equipment used would be identified. No attempt has been made thus far to include design cost and overhead costs as part of the experiment.

A characteristic of the market for such things as hydraulic generators is that few orders are let in any given year and rare is the order with a specification identical to that of any other order. In such circumstances price estimates are derived by asking the manufacturers to bid a specified model each year stating what price would have been sufficiently low to have won that hypothetical or model order in the market specified. This estimated new order price is assumed to include work costs adjusted as necessary to reflect prevailing levels of overheads and profits. Escalation costs are excluded. Model pricing for equipment is presently underway for turbines, generators and gates. The index items structural steel in-place and camp accommodation are also being priced in this fashion. Other areas will be covered similarly later.

Much use has been made of manufacturers' selling prices which are for goods physically similar to those used in hydro-electric construction. However the normal volumes on which such goods are sold will not often be typical of hydro-electric construction purchases. Thus it has been necessary to utilize smaller volume sales to represent the larger volume intermittent purchases for this class of construction. Similarly prices reported are for sales to classes of customers on the market continuously.

A final major difference of the hydro-generation indexes compared to the earlier published indexes is that capitalized expense for such things as temporary accommodation, interest during construction and overhead expenses, have been included as an index category. The long length of time required to construct hydro-electric projects, the large design and supervisory inputs are the characteristics determining the importance of these components - a feature of no surprise to utility users but one of possible surprise to those less familiar with electric utility construction. Thus the capitalized cost of a hydro-electric station is considerably more than the cost of output of construction activity and the cost of equipment sold by manufacturers. As a result, indexes are provided which relate to the erection and operation of construction camps, interest during construction and to engineering and administrative expense which mainly relates to salaries and wages for such people as engineers and technicians. Utility users will be able to utilize many of these same individual indexes if they wish to revalue separately engineering and administrative expense relating to other classes of utility construction. When the currently published 1961=100 indexes are revised to a 1971=100 base, similar elements of expense will be included as relevant for all four categories of indexes. For the indexes currently published, this component will represent a much smaller proportion of expense than is shown for hydro-electric generating stations.

A more expanded statement of the characteristics of the price sample is provided below and in Table 3.

#### SOURCES AND CHARACTERISTICS OF THE PRICE DATA

The purpose of this section is to provide a description of the price data utilized in the index together with descriptions of sources from which more detailed descriptions can be obtained.

Prices used in the index have the following origins:

	Mainly DBS Sources	Mainly Non-DBS Sources
Materials and equipment	x	
Labour .....		x
In-place prices .....	x	

The materials and equipment prices have been adjusted for Federal Sales Tax utilizing the rates shown in Table 4, page xx.

With respect to the labour component, the principal source of wage rates is basic union rates recorded in agreements and tabulated for major cities by or for the Canadian Construction Association. These data are thought suitable because much hydro-construction work is done by union workers and because wage levels at remote sites are for the most part a function of the union levels prevailing in the main employment centres of the province. As a result, wage rate movement in remote sites is expected to have a similarity with wage rate movement in major settled locations. Wage rates from the nine cities included have been aggregated utilizing the province weighting pattern presented on page xiii.

Price comparability is ensured by paying close attention to specifications and terms of sale during the pricing process and by obtaining either overlapping prices or estimates of the cost of producing changed components. These conventions are described in more detail in the data sources mentioned below and are summarized in Price Indexes of Electric Utility Construction, D.B.S. Catalogue 62-526, pages 12, 13, 29 and 30.

The following table summarizes the multiplicity of data sources and serves to introduce the more complete explanation which follows.



TABLE 1. Price Sources for the Construction Price Indexes of Hydro-Electric Generating Stations

	Relative importance or weight of the item in the index			Sources of price data (DBS data unless asterisked)
A. Prices obtained from appropriate or nearly appropriate price locations .....			29.5	(1)
Ready-mix concrete for concrete production ...	8.7	21.5		1 Manufacturers' selling prices collected through the Industry Selling Price Indexes system which are used also in a variety of special purpose indexes
Excavation and embankments .....	12.8			2 Highway Construction Price Indexes for grading and granular base courses
Interest during construction .....		8.0		3 * McLeod, Young, Weir Average Yield for 10 Provincial Bonds
B. Substitute prices (prices which will be replaced later with more appropriate price indexes which are being developed .....			36.2	
Power house finishing .....		1.4		4 Non-residential Building Materials Index
Fabricated steel in-place, (structural and plate) .....		3.1		1 Manufacturers' selling prices and selected wage rates, from various sources listed in C, below
Mechanical equipment .....		10.5		5 Implicit Price Index for Machinery and Equipment relating to business gross fixed capital formation
Electrical equipment .....		11.2		1 Manufacturers' of Heavy Electrical Equipment, ISPI Index 3360
Temporary construction camps:				
Building and equipment .....		5.5		5 Adjusted Implicit Price Index for Residential Construction relating to business gross fixed capital formation, and manufacturers' selling prices
Operation .....		4.5		1 Manufacturers' selling price indexes supplemented by prices obtained from the Consumer Price Index, the General Wholesale Index and Average hourly earnings from the Labour Division, DBS
C. Input Prices .....			34.3	
Materials .....		3.3		1 Manufacturers' selling prices, mainly collected through the Industry Selling Price Indexes system
Labour .....	12.8	29.8		9 (a) * Canadian Construction Association basic union wage rates
	9.5			10 (b) * Pay Research Bureau prevailing levels of salaries and wages selected occupational groups
	7.5			11 (c) * Canada Department of Labour Wage Rate Surveys, Economics and Research Division
	(2)	(1.2)		12 (d) Labour Standards Branch, Canada Department of Labour
Construction Equipment and Operation .....				1 Canadian manufacturers' selling prices
				13 Canadian distributors purchasing prices
				14 US Bureau of Labour Statistics, (published price indexes adjusted for exchange duty and Federal Sales Tax)
Total .....		100.00	100.00	

(1) The numbers provided are cross-reference numbers to the text following and to Diagram 1, page vi.

