Q. On page 9 of Mr. Greneman's Evidence, he states "The demands used in the study were developed with the support of updated load data from other northern climate electric utilities in North America." Please provide all data, including the source, obtained from these other utilities. Please discuss how data from other utilities is applicable to Hydro.

A. The report titled "Load Research Documentation", prepared by Stone & Webster and attached in response to this question discusses the development of the updated load data and its applicability to Hydro. The updated load data was input to Hydro's load model where allocation factors were developed for use in its cost of service studies.

Newfoundland and Labrador Hydro

LOAD RESEARCH DOCUMENTATION

Stone & Webster Management Consultants, Inc.

TABLE OF CONTENTS

1. Background

Stone & Webster Management Consultants (SWMCI) has performed a review of the practices involved in the development of load research data at Newfoundland & Labrador Hydro (NLH). Load research data at NLH are used for the purpose of developing allocation factors for various customer rate classes in cost of service studies (COSS) for general rate proceedings with the Board of Commissioners of Public Utilities in Newfoundland and Labrador. As a result of that review, SWMCI has recommended that NLH adopt the load research procedures described in this report.

2. Load Research at NLH

2.1. Current Load Research Data

NLH does not have a formal load research program with statistically designed surveys and sample metering. All of its load research results have been based on data borrowed from other utilities throughout Canada and the United States. The following table represents the existing sources of load research data that are used to develop the rate class allocators at NLH.

Rate Class	Data Source	Data Type
Rate 1.1 DOMESTIC		
	Alta Power - 1984	NCP, CP and kW @ meter
	NE Utilities - Dec 1980	NCP, CP and KW @ meter
	Niagara Mohawk - Dec 1975	NCP, CP and KW @ meter
	Niagara Mohawk - Dec 1983	NCP, CP and KW @ meter
	Nova Scotia Power Corp. - April 89/March 1990	NCP, CP and KW @ meter
	Orange & Rockland - Dec 1975	NCP, CP and KW @ meter
	Rochester Gas & Elec - Jan/Dec 1973	NCP, CP and KW @ meter
Rate 1.12 DOMESTIC ALL ELECTRIC		
	Niagara Mohawk - Jan/Dec 1983	NCP, CP and KW @ meter
Rate 2.1 GENERAL SERVICE 0-10 kW		
	Niagara Mohawk	Load Factor for Class NCP, CP
	Consumers Power Co	Load Factor for Class NCP, CP
	Nova Scotia Power Corp	Load Factor for Class NCP, CP
	Central Main Power	Load Factor for Class NCP, CP
Rate 2.2 GENERAL SERVICE 10-100 kW		
	Niagara Mohawk	Coincidence Factor for Class NCP, CP
	Nova Scotia Power Corp	Coincidence Factor for Class NCP, CP
	Long Island Lighting	Coincidence Factor for Class NCP, CP
Rate 2.3 GENERAL SERVICE 100-1000 kVA		
	Nova Scotia Power Corp	Coincidence Factor for Class NCP, CP
Rate 2.4 GENERAL SERVICE 1000 kVA and Over		
	Jersey Central	Coincidence Factor for Class NCP, CP
	Northeast Utilities	Coincidence Factor for Class NCP, CP
	Illinois Power	Coincidence Factor for Class NCP, CP
	Nova Scotia Power Corp.	Coincidence Factor for Class NCP, CP
	Newfoundland light & Power	Coincidence Factor for Class NCP, CP
Rate 1.23 Churches, Schools, Community Centers, etc.		
	Penn Elec Co.	NCP & CP
	Pub Serv Elec & Gas	NCP & CP
	Hartford Elec & Lt Co.	NCP & CP

Table #1 – Existing NLH Load Research Data Sources

2.2. Load Research Definitions

The following are definitions for the load research terminology and acronyms used in the above table:

- Noncoincident Peak or NCP is the total class demand at time of rate class peak
- Coincident Peak or CP is the class demand at time of system peak
- kW @ meter is the individual customer's billing demand
- Load Factor is average demand divided by peak demand (i.e. NCP, CP or kW @ meter)
- Coincidence Factor is the ratio of the class CP to the class NCP

3. Load Research Data Review

3.1. Appropriateness of Load Research Data

SWMCI started its review by looking at the appropriateness of load research data as it applied to NLH's service territory and it's various rate classes. The most obvious observation was the age of the borrowed data. Some of the load research data dated back to the early seventies. Much of the other load research statistics had no indication of the actual period of the data. By traditional load research guidelines, it is considered that load research data from sampled survey data becomes stale after only five years. However, this philosophy is not practiced very rigorously by load researchers at today's utilities

3.2. Demographic Similarities

The second area of interest was the demographic similarities of the donor utilities especially with regard to similar weather characteristics. All the borrowed load research data came from utilities either in Canada or northern United States. However, some of the borrowed data was as far south as New Jersey and Pennsylvania as can be seen by the companies listed in Table #1

Based on this review of this current load research data, SWMCI initially believed that more recent load research data and data sources strictly from Canadian regions would be the most appropriate source of information.

4. New Load Research Data

4.1. Canadian Load Research Data

SWMCI researched the Internet for existence of current load profile data for Canadian utilities. This sort of information is typically available in restructured markets for the use of load supplying entities (LSE's). Two sources were found with a variety of load profiles that could be adapted for load research purposes at NLH. Attachments #1 & #2 contain several graphical examples of the types of hourly load data available in these rate/customer profiles. Some typical examples of customer types and sources included hourly load profiles as shown in the following table:

Alberta	**Ontario**
Years: 1996 – 1998	Year: 1999
Residential	Residential
Farm	Residential – Water Heat
Small General Service	Residential – Space Heat
Oilfield	Church
Large General Service/Industrial	Education
Irrigation	Hotels
Street Lighting	Offices

Table #2 – Canadian Research Data Sources

Upon further review by SWMCI, much of the hourly load profile data from Ontario was found to be more customer specific data and not rate class data that would be needed for COSS work.

Additionally, NLH provided SWMCI with an assortment of load research information dated 1997 from Newfoundland Power & Light. This resource also was used to create NLH's database of basic load research data. Attachment #3 shows the examples of the types of load research statistics available through the Newfoundland Power information.

4.2. Northeast United States Load Research Data

To supplement a limited amount of Canadian load research data, SWMCI began a search of utilities in the northeast United States for load profile data more in line with NLH rate structures. Some rate class data that SWMCI expected that would be were particularly difficult to find included "all electric use" and "church and school use".

