

1 **Reference: 2.1 2024 Substation Refurbishment and Modernization**

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3 **Q. Page 4. It is stated that power transformer failures can lead to extended**
4 **outages for a large number of customers. Please list the number of substation**
5 **power transformer failures experienced by Newfoundland Power in the last**
6 **ten years, the duration of outage as a result of each failure and the number of**
7 **customers affected by each outage due to a failure of a power transformer.**

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9 A. Table 1 shows power transformer failures experienced by Newfoundland Power in the
10 last ten years including outage duration and number of customers affected.

Table 1 2013-2023 Substation Power Transformer Failures		
Transformer	Outage Duration ¹ (hours)	Number of Customers
MUN-T2	0	0
BLK-T2	0	0
DUN-T1	8.4	3,402
SLA-T3	0	0
SLA-T4	1.3	9,207
TRN-T1 ²	26	3,503
GBS-T1	0	0
HUM-T2	0	0
HUM-T3	0	0
PIT-T1	0	0
BVA-T1	23.9	2,566
PUL-T2	0	0
RVH-T1	0	0
PUL-T1	2	4,845
TRP-T1	3.8	618
VIR-T2	0	0
ROP-T1	0	0

¹ Factors that could contribute to customers not experiencing outages following the failure of a transformer include the configuration of the substation (i.e. two transformers may operate in parallel), the ability to offload customers to adjacent substations, and the availability of portable substations. In the cases of power transformers PIT-T1 and ROP-T1, these are dedicated plant transformers and do not directly serve customers.

² The failure involved the H2 bushing that was replaced on site during the outage without offloading the substation or installing a portable substation.

1 The length of time required to restore service to customers following the failure of a
2 power transformer varies depending on whether it is possible to transfer load to another
3 transformer in the substation or an adjacent substation, as well as the availability and
4 proximity of a portable substation.
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6 Examining whether it is possible to transfer load is the first step in Newfoundland
7 Power's emergency response following a transformer failure. A load transfer can
8 typically restore service to customers within a few hours. The ability to transfer load
9 depends on whether there is transformer capacity available at the substation or an
10 adjacent substation, and the presence of sufficient distribution tie points. In the
11 Newfoundland Power system, this option is generally limited to highly networked urban
12 areas, such as St. John's, during non-peak periods.³
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14 In some circumstances, a developing transformer failure can be identified early through
15 monitoring and protection systems or maintenance practices. In these instances,
16 proactively removing a power transformer from service eliminates a prolonged outage to
17 customers. Removing a power transformer from service would require the availability of
18 sufficient distribution tie points for load transfers, an available portable substation or
19 compatible spare transformer.

³ During periods of high customer demand during the winter, there is limited ability to transfer load between power transformers within the Company's urban areas. Additionally, substations supplied by radial transmission and distribution systems are not capable of transferring load to other substations as they have a single connection point to the electrical system.