
Nova Scotia Utility and Review Board

IN THE MATTER OF *The Public Utilities Act*, R.S.N.S. 1989, c.380, as amended

M11017

The Path to 2030

NS Power

December 22, 2023

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1 **1.0 EXECUTIVE SUMMARY**

2 The Nova Scotia Utility and Review Board (NSUARB, Board) provided the following direction
3 to Nova Scotia Power Incorporated (NS Power, Company) in its 2023 Annual Capital Expenditure
4 (ACE) Plan Order (M11017) of September 12, 2023: “File a detailed and specific plan outlining
5 how the Company will achieve the 2030 obligations, what specific steps are required to meet these
6 obligations, how the proposed steps will accomplish that goal, and when these steps will be taken.”
7 This Path to 2030 report is submitted to the NSUARB in compliance with the Board’s directive.

8 The Government of Nova Scotia’s 2030 Clean Power Plan, released in October 2023, provides a
9 comprehensive path forward for the province, and in particular NS Power, in meeting its 2030
10 Decarbonization Goals of achieving 80 percent electricity sales from renewable resources and the
11 phase-out of coal generation by 2030. The 2030 Clean Power Plan aligns with NS Power’s
12 Evergreen IRP Action Plan & Roadmap Update (M11307) completed in partnership with
13 stakeholders earlier in 2023. The high degree of alignment between the 2030 Clean Power Plan
14 and the updated IRP Action Plan and Roadmap is positive, indicating there is clarity on the actions
15 required to achieve the goals. Collectively, the 2030 Clean Power Plan and NS Power’s IRP
16 Action Plan and Roadmap outline various investments and actions required in meeting the 2030
17 Decarbonization Goals.

18 Achieving this significant transition will require the coordination and cooperation of a broad group
19 of partners and stakeholders, including the Government of Nova Scotia, Independent Power
20 Producers (IPPs), EfficiencyOne (E1), Mi’kmaw Partners, and NS Power. These parties will have
21 various accountabilities in the investments that will add and integrate both renewable and
22 dispatchable resources to the grid. The new resources identified in the 2030 Clean Power Plan are
23 summarized in **Figure 1** below.

24

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1 **Figure 1 – 2030 Clean Power Plan Resources**

	Nameplate Capacity (MW)	Anticipated COD (Year)
Wind & Solar Resources		
Rate Base Procurement	373	2025
Green Choice Program	350	2028
Port Hawkesbury Paper Wind	168	2025
Renewable to Retail Wind	150	2024
Community Solar	50	2025-2029
Commercial Net Metering	50	2024-2029
Energy Storage Resources		
NS Power BESS Project	150	2025-2026
Provincial Section 4D Projects	150	2026
Provincial Section 4B Projects	100	2027-2028
Fast Acting Generation Resources		
Stage 1	300	2027
Stage 2	300	2029-2030
Fuel Conversions at Existing Units		
Gas Conversion – Point Tupper 2	150	2028
HFO Operation – Lingan 1/3/4	459	2029
Total New Wind & Solar		
	1,141	
Total New Energy Storage		
	400	
Total New Fast Acting Generation		
	600	
Total Fuel Conversions		
	609	
Load Management Initiatives		
	150	2025-2029
Total Coal Phase Out		
	1,229	

2

3 These investments form a comprehensive strategy that allows for flexibility to accommodate future

4 uncertainties. Through the ongoing Evergreen IRP Action Plan & Roadmap items, NS Power is

5 closely monitoring factors which may influence the path to 2030, including load management

6 initiatives, electrification, green hydrogen development, and offshore wind development. Ongoing

7 changes to project timing through the execution stages will also be reflected as appropriate. In

8 addition, the Company is considering the impact of the Federal government’s recently proposed

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1 Clean Electricity Regulations (CER), and the impact they may have on longer-term electricity
2 system planning and investments.

3 The transition described in the 2030 Clean Power Plan will require significant investments, from
4 multiple parties, over a relatively short timeframe. NS Power is committed to continuing to work
5 with the provincial and federal governments, rights-holders, stakeholders and partners to ensure
6 an equitable transition that best manages costs for customers and provides safe and reliable
7 electricity.

8 To aid in ensuring the 2030 Clean Power Plan is achieved, NS Power will participate in a Nova
9 Scotia Department of Natural Resources & Renewables (NRR) / NS Power Working Group. The
10 group will focus on the 2030 Clean Energy Targets and establish and coordinate interdependencies
11 and activities across initiatives and projects. The Working Group will ensure close coordination
12 between provincial government staff and NS Power staff to support cost-effective, timely, and
13 successful program implementation. The Working Group will also identify enabling conditions for
14 the plan projects. NS Power will continue to monitor and address risks which may affect the timely
15 completion of the 2030 Clean Power Plan requirements.

16

1 **2.0 INTRODUCTION**

2 In its 2023 Annual Capital Expenditure (ACE) Plan Order (M11017) on September 12, 2023, the
3 Nova Scotia Utility and Review Board (NSUARB, Board) directed Nova Scotia Power Inc. (NS
4 Power, Company) to:

5

6 1) File a detailed and specific plan outlining how the Company will achieve the
7 2030 obligations, what specific steps are required to meet these obligations, how
8 the proposed steps will accomplish that goal, and when these steps will be taken.

9 2) Use its best efforts to file such a plan with the 2024 ACE Plan. Keeping in mind
10 the usual November filing of the ACE Plan. If this is not possible, the Board directs
11 that a detailed plan be filed by December 31, 2023.

12

13 In compliance with the Board’s direction, NS Power provides herein its plan to achieve the 2030
14 obligations. This document includes information regarding the following:

15

- 16 • The 2030 Decarbonization Goals
- 17 • The Province of Nova Scotia’s 2030 Clean Power Plan
- 18 • Resource Development Plan elements necessary to achieve the 2030 Clean Power Plan
- 19 • NS Power Integrated Resource Plan (IRP) Action Plan and Roadmap Items supporting the
20 2030 Decarbonization Goals
- 21 • Project Accountabilities, Coordination, and Risk Management considerations

22

23 Details related to these topics will provide greater specificity with respect to how the Company
24 will meet its 2030 obligations, including more specific timelines for each element of its plan to do
25 so.

26

27 **2.1 2030 Decarbonization Goals**

28 NS Power’s 2030 decarbonization goals are mandated under several legislative and regulatory
29 frameworks. Although there are many environmental regulations that apply to NS Power’s
30 planning and operating environment, the key items relating to planning for and achieving the 2030
31 obligations are described below.