However, SWMCI did find a variety of more recent data resources for all rate classifications in the northeast U.S. and with demographic and climatologic similarities to NLH, which are listed below.

COMPANY	PERIOD	RATE TYPE
Bangor Hydro-Electric Co	(Years: 2000 – 2001)	Residential
Bangor Hydro-Electric Co	(Years: 2000 – 2001)	Small Commercial
Bangor Hydro-Electric Co	(Years: 2000 – 2001)	Medium Commercial
Bangor Hydro-Electric Co	(Years: 2000 – 2001)	Streetlighting
Central Maine Power Co	(Years: 2001 – 2002)	Residential
Central Maine Power Co	(Years: 2001 – 2002)	Small Commercial
Central Maine Power Co	(Years: 2001 – 2002)	Medium Commercial
Central Maine Power Co	(Years: 2001 – 2002)	Streetlighting
Maine Public Service Co.	(Years: 1998 - 2001)	Residential
Maine Public Service Co.	(Years: 1998 - 2001)	Small Commercial
Maine Public Service Co.	(Years: 1998 - 2001)	Medium Commercial
Maine Public Service Co.	(Years: 1998 - 2001)	Large Commercial
Maine Public Service Co.	(Years: 1998 - 2001)	Streetlighting
NSTAR (formerly Boston Edison)	(Year: 1998)	Residential All Electric
NSTAR (formerly Boston Edison)	(Year: 1998)	Medium General Service
NSTAR (formerly Boston Edison)	(Year: 1998)	Large General Service
Connecticut P&L	(Year: 2001)	Small Church and School
Connecticut P&L	(Year: 2001)	Large Church and School
Connecticut P&L	(Year: 2001)	Residential All Electric

Table #3 – Research Data Sources form New England

5. Process Review

5.1. Current Process

Similarly, SWMCI reviewed the current processes at NLH for developing load research data to include data sources, file maintenance, methods for calibrating the existing sources of load research information. NLH used a variety of methods to develop coincident and non-coincident peaks from a combination of borrowed load research data and NLH billing statistics.

5.1.1. Residential

For the residential rate classes, the format of the borrowed load research data is kilowatthour per customer (kWh/cust), NCP, CP and annual rate kilowatthours (KWH). NLH averages the borrowed load data from the donor utilities and calibrates that result to more closely match NLH's average kW per customer based on annual kWh to produce NCP and CP for the residential rates.

5.1.2. Small General Service

For the small general-service rate classes without demand metering, the format of the borrowed load research data is NCP and CP load factors. NLH uses these average non-coincident and coincident load factors applied to their own billed energy data to produce the NCP's and PC's for the small general service rates.

5.1.3. Large General Service

For the large general-service rate classes with demand metering, the format of the borrowed load research data is NCP and CP coincidence factors. NLH uses both average coincidence factors applied to their own billed demand data to produce the NCP's and CP's for the large general service rates.

5.1.4. Church and School

For the church and school rate classes, the format of the borrowed load research data is NCP and CP kilowatts per eight months of kilowatthours. NLH applied weighting factors to the borrowed load data from the donor utilities to produce different NCP and CP demands for the church and school rates in Island Isolated and Labrador Isolated.

5.1.5. Streetlighting

For streetlighting rate classes, the format of the load research data is burning hours per year for streetlights. NLH applied the burning hours per year to the annual kilowatthours to arrive at monthly NCP and CP for streetlighting rates.

These NLH practices were consistent with accepted load research procedures to normalize borrowed load research data considering the absence of a formalized load research program with sample metering.

5.2. Modified Procedures

SWMCI found the existing number of different processes required to develop NLH's load research data somewhat overly complicated and time consuming. In an effort to simplify the process, SWMCI proposed a method whereby all rates are handled in the same manner except for streetlighting.

5.2.1. Process Description

This recommended method involves the averaging of borrowed NCP/CP load factors as detailed above for existing small general service rates but applying the same procedure to all NLH rate classes. The averaging base for load research data now included the previously collected Canadian data, the newly acquired Canadian Data and specifically selected data from the New England states. Attachment #4 gives a sense of the tightness of the load factor data from the different sources in the new load research process.

With the increased availability of the new load research data, this structure allowed each rate to be treated in identically the same manner, promoted easier formatting of input data and simplified the analysis load research results.

5.2.2. New NCP/CP Formulas

The following are examples of the formulas used in the calculation of the non-coincident peak and coincident peak in all NLH regions.

In the month of June, the coincident peak (NCP) of each rate class is calculated as follows:

- NCP = (June kilowatt-hours)/(NCP load factor for June)/(720 hours)

In the peak month of January, the coincident peak (CP) of each rate class is calculated as follows:

- CP = (January kilowatt-hours)/(CP load factor for January)/(744 hours)

Where the NCP and CP load factors are based on borrowed load data as developed in Section 5.2.1.

6. Recommendations

As a result of this review, SWMCI has the following recommendations for the NLH load research procedures:

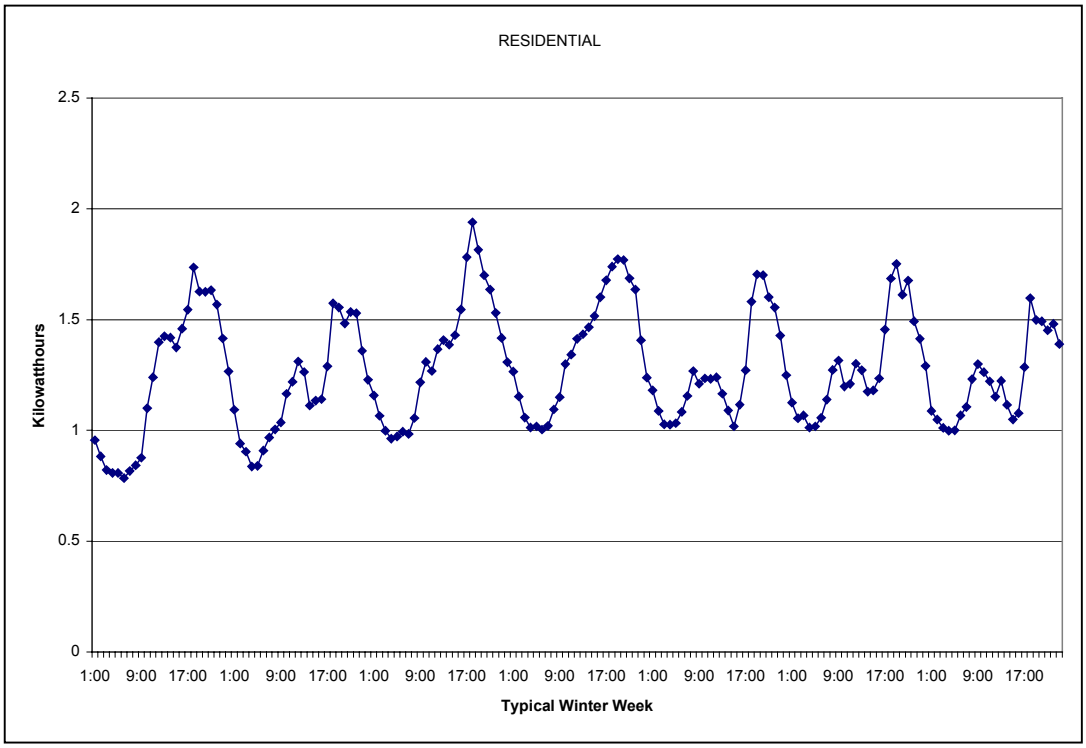
- Discontinue using all borrowed load research data dated prior to the year 1990
- Keep all existing load research data from Canadian provinces
- Update load research data with newly acquired load research data from Newfoundland Power
- Develop new load research statistics from the load profile data from Alberta and Ontario as applicable
- Incorporate the new load research data from the New England states
- Continue to use 4200 burning-hours for streetlighting rates

