

**Q. Provide a list of all Newfoundland Power substation transformers including voltage and KVA ratings. Include in the response the peak demand anticipated for each transformer for next winter. Is it correct to assume that the average demand on each transformer doesn't exceed about 50% of the peak demand?**

**A.** Attachment A provides a list of all Newfoundland Power distribution power substation transformers. Attachment B provides a list of all system power substation transformers.<sup>1</sup> The transformer ratings in both attachments include the capacity upgrade being completed before the 2014/15 winter season.<sup>2</sup>

It is not correct to assume average demand on each line would not exceed 50% of peak load. The average and peak demands on a transmission line would be dependent on a number of factors including the characteristics of the load supplied by that particular transmission line, and the characteristics of any electricity production that is interconnected through that transmission line. At locations where Newfoundland Power purchases power from Hydro, the average annual demand varies between approximately 40% and 60% of the annual peak demand.

<sup>1</sup> Distribution power transformers connect transmission voltage levels (138, 66, 33 kV) to distribution voltage levels (25, 12.5, 4.16 kV). System power transformers connect one transmission voltage level to another. The response to this Request for Information does not include generation power transformers which are used to connect generation level voltages to transmission or distribution level voltages. Generation power transformers are sized to match the generators output.

<sup>2</sup> This includes capacity upgrades at the Hardwoods, Bay Roberts, and Marble Mountain Substations.

**Listing of Distribution Power Substation Transformers**

Distribution Power Transformer Listing St. John's Region						
Substation	Transformer	Primary Voltage (kV)	Secondary Voltage (kV)	Transformer Rating (MVA)	Forecast 2013/14 Peak Load (MVA)	% Rating
Broad Cove (BCV)	BCV-T1	66	12.5	25	25.10 <sup>1</sup>	100%
Big Pond (BIG)	BIG-T1	66	12.5	11.1	9.08	82%
Cape Broyle (CAB)	CAB-T2	66	12.5	5	4.25	85%
Chamberlains (CHA)	CHA-T1	66	25.0	25	24.22	97%
Chamberlains (CHA)	CHA-T2	66	25.0	25	23.51	94%
Fermuse (FER)	FER-T1	69	13.8	4	2.47	62%
Glendale (GDL)	GDL-T1	66	12.5	25	16.98	68%
Glendale (GDL)	GDL-T2	66	12.5	25	17.10	68%
Glendale (GDL)	GDL-T3	66	12.5	25	17.35	69%
Goulds (GOU)	GOU-T2	66	12.5	20	16.58	83%
Goulds (GOU)	GOU-T3	66	12.5	13.33	11.50	86%
Hardwoods (HWD)	HWD-T1	66	12.5	20	18.93	95%
Hardwoods (HWD)	HWD-T2	66	12.5	20	18.84	94%
Hardwoods (HWD)	HWD-T3	66	25.0	50	48.52	97%
King's Bridge (KBR)	KBR-T1	66	4.16	10	5.24	52%
King's Bridge (KBR)	KBR-T2	66	4.16	10	5.21	52%
King's Bridge (KBR)	KBR-T3	66	12.5	25	24.58	98%
Keligrews (KEL)	KEL-T1	66	12.5	25	21.38	86%
Kenmount (KEN)	KEN-T1	66	25.0	25	26.35 <sup>2</sup>	105%
Kenmount (KEN)	KEN-T2	66	25.0	25	26.55 <sup>2</sup>	106%
Mobile (MOB)	MOB-T2	66	12.5	16.67	10.99	66%
Molloy's Lane (MOL)	MOL-T1	66	12.5	25	23.72	95%
Molloy's Lane (MOL)	MOL-T2	66	12.5	25	22.41	90%
Memorial (MUN)	MUN-T1	66	12.5	14.83	7.57	51%
Memorial (MUN)	MUN-T2	66	12.5	20	12.09	60%
Oxen Pond (OXF)	OXF-T1	66	12.5	13.33	10.58	79%

<sup>1</sup> To address the overload, an additional 25 MVA transformer is currently planned to be installed at Broad Cove Substation in 2017 to address overload. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute ("ANSI") standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers..

<sup>2</sup> To address the overload, the existing 25 MVA KEN-T2 transformer is proposed to be replaced with a new 50 MVA transformer during 2015. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute ("ANSI") standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.