1 **2.1.1 80 Percent Renewable Electricity Sales**

2 The Province of Nova Scotia amended the Renewable Electricity Regulations¹ on July 9, 2021.
3 The amendment added a Renewable Electricity Standard for 2030 which provides that:

- 4
- 5 • Beginning in calendar year 2030, load-serving entities must supply customers with 80%
6 renewable electricity.
 - 7 • NS Power must acquire at least an additional 1,100 GWh from independent power
8 producers to meet this new requirement.
 - 9 • NS Power may incorporate contributions from renewable low-impact electricity acquired
10 from a source outside Nova Scotia.

11 This requirement was incorporated into the most recent Evergreen IRP and is considered in the
12 2030 Clean Power Plan.

13

14 **2.1.2 Coal Phase Out**

15 The Province of Nova Scotia introduced the *Environmental Goals and Climate Change Reduction*
16 *Act*² on October 27, 2021, and the legislation received Royal Assent on November 5, 2021. This
17 Act includes the following elements that influence Nova Scotia Power’s system planning
18 requirements:

- 19
- 20 • To have 80% of electricity sales in the Province supplied by renewable energy by 2030.
 - 21 • To phase out coal-fired electricity generation in the Province by the year 2030.
- 22

23 In addition to the provincial goal to phase out coal-fired electricity generation by 2030, the federal
24 Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations³
25 prescribe various regulations on coal generating units, including a requirement to stop generating

¹ N.S. Reg. 110/2021.

² S.N.S. 2021, c. 20.

³ [Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations \(justice.gc.ca\)](https://www.justice.gc.ca/sor/2012-167)
(SOR/2012-167).

1 with coal by the year 2030. The requirement to phase out coal by 2030 was incorporated into the
2 most recent Evergreen IRP and is considered in the Province of Nova Scotia’s 2030 Clean Power
3 Plan, described below.

4
5 **2.1.3 Proposed Clean Electricity Regulations**

6 In addition to the policies described above, NS Power is considering the proposed Clean Electricity
7 Regulations (CER)⁴ as part of its long-term planning. These regulations are anticipated to regulate
8 the electricity sector in Canada toward achieving net-zero emissions in 2035. Multiple drafts of
9 these regulations have been released by Environment and Climate Change Canada, and the most
10 recent comment period closed on November 2, 2023. NS Power incorporated an earlier (pre-
11 Canada Gazette 1) draft of the CER into its 2022-2023 Evergreen IRP modeling and accordingly
12 this draft was considered in the IRP Findings and Action Plan. Although the CER are anticipated
13 to come into effect in 2035, beyond the 2030 horizon of the resource plan described in this filing,
14 the CER will influence the lowest-cost long term electricity strategy for the Company. NS Power
15 will continue to monitor developments of the CER through 2024.

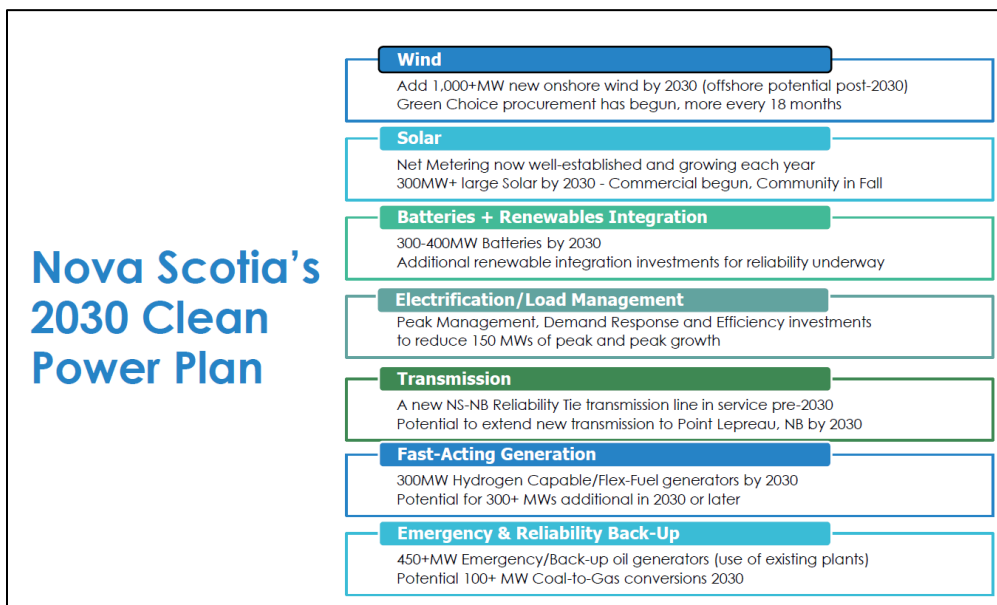
16

⁴ Canada Gazette, Part I, Volume 157, Number 33: Clean Electricity Regulations.

3.0 NOVA SCOTIA'S 2030 CLEAN POWER PLAN

On October 11, 2023, the Province of Nova Scotia released the 2030 Clean Power Plan.⁵ This release detailed the new resources that have been identified by the provincial government as being required to meet the 2030 Decarbonization Goals. A summary of the 2030 Clean Power Plan is shown in Figure 2 below.

Figure 2 – Nova Scotia's 2030 Clean Power Plan (October 2023)



As part of its Evergreen IRP process in August 2023, NS Power filed an updated IRP Action Plan and Roadmap with the Board. This update incorporated a significant modeling effort and stakeholder engagement process. NS Power is pleased to note the strong alignment between the 2030 Clean Power Plan and the Evergreen IRP Action Plan, building on a foundation of ongoing collaboration between NS Power and the Province. This alignment provides a basis on which to proceed with the required resource development activities identified in the 2030 Clean Power Plan. The specific approach to this development is detailed in the remainder of this document.

⁵ [nova-scotia-clean-power-plan-presentation-en.pdf \(novascotia.ca\)](#)

1 **4.0 RESOURCE DEVELOPMENT PLAN ELEMENTS**

2
3 **4.1 Wind and Solar Resources**

4 The 2030 Clean Power Plan incorporates a significant quantity of new variable renewable
5 generation which must be added to the grid by 2030. Similarly, most Evergreen IRP scenarios
6 incorporated approximately 1500 MW of new wind and 200 MW of new solar generation,
7 inclusive of projects already under development. This new renewable capacity will transform the
8 Nova Scotia grid and is the key component to achieving the 80 Percent Renewable Electricity
9 Standard in 2030.

10
11 The required renewable energy projects will be procured by the Province of Nova Scotia via
12 multiple streams, with NS Power supporting each of these as required. Updates on each
13 procurement stream are provided below, including next steps and timing for each project stream.

14
15 **4.1.1 Rate Base Procurement**

16 The Rate Base Procurement (RBP) program was initiated by the Province of Nova Scotia in 2021.
17 The goal of the RBP was to contract for 1100 GWh of low-impact renewable electricity per section
18 6B(2)(b) of the Renewable Electricity Regulations⁶ as part of meeting NS Power’s 2030
19 Decarbonization Goals.

