

**Q. Reference: Newfoundland Power's 2027 Capital Budget Application,  
2.1 Substation Strategic Plan**

- a) Provide the substations that have received more than one Refurbishment and Modernization project since the 2007 Substation Strategic Plan. Include the project years and the reasons for multiple refurbishments.**
- b) Prior to the work proposed for 2027, provide the date of the most recent refurbishment work for both Rattling Brook and Blaketown Substations.**
- c) Explain how Newfoundland Power determines what work should be completed in a single comprehensive refurbishment project versus being deferred to later capital projects.**

**A. BACKGROUND**

Newfoundland Power filed the *Substation Strategic Plan* (the "Strategic Plan") as a part of its *2007 Capital Budget Application*. Prior to the Strategic Plan, the approach to substation capital work was largely program-based and focused on addressing specific equipment and infrastructure issues across multiple substations. Rather than evaluating the condition of individual substations as a whole, capital investments were generally directed toward common asset classes with widespread deficiencies. For example, the Company undertook the replacement of silicon carbide lightning arrestors throughout its substation system due to their elevated failure rates. While these programs improved the reliability of specific asset classes, they did not comprehensively address the overall condition and deficiencies of individual substations.

The Strategic Plan re-evaluated the Company's approach to substation capital planning in response to the aging condition of its substation assets, including a significant number of substations that had been in service for more than 40 years. The revised approach focused on assessing the condition of individual substations and coordinating major equipment maintenance with capital investments on a substation-by-substation basis. This approach was intended to improve operational efficiencies, maximize the effectiveness of capital expenditures, and minimize customer impacts resulting from planned outages and maintenance activities.

**RESPONSE**

- a) Table 1 below outlines substations that have received more than one refurbishment and modernization project since the Strategic Plan was filed. The projects completed involved separate scopes of work. Between 2007 and 2011, the Company continued to undertake a number of smaller, targeted projects while transitioning to the refurbishment and modernization approach established under the Strategic Plan, including seven projects with budgets of less than \$50,000 in 2007. Beginning in 2012, the Company fully implemented the refurbishment and modernization approach, resulting in a reduced number of

projects as capital investments became focused on comprehensive, substation-specific refurbishment and modernization work.

| Table 1<br>Substations with Multiple R&M Projects by Year<br>(2007-2025) |                        |                        |
|--------------------------------------------------------------------------|------------------------|------------------------|
| Substation                                                               | Number of R&M Projects | Years                  |
| BOT                                                                      | 2                      | 2008, 2010             |
| CAR                                                                      | 2                      | 2007, 2014             |
| CLK                                                                      | 2                      | 2007, 2010             |
| CLV                                                                      | 4                      | 2007, 2008, 2009, 2015 |
| GAL                                                                      | 2                      | 2007, 2010             |
| GAN                                                                      | 3                      | 2008, 2009, 2015       |
| GFS                                                                      | 2                      | 2009, 2010             |
| GLV                                                                      | 3                      | 2007, 2010, 2022       |
| HCT                                                                      | 2                      | 2011, 2012             |
| KBR                                                                      | 3                      | 2008, 2009, 2016       |
| KEL                                                                      | 2                      | 2008, 2009             |
| LEW                                                                      | 2                      | 2008, 2019             |
| NGF                                                                      | 3                      | 2011, 2012, 2016       |
| OSP                                                                      | 2                      | 2008, 2009             |
| RRD                                                                      | 2                      | 2007, 2015             |
| SLA                                                                      | 2                      | 2007, 2011             |
| SPF                                                                      | 2                      | 2010, 2015             |

The scopes of work completed at each of these substations are described below.

BOT Substation – In 2008, capital work at Botwood Substation was approved but delayed until 2010 due to a significant increase in unplanned work.<sup>1</sup> In 2010, capital work was completed to upgrade transformer protection and monitoring

<sup>1</sup> See the *2008 Capital Expenditure Report*, Appendix A, page 2. *Substation Refurbishment and Modernization* expenditures were lower than expected due to a need to re-assign resources to deal with the extraordinary requirement of in-service failures. This resulted in some projects approved in 2008 and 2009 being delayed and completed in subsequent years.