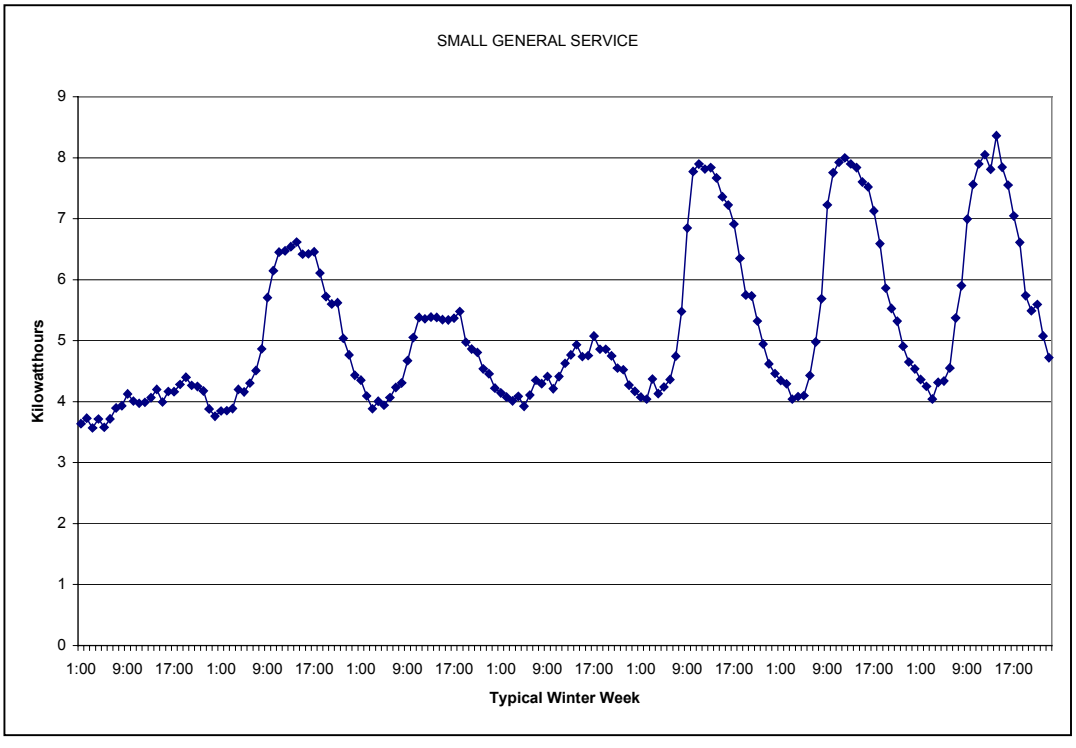
SWMCI believes that these recommendations will enable NLH to capture the essence of the load characteristics of all customers in its domestic and general service classes.

ATTACHMENTS

Attachment #1

ALBERTA


RESIDENTIAL
Kilowatthours
2.5
2
1.5
1
0.5
0
1:00 9:00 17:00 1:00 9:00 17:00 1:00 9:00 17:00 1:00 9:00 17:00 1:00 9:00 17:00 1:00 9:00 17:00 1:00 9:00 17:00
Typical Winter Week