20
21 The RBP involved a comprehensive renewable procurement managed by the Province of Nova
22 Scotia’s Procurement Administrator, Coho Climate Advisors (Coho). NS Power supported the
23 procurement process by:

- 24
25 • Completing over 35 Feasibility (FEAS) Studies under the Generator Interconnection
26 Procedures (GIP) in support of proponent bids.
27 • Providing feedback and participating in the NSUARB regulatory process to approve the
28 Power Purchase Agreement (PPA).
29 • Providing feedback on the draft Request for Proposals (RFP).

⁶ N.S. Reg. 155/2010 as amended to N.S. Reg. 338/2022.

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1 The RBP Portfolio was announced on August 17, 2022 and subsequently updated on July 12, 2023.
2 The RBP Portfolio includes 5 projects which will provide a total of 373 MW and 1,478 GWh of
3 new wind generation to the Nova Scotia system. The selected projects are⁷:

- 4
- 5 • Benjamins Mill Wind near Falmouth in Hants County, developed by Natural Forces
6 Development and Wskijnu'k Mtmo'taquow Agency Ltd, an organization which represents
7 the 13 Mi'kmaw Nations in the province.
- 8 • Higgins Mountain Wind Farm near Wentworth in Colchester and Cumberland counties,
9 developed by Elemental Energy and Sipekne'katik First Nation.
- 10 • WEB Weavers Mountain Wind near Marshy Hope in Pictou and Antigonish counties,
11 developed by SWEB Development and Glooscap First Nation.
- 12 • Wedgeport Wind Farm in Yarmouth County, developed by Elemental Energy and
13 Sipekne'katik First Nation.
- 14 • Clydesdale Ridge Wind Energy Project near Dalhousie Settlement in Pictou County
15 developed by Natural Forces Development, Dalhousie Mountain Wind Energy Inc. and
16 Wskijnu'k Mtmo'taquow Agency Ltd, an organization which represents the 13 Mi'kmaw
17 Nations in the province.
- 18

19 Consistent with requirements under the Electricity Act, NS Power shall procure all electricity
20 under a contract awarded by a procurement administrator. The RBP projects are progressing
21 toward in-service dates specified in their Power Purchase Agreements. Nova Scotia Power has
22 been supporting the RBP Portfolio projects in moving through the Generator Interconnection
23 Procedure. GIP status for the RBP projects is summarized in **Figure 3** below:

⁷ <https://novascotiarp.com/updates>

1 **Figure 3 – RBP Project GIP Status**

	SIS Part 1	SIS Part 2	Facilities Study
IR 673 Benjamins Mill	Complete	In Progress	Complete*
IR 669 Higgins Mountain	Complete	In Progress	Complete*
IR 668 Weavers Mountain	Complete	In Progress	Complete*
IR 677 Wedgeport	In Progress	Pending	Pending
IR 710 Clydesdale Ridge	Pending	Pending	Pending

2 *NS Power has completed the Facilities Study for these projects based on SIS Part 1 in order to provide timely
3 guidance and initial results to project proponents; updates to the Facilities Study may be required based on the findings
4 of SIS Part 2. Completion of SIS Part 2 requires that functional Electromagnetic Transient (EMT) models are provided
5 by the interconnection customers for each project.
6

7 NS Power is planning for the development of associated Network Upgrades and Transmission
8 Provider Interconnection Facilities for these projects. Several completed Facilities Studies have
9 noted that supply chain delays impacting long lead time high voltage components such as high
10 voltage breakers may delay project completion beyond the dates requested by interconnection
11 customers; NS Power is actively working with suppliers and proponents to identify options to
12 mitigate these delays, where possible, in a constrained global supply chain environment.
13

14 **4.1.2 Green Choice Program**

15 The Green Choice Program (GCP) was established in April 2022 following amendments to the
16 *Electricity Act*.⁸ The goal of the GCP is to build up to 350 MW of capacity from new low-impact
17 renewable generation resources for which large-scale energy customers can contract to achieve
18 their greenhouse gas emissions reduction targets while supporting NS Power’s 2030
19 Decarbonization Goals, per section 6B(3)(a) of the Renewable Electricity Regulations and per
20 section 24 of the Green Choice Program Regulations.
21

22 As a corporate voluntary renewables program, GCP enables large energy consumers (with $\geq 10,000$
23 MWh of annual load) or aggregated partnerships (with $\geq 1,000$ MWh of annual load, individually,
24 and with an annual minimum subscribed energy of 10,000 MWh) to subscribe up to 120 percent
25 of their annual load to the renewable energy generation projects selected through the RFP process.

⁸ S.N.S. 2022, c. 12.

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1 The Green Choice Program procurement will solicit sufficient new renewable electricity to serve
2 the subscribed load on an annual basis. NS Power will be responsible to continue to plan and
3 operate the system such that it has sufficient capacity available to supply the subscribed load.

4 The GCP involves a renewable electricity procurement managed by the Province of Nova Scotia's
5 Procurement Administrator, Coho, and a tandem participant intake process managed by the
6 provincial department of Natural Resources and Renewables (NRR), Coho, and with support from
7 NS Power. To date, NS Power has supported the program development by:

- 8
- 9 • Providing feedback and input on the Participant Guide.
 - 10 • Development of frequently asked questions (FAQs) for participants, specific to Renewable
11 Energy Credits (RECs), published on the GCP website.
 - 12 • Providing feedback on the draft Request for Proposals (RFP) and the Power Purchase
13 Agreement (PPA), including participation in the public feedback process.
 - 14 • Providing feedback on materials and attending and being available for questions during
15 both participant and proponent webinars.
 - 16 • Development of near-term forecast carbon cost on a variable (dollar-per-MWh) basis for
17 publishing on the GCP website.
 - 18 • Providing feedback, as requested, on participant resources, educational and support
19 materials, and participant agreement/terms and conditions.
 - 20 • Providing feedback on the draft participant application form and guide.
- 21

22 On December 1, 2023, Coho issued the Request for Proposals associated with the Green Choice
23 Program. Bids are expected to close in June 2024, with awards expected to be announced in
24 September 2024.⁹ Consistent with requirements under the *Electricity Act*, NS Power shall procure
25 all electricity under a contract awarded by a procurement administrator. The application intake
26 period for participants opened on December 15, 2023, and will remain open until March 4, 2024.
27 Projects selected as part of the GCP portfolio are expected to commit to a commercial operation
28 date (COD) on or before December 31, 2028. While the Green Choice Program procurement is

⁹ [Green Choice Program for Large-Scale Electricity Customers - Government of Nova Scotia, Canada](#)

1 open to various types of renewable generation, it is anticipated that the majority of the projects
2 selected will be wind energy projects.