1 equipment, communication systems, install a control building, ground grid  
2 improvements, and further feeder automation capabilities.  
3 CAR Substation – In 2007, capital work at Carbonear Substation included  
4 replacement of the transformer tap changer controller with a SCADA-operated  
5 controller. In 2014, capital work was completed including replacement of  
6 breakers, foundation and drainage improvements, protection and control  
7 upgrades, feeder automation, communications equipment, and grounding system  
8 enhancements.<sup>2</sup>  
9

10 CLK Substation – In 2007, capital work at Clarkes Pond Substation was approved  
11 but delayed until 2010 due to a significant increase in unplanned work.<sup>3</sup> In 2010,  
12 capital work was completed to replace the transformer tap changer controllers,  
13 install communications equipment for remote monitoring and feeder automation,  
14 and undertake additional foundation and varmint protection upgrades.  
15

16 CLV Substation – In 2007, capital work at Clarendville Substation included  
17 replacement of transformer tap changer controllers with SCADA-operated  
18 controllers. In 2008 and 2009, capital work was approved but delayed due to a  
19 significant increase in unplanned work.<sup>4</sup> Capital work completed in 2015 included  
20 replacing switches, construction of a new control building, and modernization of  
21 protection and control equipment.<sup>5</sup>  
22

23 GAL Substation – In 2007, capital work at Gallants Substation included  
24 replacement of the transformer tap changer controller with a SCADA-operated  
25 controller. In 2010, capital work was completed to replace transmission line  
26 protection equipment, install new transformer protection and monitoring  
27 systems, upgrade communications equipment, refurbish fencing, and extend the  
28 grounding system.  
29

30 GAN Substation – In 2008 and 2009 capital work was approved but delayed due  
31 to a significant increase in unplanned work.<sup>6</sup> In 2015, capital work was  
32 completed to replace aging structures and switches, transformer refurbishments,

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<sup>2</sup> In 2015, *Substation Feeder Automation* projects were added to *Substation Refurbishment and Modernization* projects. Feeder automation projects allowed remote control of substation feeder breakers and permitted feeders to be added to the provincial under-frequency load shedding scheme.

<sup>3</sup> See the *2008 Capital Expenditure Report*, Appendix A, page 2. *Substation Refurbishment and Modernization* expenditures were lower than expected due to a need to re-assign resources to deal with the extraordinary requirement of in-service failures. This resulted in some projects approved in 2008 and 2009 being delayed and completed in subsequent years.

<sup>4</sup> *Ibid.*

<sup>5</sup> In the approved 2015 *Additions Due to Load Growth* project, a new 25 MVA power transformer and associated infrastructure was added to Clarendville Substation. These projects were combined to minimize interruptions to customers and take advantage of operating efficiencies to complete multiple identified scopes of work during a single timeframe.

<sup>6</sup> See the *2008 Capital Expenditure Report*, Appendix A, page 2. *Substation Refurbishment and Modernization* expenditures were lower than expected due to a need to re-assign resources to deal with the extraordinary requirement of in-service failures. This resulted in some projects approved in 2008 and 2009 being delayed and completed in subsequent years.

1 replacement of the grounding transformer, construction of a new control  
2 building, protection and control modernization, and communications upgrades.  
3 GFS Substation<sup>7</sup> – In 2009 and 2010, capital work at Grand Falls 4.16kV  
4 Substation included replacement of deteriorated wood pole structures and  
5 upgrades to the switchgear building configuration, installation of lightning  
6 arresters, replacement of relaying equipment, and feeder automation.

7  
8 GLV Substation – In 2007, capital work at Glovertown Substation included  
9 lightning arrester replacement, tap changer controller replacement, installation of  
10 varmint protection, and feeder automation. In 2010 capital work was completed  
11 to install transformer protection. In 2022 capital work was completed to extend  
12 the yard and bus, add new 138 kV circuit breakers, spill containment facilities,  
13 and install digital protection and control systems.

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15 HCT Substation – In 2011 and 2012, capital work at Heart's Content Substation  
16 included replacement of deteriorated foundations, potential transformers, power  
17 cables, lightning arresters, protection relays, fencing, and drainage  
18 improvements.

19  
20 KBR Substation – In 2008 and 2009, capital work at King's Bridge Substation  
21 included replacement of the switchgear building, construction of a control  
22 building, cable replacements, protection upgrades, and feeder automation  
23 refurbishments. In 2016, capital work was completed to replace switches, and  
24 complete protection and automation upgrades.<sup>8</sup>

25  
26 KEL Substation – In 2008 and 2009, capital work at Kelligrews Substation  
27 included replacement of a potential transformer, refurbishment of the control  
28 building roof, and replacement of lightning arresters and transformer power  
29 cables.