(2) Negligible.

### 1. Manufacturers' Selling Prices

For any given commodity, price change reports are usually provided by at least three leading Canadian manufacturers whose reports are weighted together to provide an estimate of price change at the Canada level for the commodity. Prices are f.o.b. plant, ex. federal sales tax. Attempts are made to ensure that transaction prices are reported. Discontinuities in price are evaluated, and their effect removed from the index, mainly by obtaining overlapping market prices or by evaluating the commodities on the basis of differences in costs of production. Most manufacturers' prices are taken from the Industry Selling Price system of indexes although a few are drawn from the General Wholesale Indexes or the Transmission Line Indexes. The above description is, in this context, appropriate for all indexes. These indexes have been utilized for ready-mix concrete, for much of camp operation, for electrical equipment and the materials and equipment components of the input portion of the index.

Source: Industry Selling Price Indexes, DBS Occasional Paper 62-528. Prices and Price Indexes, DBS Catalogue 62-002. The identification numbers provided in Table 3 following, wherein the price sample is described, are the same as the Industry Selling Price Index identification numbers given in Table 2 of DBS publication 62-002. Price Indexes of Electric Utility Construction, DBS Catalogue 62-528 page 10 also gives a description of the ISPI system of indexes.

### 2. Highway Construction Price Indexes

Selected bid prices reported annually on provincial highway construction contracts are combined to derive weighted average unit prices for such construction activity as putting crushed gravels in-place or removing rock from the right-of-way. The prices can be thought of as highway contractors selling prices and they exhibit volatile price behaviour unlike many construction indexes. The highway indexes for grading and granular base courses have been utilized to represent price movement for excavation and embankment work in hydro-electric projects.

The published provincial indexes for grading and granular base courses, have been weighted together utilizing cost data reported by the utilities. Although the total index is provided, the individual major component indexes are not given because of the inability of the central statistical agency to say authoritatively that a given provincial index is appropriate for every particular utility within that province. However a given utility upon examination of its own cost and appraisal records can quite properly select any one or combination of these indexes to simulate price change appropriate to itself.

Source: Highway Construction Price Indexes, DBS Catalogue 62-520.

Revised Highway Construction Price Indexes reprint from December 1967 issue of Prices and Price Indexes, DBS Catalogue 62-002.

A somewhat longer statement of the characteristics of these prices can be found in any issue of Prices and Price Indexes on or near page 69.

### 3. McLeod, Young, Weir Average Yield for 10 Provincial Bonds

The provincial bond yield average published monthly by McLeod, Young, Weir represents the average percentage yield for a selected list of medium and long term bonds available for purchase on the monthly pricing date. Bonds included in the sample are a judgement sample of the portfolio of any given province which in the opinion of the firm is representative of the total portfolio available for purchase on the pricing date. Bonds issued by the provinces and by provincial agencies such as Hydro Quebec are included in the sample.

The index calculated from the above data is thought appropriate to reflect price movement for the index component "interest during construction". This component is defined by the utilities as interest foregone and is the estimated cost to the utility of earnings lost because the capital is invested in assets which will not earn a return until the completion of the project.

Source: McLeod, Young, Weir and Company Ltd.  
50 King Street West, Toronto 110

### 4. Non-Residential Building Materials Index

Industry selling price indexes are utilized in the preparation of the non-residential building materials index after they have been adjusted to reflect changes in Federal Sales Tax rates. Because of the multiplicity of finishing items and the small weight of this item in the total index, the total Non-Residential Building Materials Index has been utilized as opposed to selecting and re-weighting a number of specific commodities to represent price movement for the component "powerhouse finishing".

Source: Prices and Price Indexes, DBS Catalogue 62-002. The May, 1970 issue contained an expanded description of the material, labour and combined cost indexes.

### 5. Implicit Price Indexes from the National Income and Expenditure Accounts

The preparation of the estimates of national expenditure in constant dollars permits the further derivation of what are called the implicit price indexes. Thus if any given element of current value expenditure is divided by that same expenditure revalued in the prices of some selected base period, a ratio is produced which is called an implicit price index.

In many instances users who cannot find a specifically appropriate capital expenditures index utilize an implicit price index because it is the most nearly appropriate substitute.

These indexes have recently been revised to a 1961=100 time base and the construction indexes now include an estimated general adjustment for changes in contractors productivity and overheads as well as for changes in manufacturers selling prices for construction materials and labour.

All of the indexes utilized here come from the category "business gross fixed capital formation".