3
4 NS Power will continue support of the Green Choice Program development by:

- 5
- 6 • Continuing to collaborate with NRR and Coho regarding details of the program
 - 7 administration and customer support processes.
 - 8 • Verification of applicant consumption data and account status.
 - 9 • Completion of Interconnection Feasibility Studies in support of the GCP RFP.
- 10

11 Like the Rate Base Procurement projects, once the procurement is complete and PPAs are awarded,
12 NS Power will support the development of these projects via the completion of System Impact
13 Studies and Facilities Studies, and development of Transmission Provider Interconnection
14 Facilities and Network Upgrades associated with each project.

15
16 **4.1.3 NS Power Wind Projects (ECEI)**

17 NS Power had previously proposed the development of 160 MW of new NS Power-owned wind
18 generation under its Eastern Clean Energy Initiative (ECEI) program, part of the resource mix to
19 achieve the 2030 Decarbonization Goals.

20
21 In July 2023, NS Power divested interest in the potential wind projects, while enabling them to
22 continue effectively under a new partnership. The Company continues to focus on enabling the
23 necessary interconnections onto the grid for the new IPP (Independent Power Producer) wind
24 projects across the province.

1 **4.1.4 Port Hawkesbury Paper Wind**

2 Port Hawkesbury Paper Wind, a sister company to Port Hawkesbury Paper, is pursuing the
3 development of a proposed 168 MW wind farm to support the long-term sustainable operation of
4 the paper mill. The environmental assessment for this project was approved by the provincial
5 government in March of 2023 and Port Hawkesbury Paper Wind forecasts first commercial
6 operation to start in late 2025.

7
8 This project is aligned with the targets of the 2030 Clean Power Plan. Port Hawkesbury Paper
9 Wind’s project will help to meet the target for wind development under the plan. Port Hawkesbury
10 Paper’s full annual load requirement was included in the Evergreen IRP load forecast, as well as
11 the proposed wind farm (noting the initial design was for a lower capacity of 130 MW) and that
12 modeling included the requirement for NS Power to serve this load, inclusive of the new wind
13 farm on the system, while continuing to meet renewable electricity targets.

14
15 **4.1.5 Renewable to Retail**

16 The Renewable to Retail (RtR) electricity market was established in Nova Scotia in 2016 to enable
17 independent licensed retailers to sell renewable energy generated within the Province directly to
18 NS Power’s retail customers. One Licensed Retail Supplier (LRS) licence has been granted to
19 provide service under the RtR tariffs.

20
21 In the Company’s 2022 Load Forecast Report, which was the load forecast used in the development
22 of the Evergreen IRP, 29 GWh of energy sales was forecast to be supplied under the RtR tariff. In
23 the 2023 Load Forecast Report the volume of sales supplied through the RtR tariff was increased
24 to 130 GWh. NS Power’s Load Forecast Report provides details of how these forecasts have been
25 developed and these will continue to be updated as part of NS Power’s load forecasting process.

26
27 NS Power is aware of approximately 150 MW of new wind generation which has been proposed
28 to supply RtR customers, with currently anticipated in-service dates in 2024. While not explicitly
29 considered in the Evergreen IRP, this increase in expected wind generation is consistent with the
30 2030 Clean Power Plan. The customer load represented by RtR is in-province load and wind

1 generation built to meet this load is aligned with need for new wind generation to meet the 2030
2 Decarbonization Goals.

3 4 **4.1.6 Community Solar Program**

5 In April 2022, the Government of Nova Scotia passed amendments to the *Electricity Act* (in SNS
6 2022, c 12) that enable a Community Solar Program, administered by NS Power, pending an Order
7 in Council. The Province’s stated goal¹⁰ for the Community Solar Program is to enable at least 50
8 MW of new community solar generation and facilitate equitable access to renewable energy,
9 including for those otherwise unable to install on-site renewables through either Commercial Net
10 Metering or the self-generating option.

11
12 The program will encourage the development of new community solar gardens with a project
13 nameplate capacity of between 0.5 MWac and 10 MWac. Each community solar garden project is
14 built, owned, and operated by an eligible project owner which may include municipalities, towns,
15 First Nations, not-for-profits, towns/townships and villages, business, co-operative, colleges and
16 universities, or a partnership within the aforementioned. The anticipated program capacity for all
17 community solar gardens combined is 100 MW.

18
19 The Community Solar Program is anticipated to launch in Q1 2024, following proclamation of
20 amendments to the *Electricity Act*¹¹ and the registration of the Community Solar Regulations.
21 Programing and project enrolment is planned to begin immediately following the launch with
22 projects anticipated to commence operation in 2025.

23 24 **4.1.7 Commercial Net Metering**

25 In April 2022, the Government of Nova Scotia passed amendments to the *Electricity Act* that
26 established the framework for a new Net Metering program. The regulations for this new program
27 were then established by the Government of Nova Scotia through amendments to the *Renewable*

¹⁰Action 18 contained within “Our Climate, Our Future – Nova Scotia’s Climate Change Plan for Clean Growth” available at <https://climatechange.novascotia.ca/sites/default/files/uploads/ns-climate-change-plan.pdf>

¹¹ S.N.S. 2022, c. 12, s 5.

1 *Energy Regulations*¹² in October of 2022. These regulations directed NS Power to develop and
2 apply to the Nova Scotia Utility and Review Board for a Commercial Net Metering program.
3 Application was subsequently made by Nova Scotia Power in November of 2022.

4
5 Following the NSUARB’s decision in July 2023, the program was made available in August 2023
6 for Class 1 Commercial Net Metering Service (installations greater than 27 kW up to 100 kW) and
7 October 2023 for Class 2 Commercial Net Metering Service (installations greater than 100 kW up
8 to 1MW).

9
10 The new Commercial Net Metering program enables customers to generate renewable electricity
11 for their own use and to sell any excess electricity to Nova Scotia Power at a rate equivalent to the
12 rate paid for electricity up to a maximum of the customer’s total billed electricity within the same
13 calendar year. The program also introduces an expanded nameplate capacity limit of up to 1 MWac
14 in comparison to the legacy Net Metering program which was capped at 100 kWac.

15
16 With the introduction of the new Commercial Net Metering in 2023 and expanded nameplate
17 capacity limit, Nova Scotia Power anticipates increased Net Metering participation within the
18 Commercial and Industrial customer classes.

19
20 **4.1.8 Additional Renewable Energy Procurements**

21 The projects and programs identified above total approximately 1000 MW of new wind generation
22 and over 100 MW of new solar generation (depending on program uptake) beyond what is already
23 in service on the Nova Scotia grid, all of which are anticipated to be in service by 2030. This
24 represents a significant portion of the total resources identified in the 2030 Clean Power Plan as
25 being required to meet 2030 Decarbonization Goals.

26
27 The Nova Scotia 2030 Clean Power Plan identifies the potential for additional procurement
28 activities beyond those noted here to develop the remaining resource requirement; these activities

¹² N.S. Reg. 338/2022.