Distribution Power Transformer Listing St. John's Region (Cont'd)						
Substation	Transformer	Primary Voltage (kV)	Secondary Voltage (kV)	Transformer Rating (MVA)	Forecast 2013/14 Peak Load (MVA)	% Rating
Pepperrell (PEP)	PEP-T1	66	12.5	25	23.60	94%
Petty Harbour (PHR)	PHR-T3	66	4.6	3.0	2.41	80%
Pulpit Rock (PUL)	PUL-T1	66	12.5	25	16.46	66%
Pulpit Rock (PUL)	PUL-T2	66	12.5	25	16.36	65%
Ridge Road (RRD)	RRD-T2	66	12.5	20	17.79	89%
Ridge Road (RRD)	RRD-T3	66	12.5	20	19.69	98%
Seal Cove (SCV)	SCV-T2	66	12.5	11.2	10.53	94%
St. John's Main (SJM)	SJM-T1	66	12.5	25	22.47	90%
St. John's Main (SJM)	SJM-T2	66	12.5	25	24.73	99%
St. John's Main (SJM)	SJM-T4	66	4.16	7.5	2.45	33%
Stamp's Lane (SLA)	SLA-T1	66	4.16	13.33	8.86	66%
Stamp's Lane (SLA)	SLA-T2	66	4.16	10.4	0.00	0%
Stamp's Lane (SLA)	SLA-T3	66	12.5	25	25.49 <sup>3</sup>	102%
Stamp's Lane (SLA)	SLA-T4	66	12.5	25	24.20	97%
Virginia Waters (VIR)	VIR-T1	66	12.5	25	25.58 <sup>4</sup>	102%
Virginia Waters (VIR)	VIR-T2	66	12.5	25	23.44	94%
Virginia Waters (VIR)	VIR-T3	66	12.5	25	20.85	83%

<sup>3</sup> To address the overload, a load transfer to King's Bridge Substation is planned for 2016. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute ("ANSI") standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.

<sup>4</sup> To address the overload, a new transformer is planned to be installed at Virginia Waters Substation in 2016. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute ("ANSI") standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.

Distribution Power Transformer Listing Eastern Region						
Substation	Transformer	Primary Voltage (kV)	Secondary Voltage (kV)	Transformer Rating (MVA)	Forecast 2013/14 Peak Load (MVA)	% Rating
Blaketown (BLK)	BLK-T2	138	25.0	20	11.30	57%
Bay Roberts (BRB)	BRB-T1	138	12.5	20	9.89	49%
Bay Roberts (BRB)	BRB-T4	138	12.5	25	12.36	49%
Carbonear (CAR)	CAR-T1	66	12.5	25	19.80	79%
Clarke's Pond (CLK)	CLK-T1	66	12.5	10	7.40	74%
Clarke's Pond (CLK)	CLK-T2	66	12.5	10	3.40	34%
Colliers (COL)	COL-T1	138	12.5	16.67	5.70	34%
Dunville (DUN)	DUN-T1	66	25.0	8.3	8.20	99%
Heart's Content (HCT)	HCT-T3	66	12.5	2.24	1.92	86%
Harbour Grace (HGR)	HGR-T1	66	12.5	10	6.31	63%
Harbour Grace (HGR)	HGR-T2	66	12.5	6.7	3.87	58%
Holyrood (HOL)	HOL-T1	138	12.5	20	13.10	66%
Upper Island Cove (ILC)	ILC-T1	66	12.5	13.33	11.10	83%
Islington (ISL)	ISL-T1	69	13.8	4.0	3.55	89%
New Chelsea (NCH)	NCH-T1	66	12.5	6.67	3.05	46%
New Harbour (NHR)	NHR-T1	66	12.5	13.33	6.55	49%
Old Perlican (OPL)	OPL-T1	66	12.5	14.96	9.45	63%
Placentia Junction (PJN)	PJN-T1	66	7.2	0.333	0.30	90%
Quartz (QTZ)	QTZ-T1	66	4.16	0.725	0.10	14%
Riverhead (RVH)	RVH-T1	66	12.5	6.670	3.30	49%
St. Catherines (SCT)	SCT-T1	66	25.0	5.0	3.05	61%
St. Catherines (SCT)	SCT-T2	25	12.5	4.0	1.55	39%
Springfield (SPF)	SPF-T1	138	12.5	20	14.65	73%
Trepassey (TRP)	TRP-T1	66	12.5	6.67	2.90	43%
Victoria (VIC)	VIC-T1	66	12.5	13.33	8.55	64%
Western Avalon (WAV)	WAV-T6	66	12.5	13.30	13.10	98%
Bay L'Argent (BLA)	BLA-T1	138	25.0	6.67	5.05	76%
Garnish (GAR)	GAR-T1	66	12.5	3.72	2.25	60%
Grand Beach (GBE)	GBE-T1	66	7.2	0.333	0.30	90%
Greenhill (GRH)	GRH-T2	69	12.5	20	15.10	76%

