Alberta

The generation and sale of electrical energy in Alberta is a story best told in three parts which had their beginnings respectively in the City of Calgary in southern Alberta, in the City of Edmonton 200 miles farther north and in the Town of Vegreville 60 or so miles east of Edmonton. For the sake of continuity we relate each of these as distinct developments in spite of many inter-relationships which have been involved along the way.

The first part of this story began one dark night in 1886 when a man named Peter Anthony Prince slipped off a board side-walk and landed in a muddy street in Calgary. Right there he decided that Calgary’s streets should be lit by electric lights. That was the moment of conception for the predecessors of both the Calgary Power and Transmission Company and Calgary Water Power Company, which ultimately evolved as Calgary Power. Peter Prince was the Northwest Territories manager of the Eau Claire Lumber operation, having been sent there by his company from Eau Claire, Wisconsin. He won the rights to erect poles and string wire in Calgary and, by 1889, had the street lit. Initially he burned sawdust from his lumber yard to fuel a 75 kilowatt steam-driven generator. By 1893, however, he was generating by water-power with a 280 hp water wheel under a 12 foot head on the Bow River right in the very heart of Calgary at First Avenue SW between First and Second Streets. The steam plant was kept in use during periods of low river water flow. This was a very modestly sized plant even in those days. Nevertheless, this plant was subsequently used to supply power to a small subsidiary of Eau Claire Lumber—the Calgary Water Power Company Limited, which was acquired by Calgary Power Company in 1928.

Twenty years after Peter Prince’s lights first appeared, a group of business men in Montreal, headed by W. Max Aitken (later Lord Beaverbrook) conceived the Calgary Power Company Limited. From the start Calgary Power was linked with Montreal Engineering through Aitken’s investment company Royal Securities. After a series of mergers and transactions involving the Calgary Power and Transmission Company, Calgary Power Company emerged, in December 1909.

The first three presidents of Calgary Power.

Photos courtesy of TransAlta Utilities.

W.M. Aitken (Lord Beaverbrook), 1909.  H.S. Holt, 1910-1911  R.B. Bennett, 1911-1921
Starting with W.M. Aitken, Calgary Power developed under the leadership of eight more illustrious presidents to ultimately serve a wide area in southern and central Alberta, providing over two-thirds of Alberta’s electric energy requirements, and has become the largest investor-owned electric utility in Canada. These succeeding presidents form an impressive list of famous Canadians: W.M. Aitken (Lord Beaverbrook), 1909; H.S. Holt, 1910-1911; R.B. Bennett, 1911-1921; V.M. Drury, 1921-1924; I.W. Killam, 1924-1928; G.A. Gaherty, 1928-1960; G.H. Thomson, 1960-1965; A.W. Howard, 1965-1973 and M.M. Williams, 1973-

By 1911 Calgary Power completed the second hydroelectric plant on the Bow at Horseshoe Falls about 50 miles upstream from Calgary. With four horizontal Francis turbines and a driving head of 72 feet, the plant has a peak capability of 14,000 kilowatts. Two years later, in 1913, the Company installed a further hydroelectric plant on the Bow at Kananaskis with two vertical Francis turbines. These plants had sufficient capacity to supply the developing demand for electricity until 1928. During the interval the Federal Government, in 1924, constructed a hydroelectric power plant on the Cascade River, a tributary to the Bow, to supply power to Banff National Park 100 miles west of Calgary. In these early years of power developments the natural flow in the Bow River during spring floods occasionally exceeded 50,000 cubic feet per second but shrank to only about 200 cubic feet per second in the cold winter months. Calgary Power Company built water storage basins to partially overcome the natural shortage of water during the winter, when electricity is needed the most. The winter-time shortage also led to an agreement between Calgary Power and the City of Calgary for operation of the City-owned Victoria Park thermal generating station to complement the hydroelectric plant outputs. Future potential for water power from the Bow River and all its tributaries was much greater, however than these early developments. Calgary Power Company set out to serve a wider territory by more fully developing these resources.

By 1928 Calgary Power Company was short of generating capacity. The Company made a decision to design and construct the Ghost Power Project. Located downstream of both Horseshoe and Kananaskis, this plant initially consisted of two 18,000 hp generators plus a 1250 hp unit to provide electrical service for the station itself as well as residual water How for Calgary during periods when the two large units
were shut down. The plant was placed in service late in 1929. Then the depression of the 1930s came and further hydroelectric developments were suspended until the outbreak of World War II in 1939.