1 are anticipated to begin in the 2025-2027 timeframe in order to provide sufficient time to reach
2 commercial operation by 2030. The procurement target(s) for these remaining solicitation(s)
3 would be set closer to the start of the procurement based on updated resource modeling and
4 relevant developments in other sectors and programs.

6 **4.2 Battery Storage & Renewable Integration Resources**

7 The 2030 Clean Power Plan calls for significant deployments of grid-scale storage in Nova Scotia,
8 reaching an installed capacity of 300-400 MW by 2030. NS Power anticipates that grid-scale
9 storage will be added to the grid via multiple procurement paths as detailed below.

11 **4.2.1 Provincial Battery Storage Legislation**

12 On March 22, 2023, the Province introduced amendments to the *Electricity Act*¹³ that provide new
13 procurement pathways for energy storage in Nova Scotia. Specifically, the changes to the Act
14 allow the Department of Natural Resources and Renewables to issue requests for proposals for
15 energy storage solutions and contracts for well-developed, innovative energy storage projects that
16 can be implemented quickly.¹⁴

18 The amendments provide two pathways for new energy storage projects to be designated by the
19 Province:

- 21 • Energy Storage Procurements may be initiated under Section 4B of the Act.
- 22 • Energy Storage Projects may be prescribed under Section 4D (2) of the Act.

24 In addition to NS Power's 150 MW ECEI BESS project (described below), NS Power anticipates
25 that up to an additional 150 MW may be designated by the Province under Section 4D in the near
26 term (anticipated in Q2-2024 with an in-service date in 2026). In addition, another 100 MW of
27 energy storage capacity may be procured by the Province under Section 4B with a procurement
28 anticipated in 2025 and project in-service targets in 2027-2028. This series of resource additions

¹³ S.N.S. 2023, c. 17.

¹⁴ [Electricity Act Amendments Allow More Energy Storage Solutions - Government of Nova Scotia, Canada](#)

1 provides a pathway to 300-400 MW of energy storage capacity by 2030 in alignment with the 2030
2 Clean Power Plan. As discussed in the Evergreen IRP and supporting studies, similar to other
3 energy-limited resources such as wind and solar, the Effective Load Carrying Capability (ELCC)
4 or firm capacity value of energy storage declines with each marginal unit of nameplate capacity
5 added to the system.

6
7 NS Power anticipates supporting projects being procured or designated under the relevant sections
8 of the *Electricity Act* by:

- 9
- 10 • Supporting completion of interconnection studies.
 - 11 • Informing technical specifications and locational considerations for BESS projects.
 - 12 • Development of Network Upgrades and Transmission Provider Interconnection Facilities,
13 as identified by interconnection studies under the GIP.
 - 14 • Integrating the operation and dispatch of the energy storage assets to the grid, including
15 via Nova Scotia Power’s dispatch and operational procedures and systems as required.
- 16

17 **4.2.2 NS Power Battery Storage Project (ECEI)**

18 NS Power is developing a Battery Energy Storage System Project (BESS Project) comprised of
19 three 50 MW, four-hour battery facilities located at specific project sites to optimize their
20 contributions to the grid. The three facilities will be located near the following existing NS Power
21 substations:

- 22
- 23 • 99W Bridgewater
 - 24 • 132H Spider Lake
 - 25 • 43V Canaan Rd
- 26

27 The BESS Project will play an important role in phasing out coal, integrating new renewable
28 generation, and providing system benefits critical to Nova Scotia’s energy transition. The 600
29 MWh BESS Project will perform energy time-shifting functions, add firm capacity, and provide
30 various ancillary services to Nova Scotia’s electricity system.

1 NS Power anticipates filing an application with the Board seeking capital cost approval of the
2 BESS Project in Q1 2024. NS Power anticipates putting two BESS sites into service in 2025, and
3 the third in 2026.

4 5 **4.2.3 Grid Stability & Renewable Integration Resources**

6 The transition from a traditional power system, largely made up of synchronous generators, to a
7 power system which will rely heavily on inverter-based resources (IBRs) such as wind, solar, and
8 battery energy storage, will require new sources of grid support to maintain the stability, reliability,
9 and power quality of the transmission system.

10
11 On December 8, 2023, NS Power released its report *Large Scale Integration of Inverter Based*
12 *Resources in Nova Scotia*¹⁵ (Integration Report) as part of its IRP Action Plan. The primary
13 finding of the Integration Report is as follows:

14
15 NSPI can incorporate renewables, in particular inverter-based resources (IBRs)
16 such as wind, limited only by the load to be served and the best economic dispatch
17 to meet environmental requirements. There will be technical challenges and the grid
18 will need significant support as many legacy thermal plants are phased out or
19 converted to alternate fuels. That said, it is achievable with the existing and
20 evolving technologies.

21
22 The report identifies key metrics for Frequency Control and System Strength which must be
23 studied and maintained as the system transitions. Where issues are identified, mitigation options
24 must be put in place. Mitigation options identified in the report include:

- 25
26 • IBR Control System Design
27 • Battery Energy Storage Systems
28 • Synchronous Condensers
29 • Flexible AC Transmission System (FACTS) Devices, Static Var Compensators (SVCs),
30 Static Synchronous Compensators (STATCOMs), Switched and Static Capacitor Banks

¹⁵ [Wind-Integration-Study-Large-Scale-Integration-of-IBR-in-Nova-Scotia-Public.pdf \(nspower.ca\)](#)

- 1 • Fast-Acting Synchronous Generation
- 2 • Transmission Connections
- 3 • Operating Guidelines

4
5 Mitigation options, such as those identified in the bullets above, are anticipated to be needed to
6 support both existing and new inverter-based resources to allow for maximum integration of IBR
7 in Nova Scotia while maintaining grid stability and reliability. As the quantities, capabilities and
8 locations for mitigation options will depend on the configuration of other power system resources
9 (i.e. point of interconnection, type, size of the various wind, solar, and battery energy storage
10 facilities as well as the timing of resource additions), the identification of the specific series of
11 assets, beyond the BESS and Reliability Tie, has not yet been completed.

12
13 NS Power's Transmission System Interconnection Requirements specify various performance
14 requirements that must be met by new generator interconnections, with specific requirements
15 identified for wind generators. These requirements have been developed to enable the reliable
16 operation of new and existing IBRs on the Nova Scotia system. It is essential to power system
17 reliability that the requirements of the TSIR continue to be met by interconnecting resources; going
18 forward, the TSIR requirements will continue to be updated as technology advances and studies
19 are completed.

20 The Integration Report provides a series of recommendations for NS Power to consider in its
21 ongoing system planning activities. Relevant action items that will be progressed in 2024 are
22 reproduced below:

- 23
- 24 • Verify network response under high Rate of Change of Frequency (RoCoF).
- 25 • Regularly review and recommend updates to the Transmission System Interconnection
26 Requirements to address concerns identified during system study (RoCoF, models,
27 harmonics, voltage, BESS, Solar, grid forming requirement for IBR).