SMALL GENERAL SERVICE
Kilowatthours
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8
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3
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1
0
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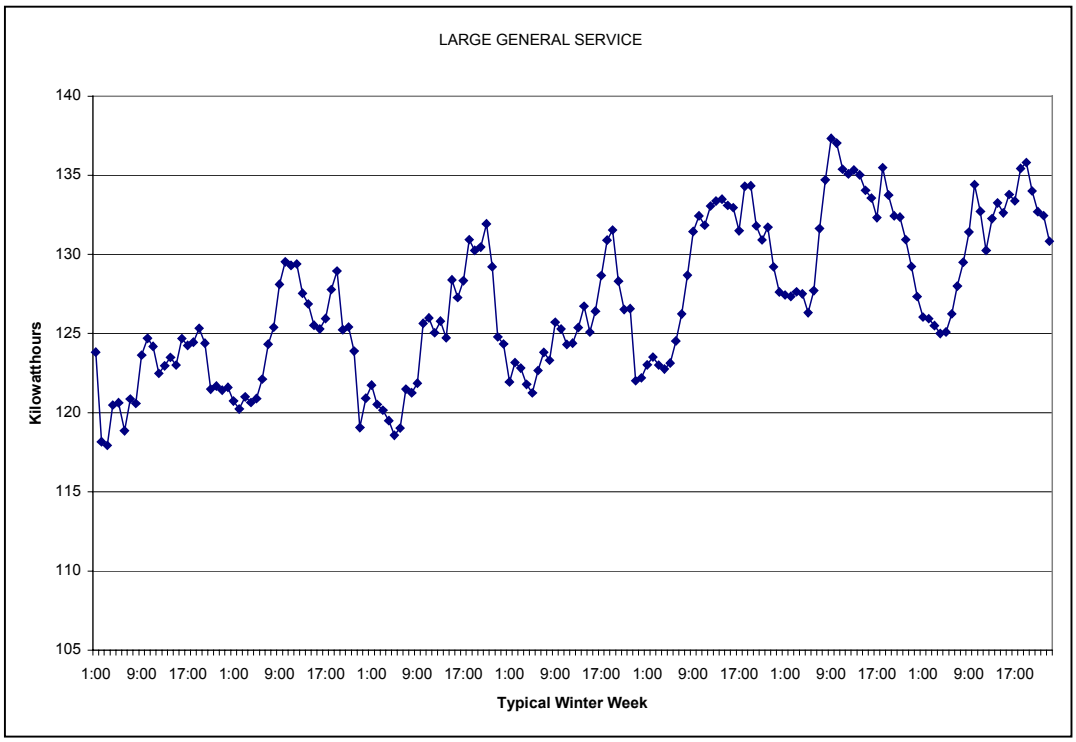
Typical Winter Week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Kilowatthours
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130
125
120
115
110
105
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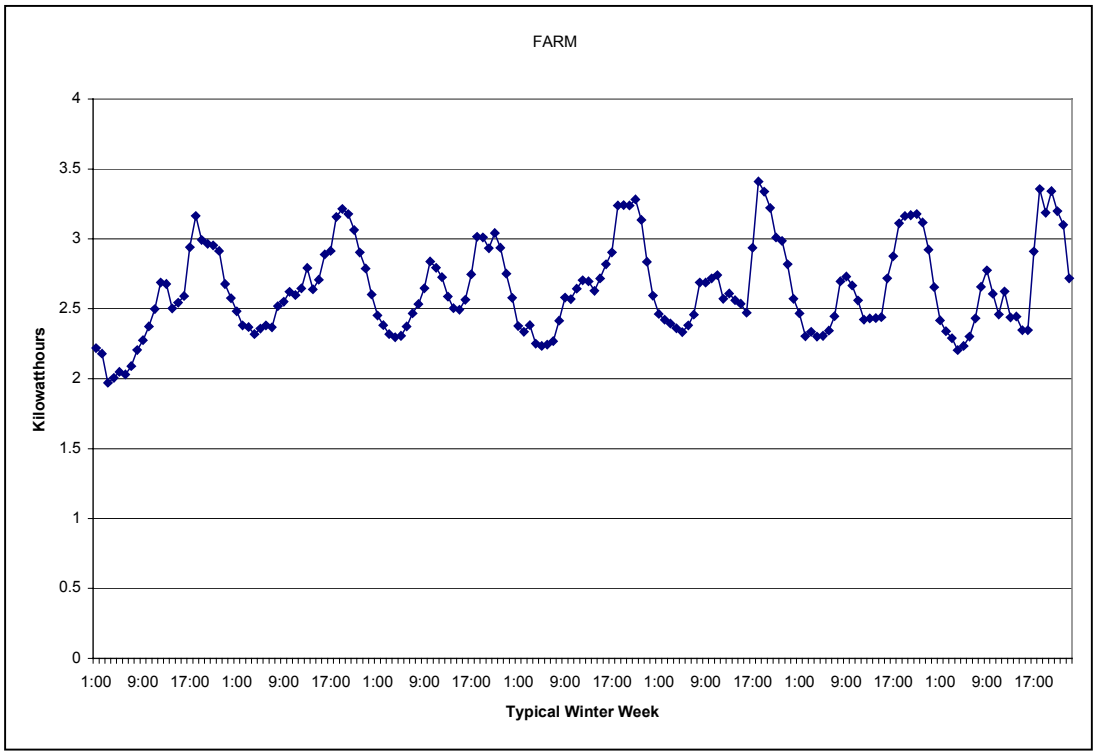
Typical Winter Week


FARM
Kilowatthours
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3.5
3
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2
1.5
1
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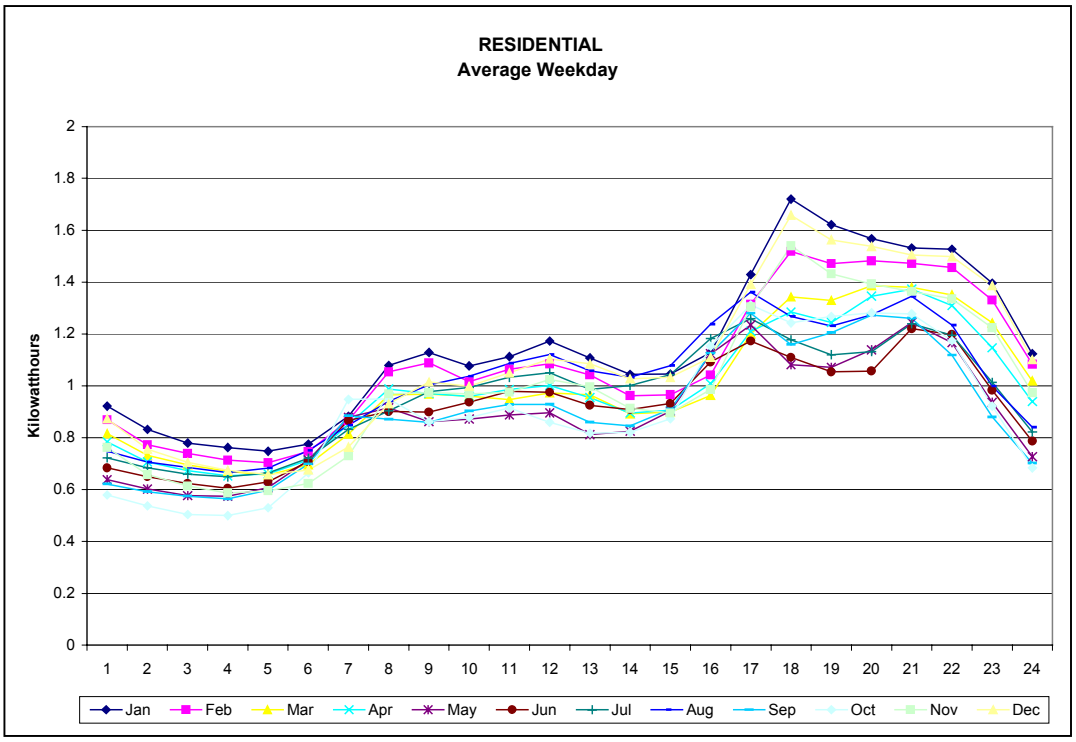
Typical Winter Week