The first step towards meeting war-time demands was to improve storage capacity at Lake Minnewanka and Upper Kananaskis Lake. The company acquired the original Cascade Plant from the Federal Government and new storage facilities came into service in 1942. A new Cascade power plant replaced the old one and provided 18,000 kilowatts of power to supply an explosives plant in Calgary. After the war, in 1947, Calgary Power completed its Barrier Generating Station on the Kananaskis River about 7 miles upstream from the Bow. With a head of 140 feet and a capacity of 13,000 kilowatts, this became the first remotely-controlled hydroelectric plant in Alberta and among the first in North America.

During the decade of the 1950s Calgary Power added 6 more hydroelectric plants along the Bow River Valley System and increased the capacities of 4 existing plants. Then the Company turned from hydro-electric to steam-powered stations for additional expansion.

In 1956 Calgary Power undertook its first steam-powered installation at Lake Wabamun 42 miles west of Edmonton. Initially this station burned gas but was designed to burn bituminous coal as soon as it would become available from an adjacent strip mining operation on property purchased from the Alberta and Southern Coal Company. From here on we are obliged to express output capacity in terms of megawatts instead of mere kilowatts. This plant’s original output was 66 megawatts and it was ultimately expanded to produce 569 megawatts.

In its next phase of expansion, and under agreement with the Provincial Government, Calgary Power constructed a storage dam and reservoir on the Brazeau River, a tributary of the North Saskatchewan. By 1961 storage was available at this reservoir, the flow of the North Saskatchewan was improved, and pollution problems at Edmonton were partially relieved. By 1967 this project also added 355 megawatts of generating capacity to the Calgary Power System.

In the meantime, Calgary Power began the design of a second steam generating station to be located at Sundance and to be supplied with sub-bituminous coal from a strip mining operation at the Highvale Mine on the South Wabamun coal field. Six steam-turbine generators of 300 to 375...
megawatts, for a total of 2,000 megawatts, were ultimately installed at this site.

With continuing water shortage and pollution problems at Edmonton, Calgary Power, in cooperation with the Provincial Government, developed a second water storage and control facility on the North Saskatchewan River, the Bighorn Project. This project created Lake Abraham, a 20-mile long reservoir described as “Alberta’s largest man-made lake”. Completed in 1972, the plant has a capacity of 120 megawatts.

In 1981 Calgary Power was renamed “TransAlta Utilities Corporation”. The Company commissioned a second coal-fired generating station in the South Wabamun coalfield west of Edmonton consisting of two units each rated 375 megawatts. These two units were brought into service respectively in 1983 and 1984.

The second part of the Alberta story started in Edmonton in 1891 when a 450 kilowatt steam-powered generator was installed by the Electric Light and Power Company. The site was at the edge of the North Saskatchewan River very close to the location of old Fort Edmonton. Steam was produced by burning local coal and operating hours were sunset to 1.00 am in summer but were extended in winter to include 5.30 pm to sunrise. The use of this generator was mainly to supply lighting for homes and streets.

In 1902 the Edmonton town council voted to purchase the power system and the municipal utility “Edmonton Power” was born. The first order of business was to relocate the generating plant to avoid the possibility of flooding. The site picked was that of the present-day Rossdale generating station. On completion of the recommissioning, the second order of business was to establish 24-hour electrical service. As the town grew so did the station through the addition of further generating units.

In 1908 Edmonton became the first city between Winnipeg and the west coast to have an electric street railway system. The streetcar system was treated as an interruptible load and service was...
frequently shut down over peak periods to give preference to industrial and domestic users. The trams began to give way to trolley buses in 1939 and had disappeared by 1951. The electric trolley bus system continues in operation today.

Edmonton Power scored a first in 1928 when the world’s first 10,000 kilowatt, 3600 rpm steam-driven turbo generator was installed. It is also claimed that, in 1931, Edmonton operated the largest steam boiler in Canada and in 1941, Rossdale was Canada’s largest thermal power station. In the early fifties the City converted its boilers to burn the abundant low-cost natural gas that accompanied the development of oil fields throughout the Province. With the conversion completed in 1955, the municipal utility installed 30 megawatt combustion turbine sets in each of 1958 and 1959. They were, at the time of their installation, the largest such units in Canada. By 1966, Rossdale had grown from its initial 450 kilowatt generator to a plant with capacity of 390,000 kilowatts (390 megawatts).