28

- 1 • As synchronous plants are retired, additional grid support for inertia and System Strength
2 is expected to be required. It is recommended that studies be undertaken to determine the
3 optimal locations for the grid support.
- 4 • Update IBR and inertia constraints for Plexos modelling.
- 5 • Perform an annual assessment of NSPI System Inertia and Strength requirements in the 10-
6 year horizon to identify potential issue (NS Power anticipates including this in the 2024
7 10-Year System Outlook Report).
- 8 • Document and publish updated model requirements for Load and Generation customers.
- 9 • Perform a system study of the expected load growth and hydro generation availability for
10 western Nova Scotia.

11 12 **4.3 Reliability Tie**

13 The Reliability Tie is a second 345 kV AC transmission line between Onslow, NS and Salisbury,
14 NB. It will improve the reliability of Nova Scotia's transmission link to the New Brunswick Power
15 system and the broader Eastern Interconnection, enabling the integration of additional variable
16 renewable generation on the Nova Scotia system. The Reliability Tie is not anticipated to provide
17 incremental access to firm capacity or energy.

18
19 NS Power is developing the Reliability Tie in collaboration with NB Power with a target in-service
20 date in 2028, in alignment with the 2030 Clean Power Plan.

21 22 **4.3.1 Update on Reliability Tie Project (ECEI)**

23 The Reliability Tie Project continues to progress toward its target in-service date. Recent work
24 includes:

- 25
26 • Environmental Assessment (EA) Filing: NS Power completed the Environmental
27 Assessment for the Nova Scotia portion of the intertie and registered the application on
28 October 26 with Nova Scotia Environment. A pre-consultation meeting was held through
29 L'Nu (Government of NS) with Kwilmu'kw Maw-Klusuaqn (KMKNO). The public
30 consultation process ended November 26. On December 15, the Provincial Minister of

1 Environment & Climate Change approved the Nova Scotia portion of the Reliability Tie
2 Project. NS Power will review the conditions cited through early 2024 to make sure that
3 full requirements are met.

- 4 • Mi'kmaq Engagement: NS Power and KMKNO have signed a Collaboration Agreement
5 on the building of the intertie. A kickoff meeting took place, and a Benefits Coordinator
6 has been assigned that will work with NS Power on opportunities for First Nations
7 members and businesses to participate in the project.
- 8 • Stakeholder Engagement: NS Power, in coordination with NB Power, has continued its
9 stakeholder engagement process with outreach to stakeholders, special interest groups and
10 municipalities in which the projects will be constructed in both provinces. The results of
11 this work were incorporated into the EA filing. NS Power continues to meet with
12 stakeholder groups, e.g. blueberry growers, to provide information about the planned work
13 and how they may be affected, such as tower placement locations.
- 14 • Engineering Services: In partnership with NB Power, a competitive procurement process
15 was conducted for the detailed engineering design and field engineering services required
16 during construction. The contract was awarded, and the work was launched in October
17 2023.
- 18 • Access Study: A detailed access and timber cruising study was completed which will be
19 used to determine the right-of-way (ROW) clearing costs and access routes for construction
20 activities. This will also be used to determine if there are any additional access agreements
21 required with landowners that could provide efficiency and productivity for construction
22 activities and in turn construction cost optimization.

23
24 Engineering and project development work will continue in 2024, with a Capital Application
25 anticipated late in 2024.

26 27 **4.3.2 Stage 2**

28 The 2030 Clean Power Plan notes the potential for the Reliability Tie to incorporate a Stage 2
29 transmission build from Salisbury, NB to Point Lepreau, NB to enable greater access to New
30 Brunswick, New England, and Quebec energy imports and exports. This extension would also be

1 accompanied by additional upgrades within Nova Scotia such as the conversion of L-7018 230 kV
2 line to 345 kV (120H-Brushy Hill to 67N-Onslow) and additional transformation capacity at 67N-
3 Onslow. This approach is consistent with IRP Action Plan Item 1b that identifies the need to
4 continue working with neighbouring jurisdictions in support of opportunities for regional
5 integration and was also identified in the Province of New Brunswick's recently released report,
6 *Powering our Economy and the world with Clean Energy – Our Path Forward to 2035*.¹⁶

7
8 Future studies for Stage 2 are anticipated to include detailed engineering and economic studies for
9 firm import options requiring new transmission investment and strengthened regional
10 interconnections. This work is anticipated to continue through 2024 and 2025 in parallel with the
11 development of the Reliability Tie from Onslow, NS to Salisbury, NB.

12 13 **4.4 Fast-Acting Generation**

14 The 2030 Clean Power Plan identifies a need for up to 600 MW of new fast-acting generation by
15 2030, with the first addition of approximately 300 MW in service by the end of 2027. The need
16 for new fast-acting generation capacity was also confirmed in the Evergreen IRP analysis and it
17 was included as part of Action Item #3c in the August 2023 update to the IRP Action Plan and
18 Roadmap. The IRP Action Plan is clear that a significant increase in system firm capacity is
19 required in order to maintain supply reliability while meeting growing peak demand requirements
20 and replacing firm capacity that will be retired in order to comply with the 2030 coal phase-out
21 policy requirements.

22
23 New fast-acting generation will provide a key reliability resource as the power system transitions
24 to higher percentages of renewable supply. This dispatchable capacity can start and stop quickly,
25 without significant minimum up and down time requirements, in order to integrate, balance, and
26 follow the significant additions of variable renewable generation described above while
27 minimizing curtailment. As described in the 2030 Clean Power Plan and the IRP Action Plan, fuel
28 flexibility to utilize clean fuels such as green hydrogen or biofuels will be considered as part of

¹⁶ <https://www2.gnb.ca/content/dam/gnb/Corporate/Promo/energy-energie/GNB-CleanEnergy.pdf>

1 project development. NS Power is also evaluating the ability of these assets to provide additional
2 grid support functions, such as by operating as synchronous condensers to provide essential grid
3 services such as system strength support, RoCoF support, and frequency oscillation damping
4 during system disturbances. This allows these resources to enable renewable integration and
5 support the power system while not consuming fuel or producing emissions.

6 The first addition of approximately 300 MW is a key transition investment and is required to
7 maintain supply reliability, as discussed further in the 2023 10-Year System Outlook which
8 provides detail on identified additions through 2032 of a total of 870 MW of fast-acting generation
9 capacity. NS Power continues to work with its partners on ways to offset portions of the identified
10 fast-acting generation requirement in the longer term via alternatives such as additional energy
11 storage, demand response (including hybrid peak programming), and efficiency programs as
12 described elsewhere in this document. Wind, solar, storage, demand response, and clean imports
13 will ensure that the new fast-acting generation has a low utilization that aligns with the Clean
14 Electricity Regulations and other regulatory requirements. Within that broader context, the first
15 addition of fast-acting generation is a no regrets investment and a requirement to maintain supply
16 reliability prior to 2030.