Attachment #2

ONTARIO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Average Weekday
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0.6
0.8
1
1.2
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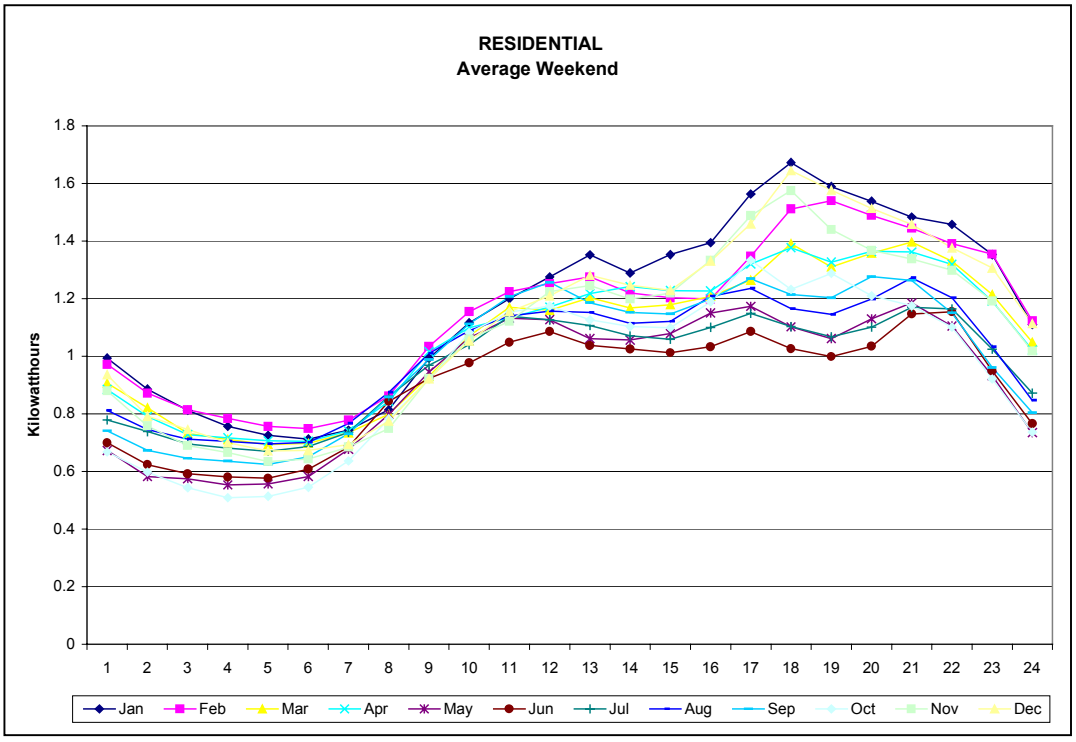
RESIDENTIAL
Average Weekend
Kilowatthours
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0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
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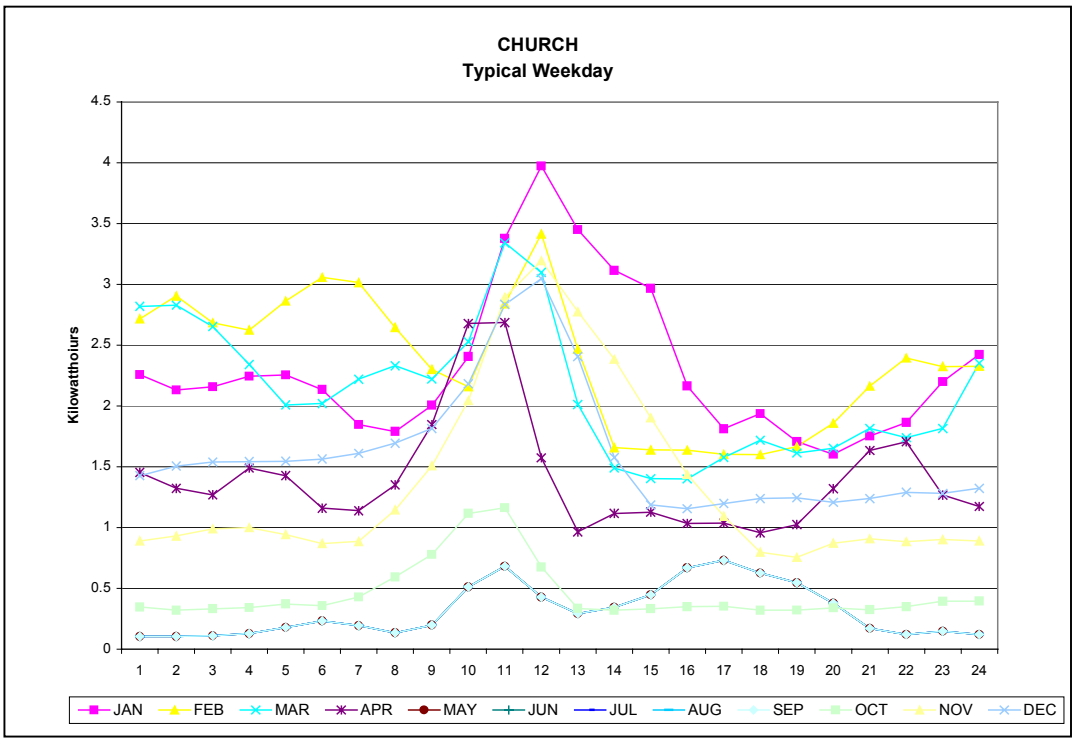
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