Sources: National Income and Expenditure Accounts, 1926 - 1968 Ottawa, August 1969

Canadian Statistical Review, DBS Catalogue 11-003. See particularly the feature article in the November, 1970 issue  
Prices and Price Indexes, DBS Catalogue 62-002

#### 6. Consumer Price Index

Consumer price indexes utilized in this index relate mainly to the food components of camp operation. Prices are collected monthly by enumerators who report posted prices from a wide variety of chain and independent food stores. Commodity prices for a selected type of outlet within a given city are provided an equal weight. Types of outlets are weighted together in terms of their relative importance in the market in the weight-base period and cities are weighted together on the basis of their relative food sales volume in the weight-base period.

Source: Prices and Price Indexes, DBS Catalogue 62-002

#### 7. General Wholesale Index

See the statement for manufacturers' selling prices, above.

#### 8. Average Hourly Earnings, Labour Division, DBS

Because average hourly earnings represent the prevailing unit cost of work done in a given industry their use as a price for price change has arisen only when no other appropriate series was available. In this series they were used only to represent wages and salaries of those operating the construction camp.

Average hourly earnings result from dividing total weekly wages by the total weekly hours.

Total weekly wages represents the gross payment for straight time and overtime, including incentive pay, shift, vacation pay and sickness pay made to weekly wage earners working on a part or full-time basis.

Total weekly hours results from dividing the total weekly man-hours worked, including hours of overtime, by the total number of wage earners who worked the hours.

Source: Man-hours and Hourly Earnings, DBS Publication 72-202.

#### 9. Canadian Construction Association Wage Rates

Most wage rate data utilized in these indexes emanate from the Canadian Construction Association surveys of wage rates for journeymen as published in union agreements. Only the basic wages are utilized in these indexes. Cities included in the sample are as follows:

St. John's, Newfoundland	Winnipeg
Halifax	Regina
Saint John, New Brunswick	Edmonton
Montreal	Vancouver
Toronto	

The Canadian average for any given trade results from the indexes of wage rates for the above city sample weighted together utilizing the province weights shown for hydro-electric stations on page xiii.

The indexes published provide only Canada total indexes. Wage rate indexes for selected trades, by city, will be published in detail later, both quarterly and annually.

The wage rate indexes when combined with the construction equipment indexes, provide the substitute indicator of the change in the cost of putting specified construction materials in-place.

#### 10. Pay Research Bureau Trends in Rates of Pay

The Pay Research Bureau of the Federal Public Service Commission has permitted publication, at the Canada level only, of indexes of salary change for engineers and technicians.

Pay Research Bureau confidential surveys determine what major employers are paying for work comparable to selected civil service occupations. To achieve this comparison civil service occupations are finely specified as are the occupations with which each is ultimately matched.

Within a given occupation the performance requirements can change from year to year. Thus far it has been possible to prevent these changes from affecting index movement by selecting for inclusion major sub-categories which have remained unchanged. When such procedures are not possible attempts will be made to estimate the value of the differences.

Prevailing salary levels are usually available by province. Weighted average rates for Canada, as prepared by the Pay Research Bureau, were utilized in index calculations.

Questions about these surveys should be directed to the Pay Research Bureau.

#### 11. Wage Rates Published by the Canada Department of Labour

Rates from the Department of Labour annual surveys are used for millwrights, draftsmen and clerks. Rates published for the most recent period are Prices Division estimates and are replaced by survey data as soon as it is available.

The Department of Labour describes its wage rates as follows:

- an average wage rate is derived by multiplying the hourly rate for the various components of an occupation by the number of employees receiving the rate. The result is divided by the total number of employees in a given occupation;
- overtime premium rates are not included in the wage figures nor are such things as shift differentials. The rates are derived before employee deductions for such items as taxes are made;
- rates relate to fully qualified employees.

Source: Wage Rates, Salaries and Hours of Labour, Annually  
Economics and Research Branch  
Canada Department of Labour

#### 12. Fair Wage Rates - Canada Department of Labour

Wage rates calculated for the construction trades by the Labour Standards Branch of the Department of Labour are utilized in the indexes for boilermakers and truckers. Rates calculated by the Department are used as minimum rates on all federal government construction contracts. For the cities for which rates are published herein the Department of Labour believes that no differentials exist between the federal government rate and the rates prevailing on non-government engineering construction. The rates used for the trades and cities price sample should be interpreted as reflecting union scale because collective agreement rates are paid by most of the employers surveyed. The unit cost of fringe benefits is excluded from the rate used in the index.

Source: Labour Standards Branch  
Canada Department of Labour

#### 13. Purchasers' Prices paid by Canadian Equipment Distributors

In some instances prices of imported goods are collected from distributors instead of from foreign manufacturers. Prices from this source are difficult to evaluate when the goods change their characteristics but attempts are made to work with the foreign manufacturer to evaluate quality changes.

These data are embedded in some of the construction equipment indexes utilized within the hydro-electric generating stations index.

#### 14. U.S. Bureau of Labour Statistics

For goods which enter Canada mainly from the United States published Bureau of Labour Statistics indexes of manufacturers' selling prices have been utilized as necessary to supplement DBS collections from American manufacturers.

The BLS indexes are adjusted to reflect changes in exchange, duty rates and taxes. These series are utilized mainly in the construction equipment components of the indexes.

#### Summary

In summary, prices at the level most closely approximating sales of construction goods, services and production equipment for electric utility construction were selected from a wide range of available sources of statistics. Where alternatives existed, indexes were selected which were judged to minimize the problem caused by not having specifically appropriate price indexes available.