17 18 **4.4.1 Technology Considerations**

19 NS Power provided an update to the Board and Stakeholders in February 2023 noting it had
20 engaged Advisian-Worley to survey available fast-acting generation technology options¹⁷. The
21 scope of the study included:

- 22
- 23 • Identification of technology and configuration options.
- 24 • Development of performance, Capital Cost, Operating Cost and Levelized Cost of Energy
25 (LCOE) analyses based on the range of operating profiles.
- 26 • Operating profiles included both peaking and standby.
- 27

¹⁷ [IRP Action Plan Update February 2023 \(nspower.ca\)](#) – slides 29-32

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1 As noted in the February 2023 update, the study reviewed 24 models of combustion turbine (CT)
2 and reciprocating engine (RICE) against the established design guidelines and performance
3 targets. Key requirements identified included:

- 4
- 5 • Purpose of the unit: fast-acting peaking power delivery service to address power supply
6 gaps and maintain grid reliability/stability during periods of low output from variable
7 renewable energy.
- 8 • Capable of providing ancillary services including load following, VAR support and voltage
9 control.
- 10 • Capable of fast start response time (10min start with at least 50 MW delivery) and ramp
11 rate (min: 10% per min).
- 12 • Potential synchronous condenser capability.
- 13 • Existing and future hydrogen firing capability.
- 14 • Unit size range between 10MW and 150MW.
- 15 • Unit types include aero/industrial/frame Gas Turbines (GTs) and Reciprocating Internal
16 Combustion Engines (RICE).
- 17 • Primary and secondary fuel type specified as gas and light fuel oil.
- 18 • Emissions capabilities within allowable limits.
- 19

20 Six Fast-Acting Power Centre configurations of approximately 150 MW were selected for detailed
21 analysis. The results of this initial analysis indicated that combinations of RICE and CT units
22 provide the optimal value to the system. The analysis also identified that many available unit
23 configurations can operate as synchronous condensers, enhancing the ability of these resources to
24 provide essential grid services needed on a system transitioning to high penetrations of renewable
25 inverter-based resources.

26

27 Subsequent to this study, compatibility with the draft Clean Electricity Regulations was also
28 identified as a technology requirement for any fast-acting generation project. This includes
29 considerations of unit size and fuel flexibility for non-emitting fuels such as hydrogen and

1 biodiesel. The draft Clean Electricity Regulations acknowledge the need for fast-acting, or
2 peaking, capacity in order to maintain supply reliability for high renewable power systems.

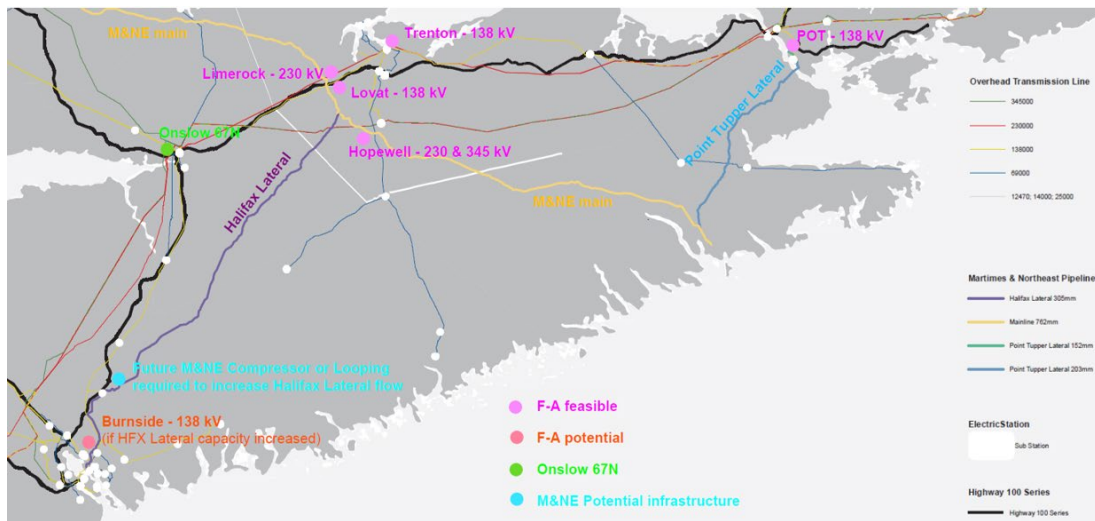
3 4 **4.4.2 Location Considerations**

5 In parallel with technology considerations NS Power has also considered potential locations for
6 new fast-acting generation sites. Key considerations for location selection include:

- 7
- 8 • Proximity to natural gas infrastructure with available capacity.
- 9 • Proximity to transmission infrastructure with available capacity.
- 10 • Nearby land use / suitability.
- 11

12 **Figure 4** below illustrates potential sites that are under evaluation by NS Power. Multiple sites
13 will be required to accommodate the quantity of fast-acting generation required on the Nova Scotia
14 system by 2030.

15
16 **Figure 4 – Fast-Acting Generation Locations Under Evaluation**



NS Power also completed an initial investigation of available natural gas supply capacity. Key considerations from a natural gas supply perspective include:

- 1 • Construction timelines and cost.
- 2 • Utilization of existing facilities, where available.
- 3 • Existing constraints on the Halifax Lateral of the Maritimes & Northeast Pipeline.

5 **4.4.3 Project Approach & Next Steps**

6 NS Power is continuing to develop a fast-acting generation project in alignment with both 2030
7 Clean Power Plan and the IRP Action Plan, which identifies approximately 300 MW of new
8 capacity required in 2027 and a further 300 MW required in 2030.

9
10 NS Power anticipates that, based on industry best practices and experience with other recent
11 project development, an Engineering, Procurement, and Construction (EPC) approach will provide
12 the best value for customers. Illustrative EPC timelines are in the order of 36 months; current
13 industry supply chain constraints could increase this project duration. Accordingly, the 2024 NS
14 Power work plan will include the follow following actions to meet the requirement for 300 MW
15 by the end of 2027:

- 16
- 17 • Site selection for detailed design.
- 18 • Submission of transmission Interconnection Requests to the NS Power System Operator.
- 19 • Submission of pipeline connection requests as required.
- 20 • Issuance of a Request for Information (RFI) for potential vendors.
- 21 • Vendor Selection.
- 22 • Stakeholder Engagement.
- 23 • Capital Application.