CHURCH
Typical Weekday
Kilowattholurs
4.5
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2
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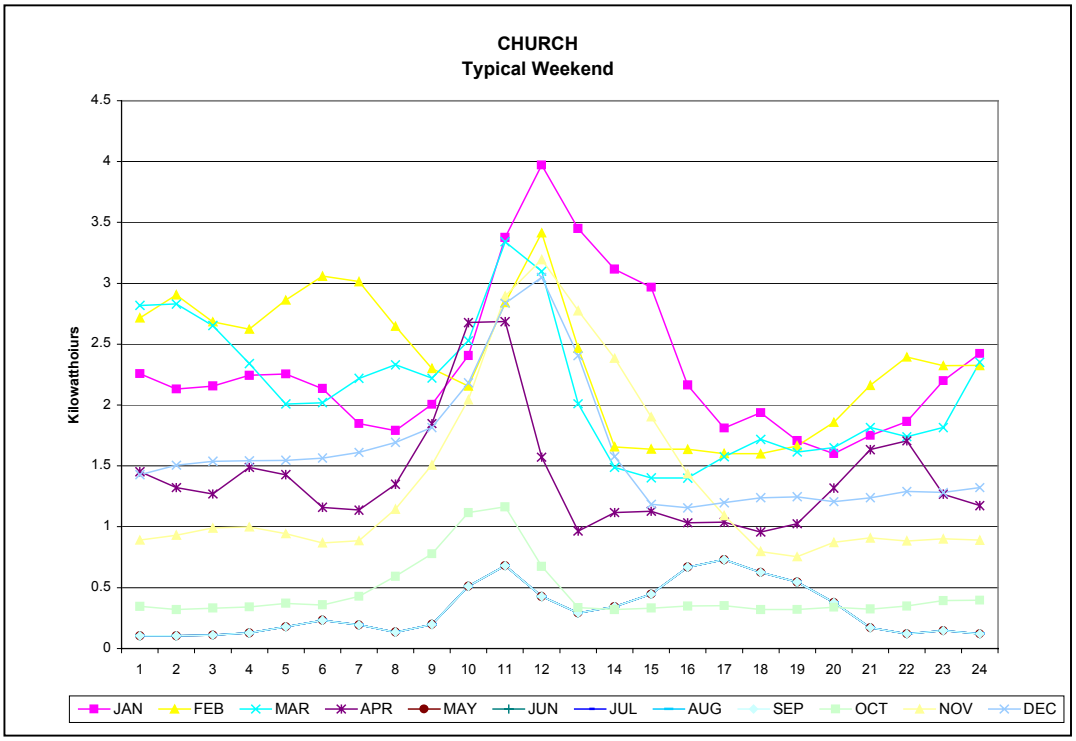
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


CHURCH
Typical Weekend
Kilowattholurs
4.5
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3.5
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1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Attachment #3

NEWFOUNDLAND POWER

Newfoundland Power Rate 2.3 Load Estimates													
	Mar-92	**Apr-92**	**May-92**	**Jun-92**	**Jul-92**	**Aug-92**	**Sep-92**	**Oct-92**	**Nov-92**	**Dec-92**	**Jan-93**	**Feb-93**	
Rate 2.3 billed energy (mWh)	80,894	69,324	58,986	51,484	51,435	47,077	46,435	51,997	60,839	70,988	82,171	83,039	
Average Demand	108,728	96,283	79,282	71,506	69,133	63,276	64,493	69,888	84,499	95,414	110,445	123,570	
Rate 2.3 peak load (kW)	171,085	152,795	125,643	103,054	96,587	89,995	97,623	122,535	149,554	147,554	160,280	167,462	
Rate 2.3 load at limit of system peak (kW)	166,215	151,997	83,749	97,911	93,833	83,249	90,928	114,254	112,777	117,577	127,798	159,145	
Rate 2.3 Load Factor at NCP	63.6%	63.0%	63.1%	69.4%	71.6%	70.3%	66.1%	57.0%	56.5%	64.7%	68.9%	73.8%	
Rate 2.3 Load Factor at CP	65.4%	63.3%	94.7%	73.0%	73.7%	76.0%	70.9%	61.2%	74.9%	81.2%	86.4%	77.6%	
	Mar-93	**Apr-93**	**May-93**	**Jun-93**	**Jul-93**	**Aug-93**	**Sep-93**	**Oct-93**	**Nov-93**	**Dec-93**	**Jan-94**	**Feb-94**	**Mar-94**
Rate 2.3 billed energy (MWh)	76,541	73,017	56,840	54,852	54,840	50,767	44,253	51,854	62,509	69,990	80,924	84,481	80,440
Average Demand	102,878	101,413	76,398	76,183	73,710	68,235	61,463	69,696	86,818	94,073	108,769	125,716	108,118
Rate 2.3 peak load (kW)	151,586	134,682	136,233	118,525	90,825	87,398	107,284	134,846	151,289	141,561	174,629	176,749	167,591
Rate 2.3 load at time of system peak (kW)	150,366	134,682	126,793	73,739	8,811	80,759	89,766	94,230	116,183	115,167	136,313	164,962	117,089
Rate 2.3 Load Factor at NCP	67.9%	75.3%	56.1%	64.3%	81.2%	78.1%	57.3%	51.7%	57.4%	66.5%	62.3%	71.1%	64.5%
Rate 2.3 Load Factor at CP	68.4%	75.3%	60.3%	103.3%	836.6%	84.5%	68.5%	74.0%	74.7%	81.7%	79.8%	76.2%	92.3%

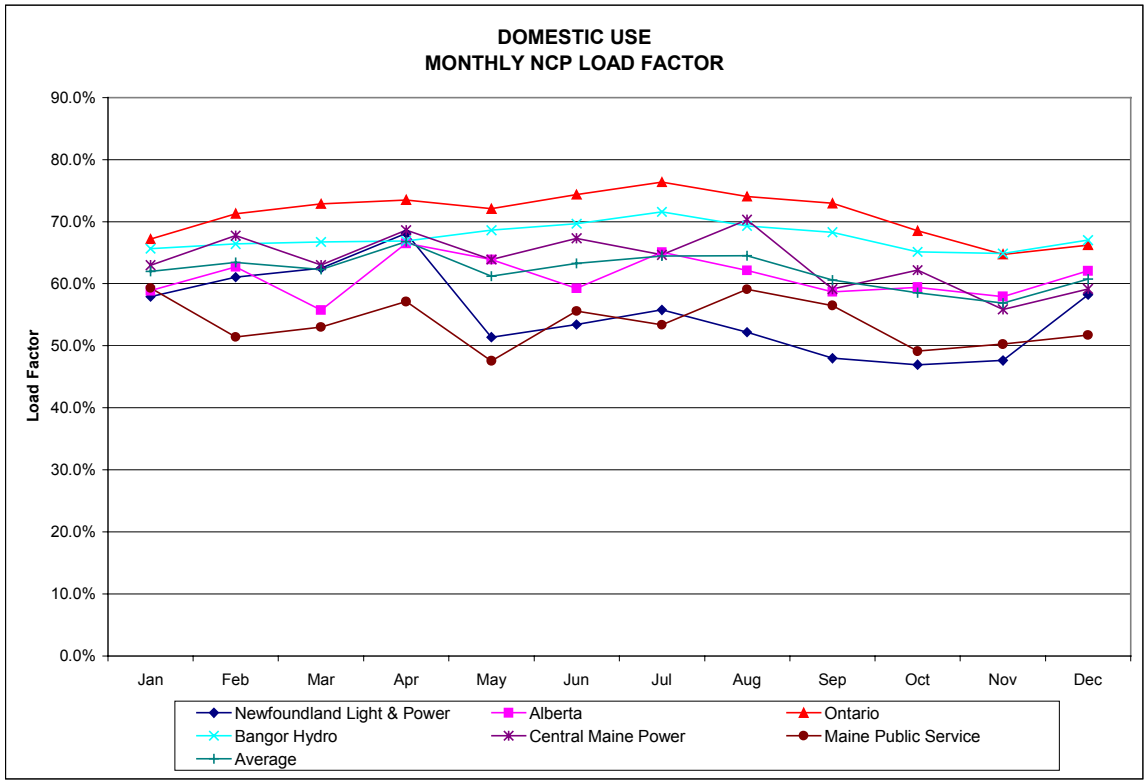
Newfoundland Power
Residential Load Estimates