# INDEX WEIGHTS

Hydro-electric construction consists of unique, and widely differing, projects which usually take more than two years to complete, and which occur relatively infrequently. While most large generating utilities usually invest in additions to hydro-electric plant each year, the expenditures in successive years will usually not relate to purchases of similar goods and services. The total amount spent will fluctuate sharply from year to year. A final important characteristic is that accounting records of gross additions to capital maintained by the utilities are rarely kept in the detail required by the price index maker nor is there consistency of accounting practice among utilities. Fortunately, many utilities maintain detailed construction records of individual projects which can be used as necessary to supplement records of capital expenditures.

In these circumstances capital expenditure data is obtained from a variety of sources relating to many years. The cost data are corrected for price change, tabulated and summarized as outlined below.

Total gross capital expenditures for generating plant were available, by province, for the period 1956 to 1965 from DBS Business Finance surveys of capital expenditures by electric utilities. Expenditures for hydro-electric plant were extracted from the totals by means of statements of total expenditure on hydro-electric and other generating facilities by the five generating utilities which accounted for better than 90 per cent of total gross additions to generating capital during the period. The remainder of the expenditure was apportioned on the basis of ratios derived from additions to generating capacity.

This process resulted in the following provincial weighting diagram which is shown in the first column of the table below. Also shown is the portion, by province, of additions to total generating stations and to steam generation stations only.

Proportion of Gross Annual Capital Expenditures, by Province, 1956-1965, for Hydro-electric Generating Stations, for Steam-electric Generating Stations and for all Generating Stations

	Generating stations		
	Hydro-electric	Steam-electric, including nuclear	All generating stations
Newfoundland .....	1.2	1.2	1.2
Nova Scotia .....	.1	3.6	1.3
New Brunswick .....	1.3	8.2	3.6
Quebec .....	52.2	14.3	39.7
Ontario .....	21.5	53.5	32.0
Manitoba .....	7.8	3.3	6.3
Saskatchewan .....	1.6	4.6	2.6
Alberta .....	1.3	4.0	2.2
British Columbia .....	13.0	7.3	11.1
Total .....	100.0	100.0	100.0
Proportion, each type of generation is of total generating expenditure .....	67.1	32.9	100.0

The above weights were then apportioned to individual project data provided by utilities from each province. Thus if cost data were utilized for seven Ontario projects, each project received a weight of about three per cent in the calculation of the total index weights.

Most of the weights within a given province were derived from individual project data and projects related to the period 1950 to 1963. In some instances utilities were able to provide commodity or other sub-aggregative cost data from their annual additions to capital records.

The weights derived from the cost data provide relative expenditures for hydro-electric construction at the national level during the period reviewed. However as a national average may not be representative of the costs of a given utility user, it may be more appropriate for the utilities to make use of the commodity or sub-aggregative indexes only and thus incorporate as weights, data derived from the utilities own records of capital expenditures. This substitution of appropriately derived company weights for the published national weights does not invalidate the use of this system of indexes as a source of official indexes. To assist in the process of deriving appropriate weights a definition of cost will be found in Table 5, page xxi, and a detailed description of the price sample will be found in Table 3, page xviii.



## TIME BASE FOR THE INDEX

The time base chosen for this index was 1961=100 in conformity with the previously published electric utility construction indexes.

Although these indexes may be converted arithmetically to a 1971=100 base during some general conversion of DBS indexes, a complete rebasing of the indexes will probably not occur until the late seventies. This is mainly because of the massive resources required both by the utilities and D.B.S. to prepare summaries of cost data in the amount of detail required.

### INDEX FORMULA

The formula for the index may be written as follows:

$$\begin{aligned}
 I_n &= \frac{\sum P_n q_0}{\sum P_0 q_0} \times 100 \\
 &= \sum \frac{P_n}{P_0} \times \left\{ \frac{P_0 q_0}{\sum P_0 q_0} \times 100 \right\} \\
 &= \sum \frac{P_n}{P_0} \times w_0, \text{ where } w_0 = \frac{P_0 q_0}{\sum P_0 q_0} \times 100
 \end{aligned}$$

where:

$I_n$	= index for year n
$\sum$	= summation over all items
$P_n$	= price of an item in year n
$P_0$	= price of an item in year 0, the base year
$\frac{P_n}{P_0}$	= price in year n, as a ratio of price in year 0. (This price ratio is often referred to as a price relative or an index.)
$w_0$	= relative importance of the price movement of an item in the index
$q_0$	= quantity of a particular item in the weight base period
$P_0 q_0$	= value of a particular item in the weight base period
$\sum P_0 q_0$	= value of all items in the weight base period
$\frac{P_0 q_0}{\sum P_0 q_0} \times 100 = w_0$	= relative value, or weight, of an item in the weight base period

### USES AND LIMITATIONS

Price indexes have an important role to play as one of the many indicators which can be of use in analyzing economic problems.

Anyone interested in analyzing price movement for a wide range of materials and services relating to this particular area of construction is being provided with greatly expanded price coverage. Regional price coverage has been given more emphasis than has been usual heretofore and it is intended to seek the necessary prices to expand the regional coverage even further.