With continuing growth of the City there came a continuing growth in the demand for electricity and in 1979, Edmonton Power completed its Clover Bar Power Station which burns gas in its four 165 megawatt generating units. Currently the utility has under construction the Genesee Power Project which will see the City return to coal-filled generation which has once again become the most economical source of energy for its steam generating stations. Located some 30 miles outside of Edmonton, the first phase of this project will add 800 more megawatts of capacity to the system.

The third part of the Alberta story started in Vegreville in 1926 with the incorporation of the Vegreville Utilities Ltd. At that time Vegreville was a town of 1600 people. In 1927 Vegreville Utilities was taken over by Mid-West Utilities, renamed Canadian Utilities in 1928. Canadian Utilities, in turn, was a subsidiary of International Utilities Corporation. Canadian Utilities took over various municipally-owned systems in Saskatchewan, British Columbia and Alberta. In 1928, the parent company bought out the Union Power Company Ltd. which supplied power in Drumheller. In 1935, Union Power was amalgamated with Canadian Utilities. This
amalgamation, together with a reorganization of the Company, permitted Canadian Utilities to reduce rates, extend the hours of service and improve the reliability of its facilities.

In 1945 Northland Utilities, which later became a subsidiary of Canadian Utilities, was formed. Northland acquired the power plants and distribution facilities of Dominion Electric Power Ltd. in Jasper, Athabasca, McLennan and Peace River in Alberta as well as Dawson Creek in B.C. and Winnipegosis in Manitoba. In 1947 the Saskatchewan Government took over all of Canadian Utilities’ plant and distribution facilities in Saskatchewan. In 1949, the B.C. Power Commission took over Northland’s Dawson Creek system and in 1950, the Manitoba Power Commission...
purchased Northland’s Winnipegosis network. Thus, both Northland and Canadian Utilities were left with holdings mainly in Alberta. Both companies undertook expansion programs. Northland had interconnected its isolated plants through a 23 kv line by 1956 and in 1957 began construction of a 72 kv interconnection between its Fairview plant and Canadian Utilities Sturgeon plant. The line was completed in 1961. By 1965, Canadian Utilities was operating 19 power stations with an installed capacity of over 150 megawatts.

Another subsidiary, Alberta Power, joined with TransAlta Utilities to construct the coal-fired Sheerness generating station with a projected in-service date for its first unit in 1985 and the second in 1986. The plant is located some 145 kilometers northeast of Calgary and will feature 400 megawatt turbine generators.

Although we have described electric power developments in Alberta as a three-part story we must now remind our readers that the three major generating utilities of the province are well coordinated to supply electrical energy at the lowest practical cost consistent with an acceptable level of reliability. Until the end of the 1960s coordinated planning was carried out informally by the three generating utilities. By 1972 the Electric Utility Planning Council was formally established and acts to coordinate the on-going planning and developments for electric power in the balanced interests of all Albertans.

World Wide Web Resources as of March 2000:
TransAlta - www.transalta.com

British Columbia

British Columbia’s first harnessed power came in 1846, shortly after the founding of Fort Victoria, when a water wheel was fashioned by a Hudson’s Bay Company wheelwright and installed at Parson’s Bridge on Millstream. By the early 1860s Victoria’s streets and some of its businesses and homes had been lighted by gas supplied by the Victoria Gas Company, B.C. Hydro’s earliest predecessor company. By 1882, Victoria’s city fathers wanted a more reliable street lighting system. They travelled to Vancouver to investigate an installation at a sawmill on Burrard Inlet.

Meanwhile, a bright Victoria telegrapher, Robert Burns McMicking, developed his own lighting system for the city and, by 1883, Victoria had its first electric street lights—carbon arc lights totalling 50,000 candlepower on three 150 foot masts. These were the first electric street lights in B.C. and among the first in all of Canada. They were roughly equivalent to 25 modern lamps of the 400-watt mercury vapor type. Mr. McMicking went on to play a prominent role in organizing the Victoria Electric Illuminating Company which had the distinction of introducing the first public incandescent lighting system in Canada. An Edison dynamo, powered by a 50 hp steam engine, had the capacity to supply four hundred 16-candle power lamps.