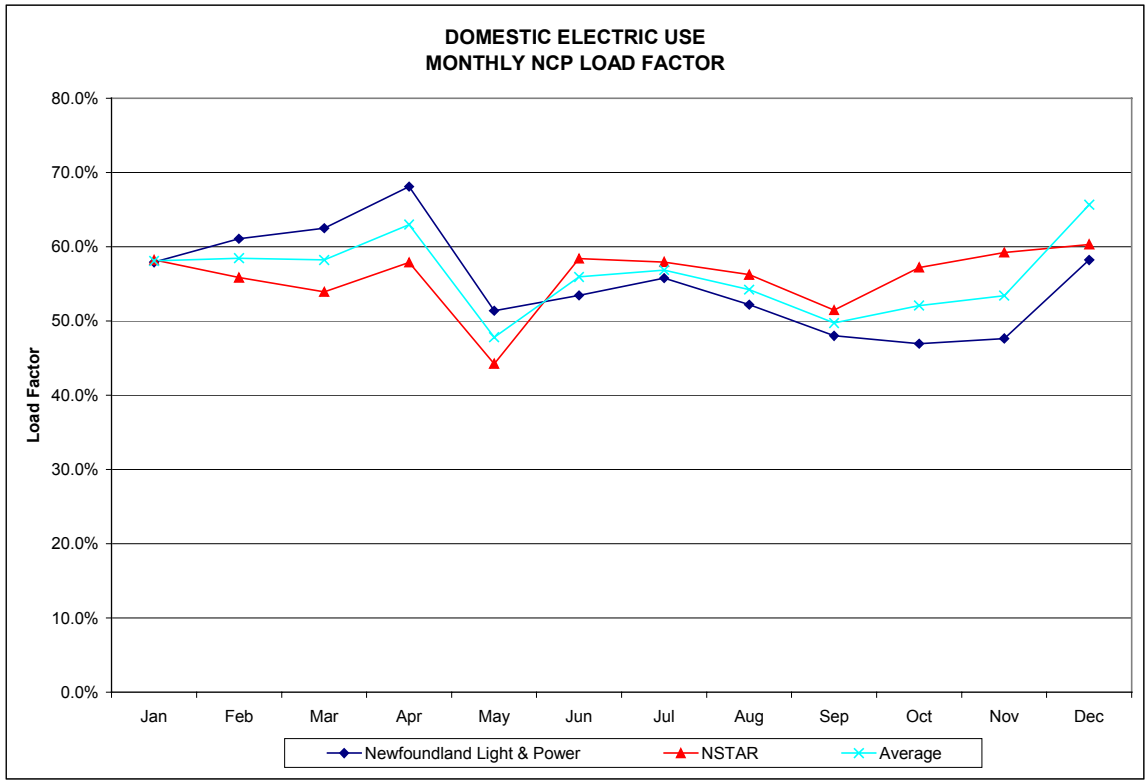
	Mar-92	Apr-92	May-92	Jun-92	Jul-92	Aug-92	Sep-92	Oct-92	Nov-92	Dec-92	Jan-93	Feb-93
Residential billed energy (MWh)	312,494	260,221	216,731	162,103	147,818	122,977	127,739	156,841	210,660	269,141	333,490	317,717
Average Demand	420,019	361,418	291,305	225,143	198,680	165,292	177,415	210,808	292,583	361,749	448,239	472,793
Residential peak load (kW)	725,170	591,816	467,276	347,098	362,621	352,454	335,936	463,260	597,000	713,224	713,848	704,840
Residential load at time of syhstem peak (kW)	640,007	441,283	411,083	276,281	253,884	335,310	263,312	429,059	482,580	668,132	663,705	577,014
Residential Load Factor at NCP	57.9%	61.1%	62.3%	64.9%	54.8%	46.9%	52.8%	45.5%	49.0%	50.7%	62.8%	67.1%
Residential Load Factor at CP	65.6%	81.9%	70.9%	81.5%	78.3%	49.3%	67.4%	49.1%	60.6%	54.1%	67.5%	81.9%