A major use of the price indexes is to obtain estimates of hydro-electric capital expenditure from which the effect of price change has been removed.(1,2)

- (1) In Appendix F, page 33 of Price Indexes of Electric Utility Construction, an algebraic illustration of this statement is provided. See DBS publication, 62-526.
- (2) Utility interest in deriving such a value series arises from the fact that capital requirements for electric power supply and distribution are heavy, periods of construction are protracted and physical assets are expected to be in useful service for very long periods of time. Any studies or analyses involving investments, must therefore, encompass a long span of years. Values of capital investment expenditures are not comparable and have limited analytical usefulness until they are corrected for price change.

Until the publication of these indexes, the user requiring official Canadian statistics for this purpose could follow one of two routes: the Implicit Price Indexes, which are general indexes derived from the National Accounts deflation, could be selected, or the user could prepare specifically appropriate indexes from the multiplicity of detailed official indexes available.

Because the second approach involves the user in a large amount of work and because more price data is available to BRS than to the user, it was decided to prepare the indexes presented here in which are a specifically selected set of relevant price index numbers. As a result these indexes represent a substantial improvement over previously available statistics for users requiring an indication of price change for capital expenditures in hydro-electric plant. The indexes as published provide an estimate of average national price change for the installation of hydro-electric plant.

The utility user is more fortunate than other users in that the utility can often obtain and utilize more detailed cost data. By revaluation of capital at finer levels of detail the effect of some of the fixed-weight conventions can be mitigated. It follows from the above that the use of the indexes at a fine level of detail with appropriate company weights does not invalidate the use of the system of indexes as official indexes because the component indexes within the national aggregate are also official indexes. In other words, the national average is not the only official index in the system and indeed its use implicitly assumes that the user has found the weights used in national average to be close to the utilities own experience, or that the differences are unimportant in the context of the intended use. The individual user may also find that index accuracy is improved by utilizing appropriate regional indexes as opposed to the national commodity or wage rate indexes.

It is anticipated that a variety of new price series for such things as turbines, fabricated steel in-place and camp accommodation will be incorporated into the index over the next five years. As some of these indexes may result in revisions to previously published indexes, users are requested to refer to the most recently published indexes. Revisions can be anticipated in all index categories.

Because of the multiplicity of price levels used, the definition of capital used, the use of substitute price indicators, and the availability of regional as well as national price indicators, the user is urged to proceed with some thoughtfulness in the use of the indexes.

TABLE 2. Construction Price Indexes for Hydro-Electric Generating Stations, including Weights, Total,  
Major Group and Commodity Indexes - Canada, Annually 1961 to 1970  
1961=100

Total, major group and commodity indexes	Index weights(1)				1961	1962	1963	1964	1965	1966	1967	1968	1969	1970P
TOTAL INDEX .....					100.0	102.7	106.0	109.5	114.8	121.8	126.2	131.3	139.2	147.4
Powerhouse .....	13.1				100.0	103.7	110.9	114.0	119.5	128.0	133.4	139.8	148.2	156.4
Excavation .....		3.144			100.0	103.7	120.9	123.1	128.9	141.7	135.4	135.6	142.6	140.6
Concrete-in-place .....		7.860			100.0	104.2	108.5	111.5	116.6	124.2	133.8	142.6	151.4	163.1
Production .....			1.965		100.0	103.8	109.0	112.0	117.2	123.8	127.2	126.4	130.4	136.0
Reinforcing steel installation .....			1.415		100.0	101.7	102.9	105.1	106.7	109.0	114.8	120.5	126.3	136.5
Labour .....				.425	100.0	105.6	109.5	113.6	120.5	131.5	149.0	168.2	182.4	203.4
Materials .....				.990	100.0	100.0	100.1	101.4	100.8	99.4	100.1	100.0	102.3	107.8
Formwork erection .....			2.830		100.0	104.8	109.5	112.6	118.5	127.0	139.3	153.1	165.2	178.4
Labour .....				2.122	100.0	105.5	110.4	114.1	121.0	132.0	147.9	164.0	175.7	194.3
Materials .....				.708	100.0	102.6	106.9	108.3	110.9	111.8	113.5	120.3	133.5	130.7
Concrete placement .....			1.651		100.0	106.0	111.0	114.7	121.1	132.8	148.6	162.9	174.4	191.7
Labour .....				1.486	100.0	106.2	111.5	115.4	122.4	135.0	152.1	168.1	180.1	199.0
Equipment and operation .....				.165	100.0	103.8	106.4	108.1	109.4	112.6	116.9	116.4	123.0	126.2
Structural steel-in-place .....		.655			100.0	101.3	104.0	108.6	116.6	120.2	122.4	124.2	131.7	140.2
Powerhouse finishing .....		1.441			100.0	102.1	105.6	109.8	115.7	122.6	131.4	140.7	150.5	162.1
Labour .....				.735	100.0	105.0	109.2	112.9	119.8	129.6	144.4	160.0	174.0	193.5
Materials .....				.706	100.0	99.1	101.8	106.6	111.5	115.4	117.8	120.7	126.1	129.4
Dams, reservoirs and waterways .....	30.2				100.0	103.4	108.5	112.1	119.1	126.6	130.7	135.0	142.9	150.1
Clearing .....		2.416			100.0	104.0	107.3	110.8	116.1	125.6	139.3	152.2	161.8	177.6
Labour .....			1.812		100.0	105.8	110.0	114.0	120.8	132.8	149.6	166.0	177.2	196.4
Equipment and operation .....			.604		100.0	98.5	99.2	101.3	102.1	103.8	108.4	111.0	115.6	121.0
Excavation and embankment .....		9.664			100.0	102.0	109.1	113.2	122.9	130.0	125.6	123.5	131.0	130.0
Excavation .....			5.412		100.0	103.7	120.9	123.1	128.9	141.7	135.4	135.6	142.6	140.6
Embankment .....			4.252		100.0	99.9	94.1	100.5	115.2	115.2	113.1	108.2	116.2	116.4