In 1888 the City of Victoria signed an agreement for the construction of an electric street railway system and the National Electric Tramway and Lighting Company was established. By 1891 the system had expanded to twelve miles of track and eleven streetcars. Then the Victoria Electric Railway and Lighting Company (founded 1894) and Consolidated Railway Company (also founded 1894) were taken over by the British Columbia Electric Railway Company Ltd. in 1897. This latter Company built the first hydroelectric plant on the Pacific Coast on the Goldstream River, Vancouver Island, in 1898. Located 15 miles from Victoria, the plant comprised two 660 hp Pelton Water Wheels directly connected to two 360 kW General Electric stationary field generators.
On the mainland, in the same year, the West Kootenay Power Company installed two 1,000 hp revolving field General Electric generators at their Bonnington Falls hydro-electric plant to supply power to the War Eagle Mining and Development Company (whose installations were described earlier).

These installations led the way to the development of many power sites which are abundantly located throughout British Columbia. In 1905, the Vancouver Power Company completed a hydroelectric development at Coquitlam Lake, 18 miles northeast of Vancouver, and in 1906, the
West Kootenay Power and Light Company installed the fourth 8,000 hp generating unit in its new power house.

Back on Vancouver Island, the B.C. Electric Railway Company began construction of a new hydroelectric development on the Jordan River, 37 miles from Victoria, in 1909. During the same year, B.C. Electric Railway Company also brought into service a 10,000 hp hydraulic generating unit at Lake Buntzen.

The year 1911 was particularly important in the development of electricity in the Province. A new hydraulic generating station was completed near Revelstoke on the Illicillewaet River. The powerhouse, about two miles west of Revelstoke, replaced a 125 kilowatt hydraulic generator which had been installed in 1896 and which was backed up by a gas-powered engine against clogging of the Illicillewaet by slush ice during winter months. The new plant embraced some elements of the old plant (a 150 kilowatt three-phase generator and its turbine) together with a new 250 kVA, three-phase 60-cycle unit and a second rated 450 kVA. The Prince Rupert Hydro-Electric Company Ltd. was formed to develop hydroelectric facilities to supply the City of

*Ruskin Dam completed in 1930 by Western Power Company. Photo courtesy of B.C. Hydro.*
Prince Rupert and surrounding area. The first steel tower line to be built in British Columbia went into service connecting the Western Canada Power Company’s Stave Falls generating station to Vancouver and New Westminster. Two years later, at Vernon, the first diesel electric generating plant in the Province was completed.

By 1920 the B.C. Electric Railway Company had bought control of the Western Power Company of Canada thus merging electrical interests on the lower mainland of the Province. Developments continued apace during the twenties and thirties with B.C. Electric Railway Co. installing a 10,000 hp hydraulic unit at its Alouette generating station in 1927 and the West Kootenay Light and Power Company completing its 75,000 hp South Slocan Station in 1929 and immediately beginning surveys for a 40,000 hp plant on the Adams River. The following year saw the Vancouver Island Power Company complete its 18,000 hp hydroelectric unit on the Jordan River while the Western Power Company (a subsidiary of B.C. Power Corp.) completed its Ruskin Plant and the West Kootenay Power and Light Co. began construction of its fourth plant on the Kootenay River. Northern British Columbia Power Co. placed in service a 6,000 hp unit at its hydroelectric development on the Falls River. In 1938 Western Power Co. installed a second unit of 17,000 hp at the Ruskin Station. In 1940, the West Kootenay Power and Light Co. added two 25,000 hp units at its Upper Bonnington Falls Station.

The year 1943 saw the formation of the Rural Electrification Committee by the B.C. Government which led to the formation of the B.C. Power Commission to unify power generation in the
Province and in 1945, the B.C. Government took over the West Canadian Hydro-Electric Corp., Nanaimo-Duncan Utilities Ltd. and Columbia Power Company.

In 1948, at Bridge River, first power was delivered from a hydroelectric development which would provide 600,000 hp when completed. In 1949, the B.C. Power Commission placed in service the 112,000 hp John Hart hydroelectric development on the Campbell River on Vancouver Island.

B.C. Electric continued to make additions to its system having brought along an 80,000 hp hydroelectric development at Jones Lake between Hope and Rosedale and began construction of a 912,500 kilowatt oil or natural gas fired thermal plant on Burrard Inlet. In 1962, the B.C. Government expropriated the facilities of the B.C. Electric Railway Company leading to the formation of the present B.C. Hydro and Power Authority.