<b>Distribution Power Transformer Listing Eastern Region (Cont'd)</b>						
<b>Substation</b>	<b>Transformer</b>	<b>Primary Voltage (kV)</b>	<b>Secondary Voltage (kV)</b>	<b>Transformer Rating (MVA)</b>	<b>Forecast 2013/14 Peak Load (MVA)</b>	<b>% Rating</b>
Laurentian (LAU)	LAU-T1	66	12.5	10	5.45	55%
Linton Lake (LLK)	LLK-T1	138	12.5	20	6.80	34%
Marystown (MSY)	MSY-T1	138	12.5	20	18.50	93%
Salt Pond (SPO)	SPO-T1	66	12.5	15	10.70	71%
Webbers Cove (WBC)	WBC-T1	66	25.0	8.33	4.05	49%
Bonavista (BVA)	BVA-T1	138	12.5	25	15.68	63%
Catalina (CAT)	CAT-T2	138	12.5	20	4.55	23%
Clarenville (CLV)	CLV-T2	138	12.5	20	21.44 <sup>5</sup>	107%
Lethbridge (LET)	LET-T1	66	25.0	6.7	7.74 <sup>6</sup>	116%
Lockston (LOK)	LOK-T3	66	12.5	4.0	3.30	83%
Milton (MIL)	MIL-T1	66	25.0	16.67	9.60	58%
Northwest Brook (NWB)	NWB-T1	138	25.0	11.2	8.20	73%
Port Blandford (PBD)	PBD-T1	138	25.0	16.67	3.10	19%
Summerville (SMV)	SMV-T1	66	25.0	4.0	3.55	89%
Sunnyside (SUN)	SUN-T5	138	25.0	25	20.05	80%

<sup>5</sup> To address the overload, a 25 MVA transformer is proposed to be added at Clarenville Substation in 2015. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute (“ANSI”) standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.

<sup>6</sup> To address the overload, a 6.7 MVA transformer at Lethbridge will be replaced by a 16.67 MVA transformer in 2016. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute (“ANSI”) standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.

Distribution Power Transformer Listing Western Region						
Substation	Transformer	Primary Voltage (kV)	Secondary Voltage (kV)	Transformer Rating (MVA)	Forecast 2013/14 Peak Load (MVA)	% Rating
Cobb's Pond (COB)	COB-T1	138	12.5	20	11.14	56%
Cobb's Pond (COB)	COB-T3	138	12.5	25	12.36	49%
Gambo (GAM)	GAM-T1	138	25.0	6.67	5.10	76%
Gander (GAN)	GAN-T1	138	12.5	20	18.78	94%
Gander Bay (GBY)	GBY-T1	66	25.0	13.3	10.02	75%
Glenwood (GLN)	GLN-T1	138	25.0	8.34	4.01	48%
Glovertown (GLV)	GLV-T1	138	25.0	20	10.52	53%
Greenspond (GPD)	GPD-T1	66	12.5	2.8	1.20	43%
Hare Bay (HBS)	HBS-T1	66	25.0	5.0	3.41	68%
Jonathan's Pond (JON)	JON-T1	66	7.2	0.333	0.02	6%
Summerford (SUM)	SUM-T1	66	25.0	10	7.51	75%
Terra Nova (TNS)	TNS-T1	138	14.4	1.0	0.75	75%
Trinity (TRN)	TRN-T1	66	25.0	5.0	3.26	65%
Twillingate (TWG)	TWG-T1	66	12.5	13.3	9.52	72%
Wesleyville (WES)	WES-T1	66	12.5	13.3	9.12	69%
Bishop's Falls (BFS)	BFS-T1	138	25.0	20	8.65	43%
Botwood (BOT)	BOT-T1	138	25.0	20	13.60	68%
Baie Verte Junction (BVJ)	BVJ-T1	138	25.0	2.67	0.20	7%
Grand Falls (GFS)	GFS-T2	138	25.0	20	20.77 <sup>7</sup>	104%
Grand Falls (GFS)	GFS-T3	138	25.0	20	21.53 <sup>7</sup>	108%
Grand Falls (GFS)	GFS-T5	66	4.16	8.4	7.56	90%
Lewisporte (LEW)	LEW-T1	66	25.0	25	18.20	73%
Rattling Brook (RBK)	RBK-T2	66	12.5	5.0	2.85	57%
Springdale (SPR)	SPR-T1	138	25.0	16.67	10.53	63%
Bayview (BVS)	BVS-T1	66	12.5	20	15.30	77%
Bayview (BVS)	BVS-T2	66	12.5	15	8.35	56%
Deer Lake (DLK)	DLK-T1	66	12.5	25	18.95	76%

<sup>7</sup> To address the overload, a 50 MVA transformer is proposed to replace a 25 MVA transformer at Grand Falls Substation in 2016. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute ("ANSI") standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.