Concrete-in-place .....	15.704			100.0	104.5	109.3	112.5	118.0	125.2	133.2	143.4	150.8	161.4
Production .....		6.753		100.0	103.8	109.0	112.0	117.2	123.8	127.2	126.4	130.4	136.0
Reinforcing steel installation .....		.785		100.0	101.7	102.9	105.1	106.7	109.0	114.8	120.5	126.3	136.5
Formwork erection .....		4.240		100.0	104.8	109.5	112.6	118.5	127.0	139.3	153.1	165.2	178.4
Concrete placement .....		3.926		100.0	106.0	111.0	114.7	121.1	132.8	148.6	162.9	174.4	191.7
Plate steel placement .....	2.416			100.0	100.7	102.4	106.9	113.7	116.2	113.8	115.6	121.6	129.6
Labour .....		.604		100.0	105.2	109.4	112.9	117.0	124.0	139.5	152.3	162.8	179.5
Materials .....		1.812		100.0	99.2	100.0	104.9	112.6	113.6	105.3	103.4	107.9	113.0
Mechanical equipment .....	10.5	10.5		100.0	103.2	105.7	109.3	113.0	116.6	118.0	119.6	123.6	129.3
Equipment .....		8.820		100.0	103.0	105.3	108.9	112.1	114.9	114.2	113.6	116.4	119.3
Installation (Labour) .....		1.680		100.0	104.2	107.5	111.7	117.5	125.6	138.1	150.8	161.4	182.1
Electrical equipment .....	11.2	11.2		100.0	102.2	103.3	107.8	111.2	114.3	111.9	108.1	110.8	118.7
Equipment .....		9.856		100.0	101.8	102.5	106.9	109.8	112.0	107.1	100.6	102.1	108.5
Installation (Labour) .....		1.344		100.0	105.2	109.6	114.2	121.6	131.1	147.0	162.9	174.9	193.6
Temporary construction camps .....	10.0			100.0	101.0	103.7	106.6	111.2	117.7	123.2	127.2	134.1	139.3
Camps .....		5.5		100.0	100.0	101.9	106.2	111.3	117.9	125.0	127.6	134.0	138.4
Buildings .....		5.225		100.0	100.0	102.2	106.9	112.3	119.2	126.6	129.2	136.0	140.5
Equipment .....		.275		100.0	99.4	96.6	92.5	92.0	92.8	95.4	96.2	96.6	97.9
Operation .....		4.5		100.0	102.2	105.8	107.2	111.1	117.4	121.1	126.6	134.3	140.5
Labour .....		1.773		100.0	102.7	106.8	111.3	116.9	123.6	133.0	142.1	153.1	166.1
Materials .....		2.727		100.0	101.9	105.1	104.6	107.4	113.3	113.3	116.5	122.0	123.9
Food .....			2.182	100.0	101.6	105.7	104.8	108.0	115.3	114.1	117.3	123.7	125.8
Other materials .....			.545	100.0	103.0	102.9	103.6	105.1	105.5	110.0	113.4	115.1	116.4
Interest during construction .....	8.0	8.0	8.000	100.0	100.2	98.7	100.7	101.8	114.6	122.0	138.4	153.0	162.2
Engineering and administration .....	17.0	17.0		100.0	102.9	104.6	108.4	115.1	122.4	131.0	139.8	150.8	163.4
Engineers .....		5.780		100.0	102.7	104.0	107.9	114.3	123.0	131.9	140.8	151.3	161.7
Technical .....		7.480		100.0	103.0	104.6	108.2	115.8	122.8	131.6	141.4	152.2	167.0
Technicians .....			3.740	100.0	102.7	104.0	107.8	116.6	123.9	133.5	146.6	159.6	174.8
Draughtsmen .....			3.740	100.0	103.2	105.1	108.7	114.9	121.7	129.7	136.3	144.7	159.2
Clerical .....		3.740		100.0	103.2	105.4	109.6	114.9	120.7	128.2	135.0	147.0	158.8

(1) Sufficient index weights are given to three decimal places to reduce errors in index recalculations.

P Preliminary figures.

TABLE 3. Description and Sources of Prices Used in the Hydro-Electric Generating Stations Construction Price Index