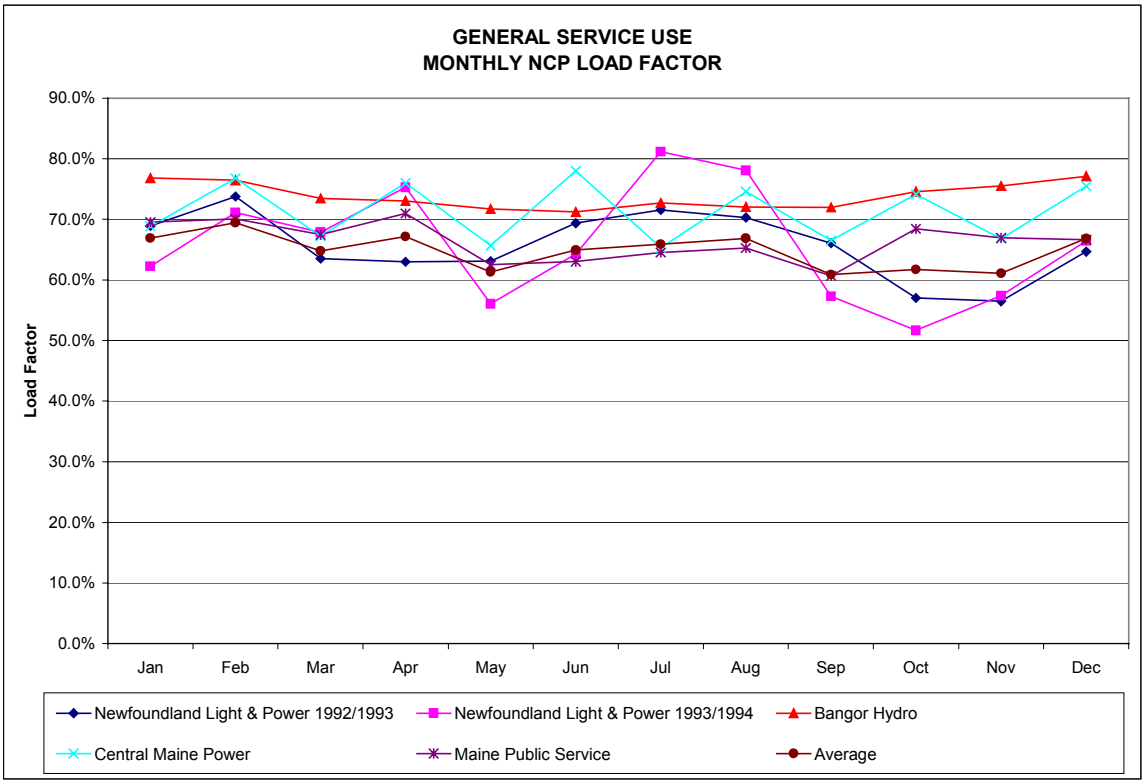
	Mar-93	Apr-93	May-93	Jun-93	Jul-93	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Jan-94	Feb-94	Mar-94
Residential billed energy (MWh)	291,566	271,244	204,665	188,337	146,493	130,236	126,534	154,794	212,295	262,478	326,172	329,425	307,868
Average Demand	391,890	376,728	275,087	261,579	196,899	175,048	175,742	208,056	294,854	352,793	438,403	490,216	413,801
Residential billed energy (MWh)	625,495	528,171	573,829	436,059	335,353	297,429	374,091	482,027	907,926	714,648	693,554	720,599	662,133
Residential load at time of system peak (kW)	535,808	446,154	439,229	392,727	335,871	245,801	323,234	452,167	552,984	629,598	557,917	686,257	644,435
Residential Load Factor at NCP	62.7%	71.3%	47.9%	60.0%	58.7%	58.9%	47.0%	43.2%	32.5%	49.4%	63.2%	68.0%	62.5%
Residential Load Factor at CP	73.1%	84.4%	62.6%	66.6%	58.6%	71.2%	54.4%	46.0%	53.3%	56.0%	78.6%	71.4%	64.2%

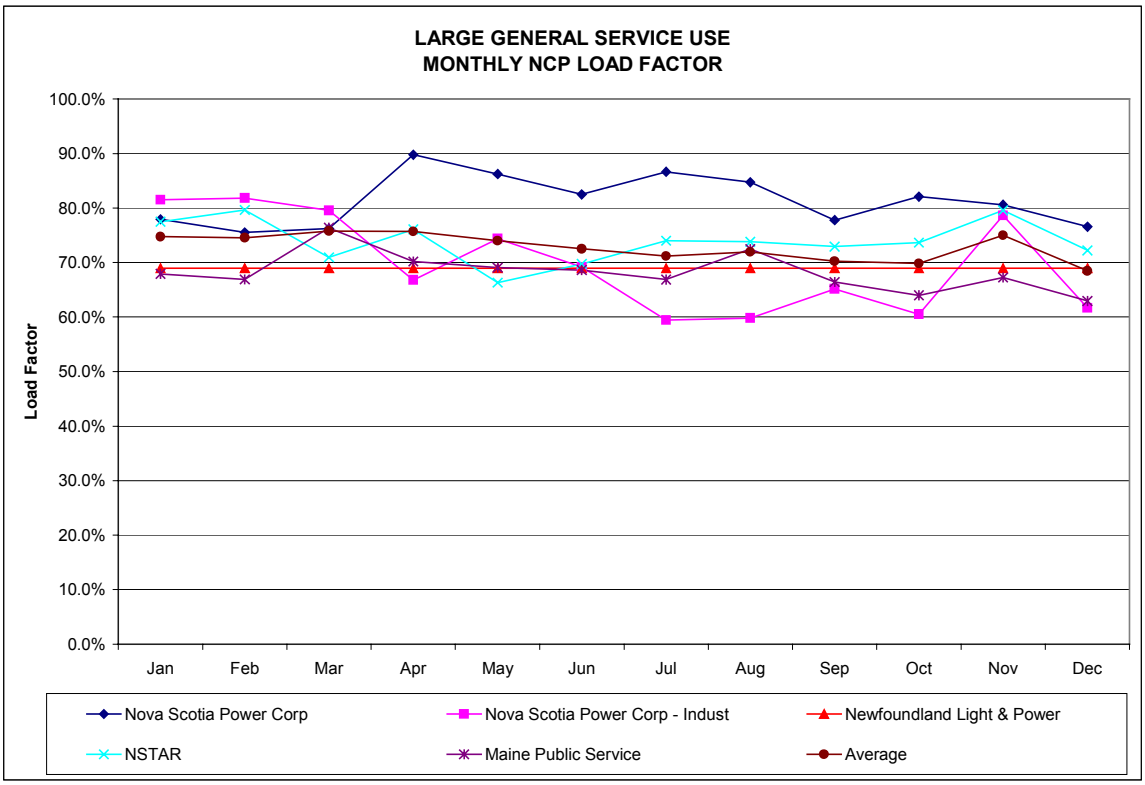
Attachment #4

NCP LOAD FACTORS


DOMESTIC USE
MONTHLY NCP LOAD FACTOR
Load Factor
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Newfoundland Light & Power
Alberta
Ontario
Bangor Hydro
Central Maine Power
Maine Public Service
Average


DOMESTIC ELECTRIC USE
MONTHLY NCP LOAD FACTOR
Load Factor
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Newfoundland Light & Power
NSTAR
Average


GENERAL SERVICE USE
MONTHLY NCP LOAD FACTOR
Load Factor
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Newfoundland Light & Power 1992/1993
Newfoundland Light & Power 1993/1994
Bangor Hydro
Central Maine Power
Maine Public Service
Average


LARGE GENERAL SERVICE USE
MONTHLY NCP LOAD FACTOR
Load Factor
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Nova Scotia Power Corp
Nova Scotia Power Corp - Indust
Newfoundland Light & Power
NSTAR
Maine Public Service
Average