In 1961 the Columbia River Treaty was signed by the Canadian and U.S. Administrations. While the Treaty was ratified by the United States Senate, it was not ratified by the Canadian Government until 1964. The Treaty made provision for the construction of storage dams in Canada at Duncan, Arrow and Mica for both flood control purposes and to improve generating capabilities on the river in the United States as well as providing the installation of generating facilities at the Mica Dam. Because of the delay in ratification by the Canadian Government, B.C. Hydro went ahead with the development of the Peace River Project. The first dam on the
Peace at Portage Mountain included an underground powerhouse with provision for the installation of 10 units and an ultimate capacity of 2,400 megawatts. Required also were two 500 kilovolt, 575-mile long transmission lines to interconnect with the lower mainland. The dam was completed in 1967 and the first three 227,000 kilowatt generators were placed in service in 1968. By 1980 the Portage Mountain project on the Peace River was completed with IO generating units ranging from 227,000 to 300,000 kilowatts each.

In 1980 a second powerhouse on the Peace River, called the Peace Canyon Generating Station, 12 miles downstream from the Portage Mountain site, added a further 700 megawatts of generation.

Of special interest, insofar as the Columbia development is concerned, is the Mica Dam in which electrical generating facilities were to be installed. Construction began in the wilderness country in 1964, 237 miles north of the Arrow Dam near the confluence of the Columbia, Canoe and Wood Rivers. The dam was completed in 1973 and the powerhouse structure followed. A total of 2400 megawatts was planned to be in six units. Four units were installed in 1976 and 1977. Although all generators were provided by General Electric, two of the turbines were supplied by Hitachi of Japan and two by Leningrad Metal Works of Russia.

Also on the Columbia River, but not part of the works covered by the Treaty between Canada and the U.S., the Revelstoke project was begun in 1977. Again the powerhouse had provision for the installation of six units of 450 megawatts. By 1983 two units were installed and scheduled to feed energy into the grid in 1984 with two further units to be installed in 1984 and a further two to follow when the Mica project is brought to full capacity.
As part of the projects covered by the International Treaty, the Kootenay Canal project was undertaken. Existing powerhouses on the Kootenay at Corra Linn, City of Nelson, Upper and Lower Bonnington and South Slocan could not make full use of the regulated flows resulting from the storage dams constructed under the Columbia River Treaty. Accordingly the Kootenay diversion canal was built to carry flows from the Corra Linn Dam to a new powerhouse below the South Slocan Dam. This station houses four 132 megawatt generators.

Of particular interest also is the fact that North America’s first DC transmission link connected Vancouver Island to the mainland. It was commissioned in 1968. Using mercury arc valves, the line operated at +260 kV. The second stage was completed in 1975. Thyristors were used in place of mercury arc valves and this second line operates at -280 kV. The combined capacity of the two stages is 788 megawatts. The total line length is 74 kilometers, 33 kilometers of which is submarine cable, the remainder being overhead construction.

In October 1983, a 500 kV ac line was installed to serve Vancouver Island with a capacity of 1200 megawatts. It is claimed to be the longest high-voltage submarine line in the world.

World Wide Web Resources as of March 2000:
BC Hydro - www.bchydro.bc.ca

Canadian Electrical Association (CEA)
We cannot conclude our story of the development of Electric Power Utilities across Canada without mention of the Canadian Electrical Association. Founded as an association of electric utilities, almost a hundred years ago, it fosters the efficient development of energy resources and promotes a balance between protection of the environment and the continuously growing energy needs of the nation, provides a forum for study, discussion, exchange of information and further development of all subjects of interest to its collective membership. It is also committed to informing the public, government and industry of the achievements and goals of the Canadian electric utility industry. It organizes special committees of its members to study the production, distribution and utilization of energy and promotes research programs in conjunction with Government, Scientific, Academic, Industrial communities and kindred organizations to the benefit of all Canadians. The membership includes corporate members and private members from Utilities and Manufacturers.

Recently the President of CEA stated: “The Association has been an excellent source of technical exchange for 95 years. In more recent times, it has mounted a superb user-driven research and development program. We’re going to take a good organization with excellent goals and take it one, maybe two, steps forward towards a greater role... We intend to speak out on issues of concern so that all sectors of the Canadian economy will have a better understanding of the electric utility industry in Canada”.

World Wide Web Resources as of March 2000:
Canadian Electricity Association - www.canelect.ca