30  
31 LEW Substation – In 2008, capital work at Lewisporte Substation included  
32 replacement of lightning arresters. In 2019, capital work was completed to  
33 replace the power transformer, upgrade the substation from 66 kV to 138 kV,  
34 install new bus structures and switching equipment, modernize protection and

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<sup>7</sup> The Grand Falls Substation refers to two physically separate substation yards. On the north side of the Trans-Canada Highway ("TCH") within the town of Grand Falls – Windsor, there is a substation yard that contains 138 kV, 66 kV and 25 kV infrastructure, which is known as the "Grand Falls 25 kV Substation" ("NGF"). On the south side of the TCH, located directly across the road from the first substation yard and connected via a very short 66 kV transmission line, there is another substation yard that contains 66 kV and 4.16 kV infrastructure, which is known as the "Grand Falls 4.16 kV Substation" ("GFS").

<sup>8</sup> In an approved 2016 *Additions Due to Load Growth* project, a new 25 MVA power transformer and associated infrastructure was added to King's Bridge Substation. These projects were combined to minimize interruptions to customers and take advantage of operating efficiencies to complete multiple identified scopes of work during a single timeframe.

control systems, construct a control building, upgrade communications and SCADA capabilities, and extend the substation grounding system.<sup>9</sup>

NGF Substation – In 2011 and 2012, capital work at New Grand Falls Substation included replacement of lightning arresters, transformer cables, air-break switches, potential transformers, and transmission line protection relays, together with grounding system upgrades. In 2016, the completed capital work included switch and relay replacements.<sup>10</sup>

OXF Substation – In 2008 and 2009, capital work at Oxen Pond Substation included foundation replacements, lightning arrester replacement, feeder protection upgrades, and feeder automation.

RRD Substation – In 2007, capital work at Ridge Road Substation included refurbishment of a structure foundation. In 2015, capital work was completed to install a low-voltage bus tie breaker, modernize protection and control systems, feeder automation, upgrade communications equipment, and enhance the station grounding system.

SLA Substation – In 2007, capital work at Stamp's Lane Substation included refurbishment of deteriorated concrete foundations and replacement of deteriorated transformer power cables. In 2011, capital work was completed to replace transmission line relays and deteriorated transformer radiators.

SPF Substation – In 2010, capital work at Springfield Substation included replacement of transformer radiators and transformer power cables. In 2015, capital work was completed to refurbish and modernize the power transformer protection, upgrade transmission line and bus protection systems, install communications and SCADA equipment, construct a control building, install a circuit breaker, and extend the substation grounding system.

b) The most recent refurbishment of Rattling Brook Substation was in 2021.<sup>11</sup> The most recent refurbishment of Blaketown Substation was in 2007.

c) Substation inspection results are incorporated into Newfoundland Power's annual update of its *Substation Refurbishment and Modernization Plan*. Data collected through inspections, equipment testing, oil analyses, and regular operations are

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<sup>9</sup> As per the Central Newfoundland System Planning Study, Lewisporte Substation was converted from 66 kV to 138 kV in 2019 under the approved *Substation Refurbishment and Modernization* project.

<sup>10</sup> In an approved 2016 *Additions Due to Load Growth* project, a new 50 MVA power transformer and associated infrastructure was added to Grand Falls 25 kV Substation. These projects were combined to minimize interruptions to customers and take advantage of operating efficiencies to complete multiple identified scopes of work during a single timeframe.

<sup>11</sup> The 2021 *Rattling Brook Refurbishment and Modernization* project was focused on the addition of new 138 kV infrastructure. The proposed 2027 *Rattling Brook Refurbishment and Modernization* project is focused on the 66 kV wood pole bus infrastructure that was not replaced during the 2021 project.

1           used to assess asset conditions and identify specific equipment requiring  
2           replacement or refurbishment within each substation.

3  
4           In developing the scope of an individual substation refurbishment project, the  
5           Company considers the condition and remaining service life of the assets within  
6           the substation, as well as the operational benefits of coordinating replacement  
7           activities during a single planned project. Assets exhibiting deteriorated  
8           condition, adverse inspection or testing results, and are expected to require  
9           replacement within the five-year capital planning cycle are generally included in  
10          the project scope. Assets that remain in satisfactory condition and are not  
11          expected to require replacement in the near term may be deferred to future  
12          capital projects, provided they do not require relocation or removal during  
13          execution of the proposed project scope.