Index item	Description of index item	Source of the price data (Price Division data unless otherwise specified)
<u>Powerhouse</u>		
Excavation	Grading indexes	Highway Construction Price Index.
Concrete in place:		
Production	3,000 psi ready-mix concrete	Industry Selling Price Index 3480, referred to below as ISPI.
Reinforcing steel installation:		
Labour	Iron workers, reinforcing	Canadian Construction Association referred to below as CCA, ISPI 2910-042.
Materials	Bars, concrete reinforcing	
Formwork erection:		
Labour	Carpenters and labourers	CCA.
Materials	Input indexes as follows: Light structural steel Douglas fir plywood Welders	ISPI 2910-040. ISPI 2520-035. Labour Standards Branch, Canada Department of Labour.
Concrete placement:		
Labour	Crane operators, labourers, concrete finishers	CCA.
Equipment and operation	Mobile truck cranes  Gasoline, diesel fuel and lubricating oils	U.S. Bureau of Labor Statistics and manufacturers' selling prices from the DBS Machinery and Equipment Indexes. Components of ISPI 3651 and 3652.
Structural steel in-place:		
Labour	Crane operators and structural iron workers	CCA.
Materials	Heavy structural steel shapes	A component of ISPI 2910.
Powerhouse finishing:		
Labour	Sheet metal workers, labourers, electricians and plumbers	CCA.
Materials		Total Non-Residential Building Materials Index.
<u>Dams, waterways and reservoirs</u>		
Clearing:		
Labour	Labourers and tractor operators	CCA.
Equipment:		
Crawler tractors	Tractors, crawler mounted	Manufacturers selling prices.
Trucks	Gross vehicle wt. 6,000 lbs or less	ISPI 3230-010.
Operation expenses	Gasoline, diesel fuel and lubricating oils Replacement parts and mechanics	Components of ISPI 3651 and 3652. Transmission Lines Index.
Excavation and embankment:		
Excavation	Grading indexes	Highway Construction Price Index.
Embankment	Granular base course indexes	Highway Construction Price Index.



Concrete in-place	Same as concrete in-place in powerhouse	
Plate steel installation:		
Labour	Crane operators and structural iron workers	CCA.
Materials	Plates, 100" and under in width	ISPI 2910-045-052.

#### Mechanical equipment

Equipment	Implicit Price Indexes for Machinery and Equipment	Indexes for Business Gross Fixed Capital Formation prepared by The National Income and Expenditure Division, DBS.
Installation	Millwrights Electricians and plumbers	Economics and Research Branch, Canada Department of Labour. CCA.

#### Electrical equipment

Equipment	Manufacturers' Selling Price Indexes of Electrical Industrial Equipment	ISPI 3360.
Installation	Electricians, structural iron workers and labourers	CCA.

#### Temporary construction camps

Camps:		
Buildings	Implicit Price Index for Residential Construction (1961=100)	National Income and Expenditures Division, DBS.
Equipment	Stoves, refrigerators and freezers	Components of ISPI 3320.
Operation:		
Labour	Average hourly earnings for hotels, restaurants and taverns	DBS, 72-202, Review of Man Hours and Hourly Earnings.
Food	Fresh fruits and vegetables Canned fruits and vegetables Meats and fish Poultry and eggs Miscellaneous groceries Dairy products	Consumer Price Index, Table 9. ISPI 1120 1, 11, 12, 27, 33, 37, 42 and 62. Components of ISPI 1010. General Wholesale Index. Components of ISPI 1120 and 1392. Components of ISPI 1051, 1053 and 1055.
Other materials	Pots, pans, glassware and chinaware Blankets, pillows and cotton sheets Detergents and cleaning compounds Bed springs and mattresses	Consumer Price Index, Table 9. ISPI 1830-25. ISPI 3760-19, 20 and 29. ISPI 2660-55, 58 and 61.

<u>Interest during construction</u>	Ten provincial bond yield averages	McLeod, Young, Weir, 50 King Street West, Toronto.
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#### Engineering and administration

Engineering and technical	Engineers II, III and technician III	Pay Research Bureau, Public Service Staff Relations Board.
Drafting and clerical	Senior and intermediate draftsmen and various clerical categories	Economics and Research Branch, Canada Department of Labour.

TABLE 4. Federal Sales Tax Rates for Materials and Equipment Utilized in the Calculation of the Hydro-Electric Generating Stations Construction Price Index

Index component	Federal sales tax rates						
	1/1/61 to 6/14/63	6/15/63 to 3/31/64	4/1/64 to 12/31/64	1/1/65 to 12/31/66	1/1/67 to 3/31/67	4/1/67 to 6/1/67	6/2/67 to publica- tion date
Powerhouse:							
Excavation .....	0	0	0	0	0	3	0
Concrete, ready-mix(1) .....	0	4	8	11	11	11	11
Reinforcing steel .....	11	11	11	11	12	12	12
Formwork, prefabricated .....	11	11	11	11	12	12	12
Equipment and fuels for concrete placement .....	11	11	11	11	12	12	12
Structural steel .....	0	4	8	11	11	11	11
Powerhouse finishing(2)							
Dams, reservoirs and waterways:							
Equipment, fuels and repairs for clearing .....	11	11	11	11	12	12	12
Excavation and embankment .....	0	0	0	0	0	0	0
Plate steel(3) .....	0	4	8	11	11	6	0
Concrete, ready-mix(1) .....	0	4	8	11	11	11	11
Reinforcing steel .....	11	11	11	11	12	12	12
Formwork, prefabricated .....	11	11	11	11	12	12	12
Equipment and fuels for concrete placement .....	11	11	11	11	12	12	12
Mechanical equipment .....	0	4	8	11	11	1	0
Electrical equipment .....	0	4	8	11	11	6	0
Temporary construction camps:							
Buildings(4)							
Equipment .....	11	11	11	11	12	12	12
Operation:							
Food .....	0	0	0	0	0	0	0
Other materials:							
Utensils, dishes, flatware, etc. ....	11	11	11	11	12	12	12

(1) The tax rate shown is applied only to the value of cement and chemical additives in the ready-mix concrete.