<b>Distribution Power Transformer Listing Western Region (Cont'd)</b>						
<b>Substation</b>	<b>Transformer</b>	<b>Primary Voltage (kV)</b>	<b>Secondary Voltage (kV)</b>	<b>Transformer Rating (MVA)</b>	<b>Forecast 2013/14 Peak Load (MVA)</b>	<b>% Rating</b>
Frenchman's Cove (FRN)	FRN-T1	66	12.5	6.67	6.34	95%
Gillams (GIL)	GIL-T1	66	12.5	6.67	4.55	68%
Howley (HOW)	HOW-T3	25	4.16	1.0	0.20	20%
Humber (HUM)	HUM-T2	66	4.16	7.46	6.87	92%
Humber (HUM)	HUM-T3	66	12.5	13.33	12.94	97%
Marble Mountain (MMT)	MMT-T1	66	12.5	6.7	5.80	87%
Pasadena (PAS)	PAS-T1	66	12.5	13.3	12.30	92%
Seal Cove Road (SCR)	SCR-T1	138	25.0	8.33	5.75	69%
Walbournes (WAL)	WAL-T1	66	12.5	20	18.00	90%
Walbournes (WAL)	WAL-T2	66	12.5	25	18.75	75%
Abraham's Cove (ABC)	ABC-T1	66	12.5	13.33	5.95	45%
Berry Head (BHD)	BHD-T1	66	12.5	7.46	3.70	50%
Doyles (DOY)	DOY-T2	66	25.0	4.0	4.41 <sup>8</sup>	110%
Gallant Street (GAL)	GAL-T1	66	12.5	13.33	9.97	75%
Gallant Street (GAL)	GAL-T2	66	12.5	13.33	9.68	73%
Grand Bay (GBS)	GBS-T1	66	12.5	14.93	13.20	88%
Harmon (HAR)	HAR-T1	66	12.5	14.9	13.75	92%
Long Lake (LGL)	LGL-T1	66	25.0	14.9	6.35	43%
Port Aux Basques (PAB)	PAB-T5	66	12.5	13.33	8.28	62%
Robinsons (ROB)	ROB-T1	66	25.0	6.67	3.84	58%
St. Georges (STG)	STG-T1	66	12.5	6.67	3.50	52%
Stephenville Crossing (STX)	STX-T1	66	12.5	6.67	5.09	76%

<sup>8</sup> To address the overload, it is proposed that a 6.7 MVA transformer replace the 4.0 MVA transformer at Doyles Substation in 2015. Until this project is completed, additional capacity beyond the transformer name plate rating will be used based on the American National Standards Institute ("ANSI") standard C57.92, Guide for Loading Oil-immersed Distribution and Power Transformers.



**Listing of System Power Substation Transformers**

System Power Transformer Listing						
Substation	Transformer	Primary Voltage (kV)	Secondary Voltage (kV)	Transformer Rating (MVA)	Forecast 2013/14 Peak Load (MVA)	% of Rating
Goulds (GOU)	GOU-T1	66	33	10	5.38	54
Blaketown (BLK)	BLK-T3	138	66	41.6	27.98	67
Bay Robert's (BRB)	BRB-T2	138	66	41.6	23.35	56
Bay Robert's (BRB)	BRB-T3	138	66	41.6	22.89	55
Salt Pond (SPO) <sup>1</sup>	SPO-T4	138	66	41.6	0.00	0
Salt Pond (SPO)	SPO-T5	138	66	41.6	37.85	91
Catalina (CAT)	CAT-T1	138	66	16.7	6.85	41
Clarendville (CLV)	CLV-T1	138	66	25	17.34	68
Cobb's Pond (COB)	COB-T2	138	66	41.6	23.28	56
Gambo (GAM)	GAM-T2	138	66	41.6	16.98	41
Gander (GAN)	GAN-T2	138	66	26.67	11.14	42
Grand Falls (GFS)	GFS-T1	138	66	29.7	28.61	96

<sup>1</sup> The SPO-T4 transformer has a winding configuration referred to as an auto transformer with a delta tertiary winding. It is available to backup to SPO-T5 and other system power transformers. Its tertiary winding is currently being used to supply station service to the Salt Pond Substation.