(2) The Non-Residential Building Materials Index which is used as a proxy for the material component is already adjusted for Federal Sales Tax utilizing rates appropriate to this index.

(3) Plate steel in-place represents price movement for penstocks and liners and the tax rates shown are appropriate for those elements of cost.

(4) The Residential Implicit Price Index which is used as a proxy for camp buildings is already adjusted for Federal Sales Tax. The rates utilized are appropriate for this index.

TABLE 5. Definition of Cost Used in Deriving the Weighting Pattern for Construction Price Indexes  
for Hydro-Electric Generating Stations

Index Item	Definition of Expense
<b>POWERHOUSE</b> .....	Includes both substructure and superstructure
Excavation .....	Expense for: drilling blasting mucking and removal of rock lifting and removal of earth
Concrete-in-place .....	For additional details see concrete-in-place for dams, reservoirs and waterways.  Expense for: concrete production reinforcing steel installation formwork erection concrete placement including conveying and heating
Structural steel-in-place .....	The cost of the supply and erection of structural steel for the frame of the powerhouse and other miscellaneous embedded steel
Powerhouse finishing .....	Expense for: plumbing drainage lighting stone brick or blockwork painting miscellaneous items
<b>DAMS, RESERVOIRS AND WATERWAYS</b> .....	Three elements of expense, unwatering, underground excavation and miscellaneous expense, as listed below, were not retained for direct pricing within the dams, reservoirs and waterways index. Thus it was assumed that their price movement would be similar to the average of the items included for pricing within the category. This assumption was based on the similarity of the components of imputed elements to all the elements priced directly within the category.
<b>Imputed items</b>	
Unwatering .....	Expense for: pumping, cofferdams, excavation, piling (steel and timber) rock anchors, concrete, embankments, sheeting.
Underground excavation .....	For tunnels and shafts; including excavation, grouting, liners and concrete work.
Miscellaneous expense .....	Rock anchors, grouting, drainage, fencing, rails, gauges and piping, other miscellaneous expense.
<b>Items priced directly</b>	
Clearing .....	Cutting and removal of trees.
Excavation .....	Removal of rock and earth as defined above for the powerhouse in relation to channel improvements, cliff improvements, river diversions, intake structures, dams and reservoirs.
Embankment .....	Expense for: the placing and compaction of pervious and impervious materials, for the supply and placing of riprap in dams, embankments and canals.
Concrete-in-place .....	For dams, headworks, and sluiceways.
Concrete production .....	Expense for: the installation and operation of aggregate production plant, including compressed air plant; installation and operation of aggregate conveying system, mixing plant and heating plant; costs relating to cement acquisition, hauling, storage and distribution.

TABLE 5. Definition of Cost Used in Deriving the Weighting Pattern for Construction Price Indexes  
for Hydro-Electric Generating Stations - Continued

Index item	Definition of expense
Reinforcing steel installation .....	Supply, bend and place reinforcing steel.
Formwork erection .....	Supply, erection, relocation and removal of forms.
Concrete placement .....	Includes expense for delivery, conveying, placing, vibrating, heating and finishing concrete.
Plate steel installation .....	Supply and erect penstocks and liners. Supply and erect miscellaneous embedded steel for gates.
MECHANICAL EQUIPMENT	
Turbines .....	Includes expense for governors, scroll cases, liners and valves as well as the supply and installation of the turbines.
Gates .....	The supply and installation expense of gates and trash racks.
Miscellaneous equipment .....	Expense for: cranes and winches elevators fire protection systems gauges meters and recording devices cooling water oil systems draft tube decompression sump and dewatering compressed air systems
ELECTRICAL EQUIPMENT	
Generators .....	The supply and installation of generators including associated control, monitoring switching, and grounding systems.
Other expense .....	Station service transformers, supervisory equipment, cables ductwork and grounding, metalclad switchgear, miscellaneous.
TEMPORARY CONSTRUCTION CAMPS .....	
This expense relates to providing temporary accommodation and work shops for those living at the job-site.	
Temporary buildings .....	Dormitories, cafeterias, buildings for recreation, laundries, garages and warehouses.
Equipment .....	Stores, refrigerators, laundry, equipment.
Camp operation	
Labour .....	Cooks, waiters, cleaners.
Materials .....	Food, linens, bedding.
INTEREST DURING CONSTRUCTION .....	
Interest foregone during the construction period.	
ENGINEERING AND ADMINISTRATION	
Engineering .....	Costs for planning and design, site surveys, model preparation, project supervision, soil testing and concrete control.

TABLE 5. Definition of Cost Used in Deriving the Weighting Pattern for Construction Price Indexes  
for Hydro-Electric Generating Stations - Concluded

Index item	Definition of expense
Administrative expense .....	Expense for: head office overheads superintendence accounting personnel legal fees unallocated stores expense injuries and damages telephone office supplies power during construction residual transportation services other miscellaneous expense.
EXPENDITURES EXCLUDED FROM THE TABULATIONS	
Lands and land rights .....	
Temporary construction not previously mentioned .....	Roads, bridges, distribution systems.
Permanent ancillary structures .....	Roads, bridges, parking lots, wharves, piers, fish lifts and ladders, parking lots, logging facilities, water and sewer systems.
Other major elements of utility production capital .....	distribution systems transmission lines step-up transformer stations.



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