24

25 **4.5 Fuel Conversions at Existing Units**

26 The 2030 Clean Power Plan includes alternate fuel operation at four of NS Power's existing
27 thermal units. Similarly, the Evergreen IRP identified that alternate fuel operation at four units
28 was a common resource plan element across IRP scenarios, and these were included in the IRP
29 Action Plan under item #3e.

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4.5.1 Gas Conversion at Point Tupper Generating Station (ECEI)

In all scenarios modeled as part of the Evergreen IRP, the coal-to-natural-gas conversion of Point Tupper Generating Station Unit 2 (150 MW) was observed as a common outcome. This converted unit is shown to be operated in a peaking capacity (with low annual capacity factors) during periods of net peak demand to support system reliability and to meet customer demand. NS Power will be progressing the completion of the coal to gas conversion by 2028 in alignment with the phase-out of coal generation for the Point Tupper unit.

The coal-to-gas conversion was also a finding of the 2020 IRP and demonstrated value to the system in a peaking capacity. As a result (and reflected in the 2020 IRP roadmap), a coal-to-gas conversion project was initiated as an ECEI project and Class III engineering design/economic assessment work was completed to further evaluate the project scope and value. In parallel, NS Power continued to evaluate options for supply of natural gas to the site. This work will serve as a starting point for the advancement of the coal-to-gas conversion project. Updates on this work have been provided as part of recent IRP Action Plan updates to the Board.

To enable the coal-to-gas conversion by 2028, the NS Power team is developing milestones and project timelines for engagement, the regulatory process, and design/commissioning. This work will continue in 2024.

4.5.2 HFO Operation at Lingan Generating Station

Transition to the peaking use of Heavy Fuel Oil (HFO) for Lingan units 1, 3 and 4 (approximately 450 MW total) was identified in the 2030 Clean Power Plan. It was also a consistent outcome across all Evergreen IRP scenarios. This was a new finding as compared to the 2020 IRP, the value of which is supported by the low capital cost (these units already operate on HFO) and the ability for these units to operate in a peaking capacity during periods of net peak demand.

The timing for the transition to heavy fuel oil for Lingan 1, 3 and 4 was a consistent outcome of the Evergreen IRP as well (2028-2030) and is in alignment with the timing of the phase-out of coal

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1 generation for the three units. It is also consistent with the recognized need for dispatchable
2 capacity, including both gas and liquid fueled units, which was acknowledged as part of the
3 development of the draft CER.

4

5 To achieve the necessary timing to enable the 2030 plan, the NS Power team is developing
6 milestones and project timelines for engagement, the regulatory process, and
7 design/commissioning. Due to the timing of these conversions, no significant activity is
8 anticipated to be undertaken in 2024.

9

1 **5.0 ADDITIONAL IRP ACTION PLAN AND ROADMAP ITEMS**

2
3 In addition to the items identified in the 2030 Resource Development Plan, there are other elements
4 of the broader IRP Action Plan which have specific and significant impacts on resource
5 development requirements to 2030. These are highlighted below.
6

7 **5.1 Electrification & Load Forecast**

8 NS Power files its Load Forecast Report annually with the Board. This provides an annual update
9 on the anticipated peak and energy requirements of the system, incorporating the latest available
10 information and modeling as well as significant stakeholder engagement. As the system continues
11 to develop toward 2030, updates to the resource plan presented in this filing will be made to match
12 the identified firm capacity requirement of the Nova Scotia Power system.
13

14 In alignment with the Evergreen IRP Action Plan and Roadmap, NS Power released its
15 Electrification Strategy report on December 8, 2023. Stakeholder engagement on this report will
16 continue in 2024.
17

18 **5.2 Demand Side Management**

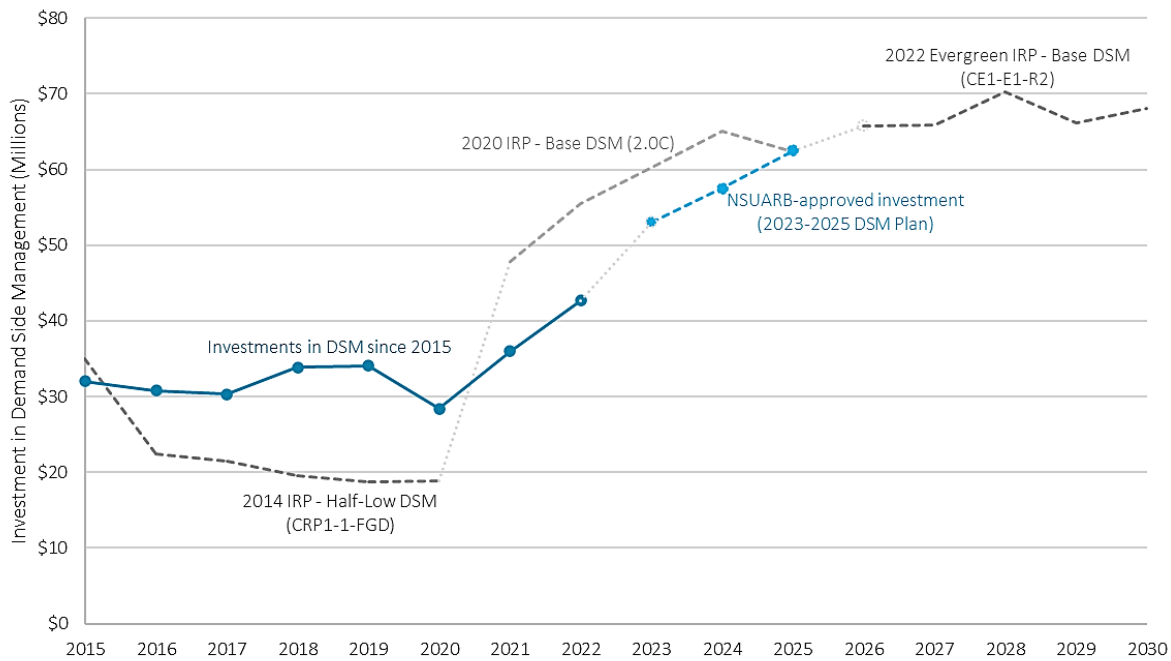
19 Historically, demand side management (DSM) activities in Nova Scotia have centered on energy
20 efficiency (i.e. reducing energy consumption and system coincident peak demand) and focused
21 primarily on the achievement of energy and peak demand savings targets. In September 2022,
22 EfficiencyOne (E1) received approval for an investment of \$173.1 million for its 2023-2025 DSM
23 Plan activities. The plan, which targets 412.7 GWh and 78.8 MW in energy efficiency (EE) savings
24 over the three-year period, launches E1’s first demand response (DR) program with an available
25 capacity target of 17.9 MW by the end of 2025. In its Enabling Strategies component, E1 plans to
26 support electrification strategy development.
27

28 The current planned investment of \$173.1 million for 2023-2025 represents a 62 percent increase
29 in total DSM investment over the 2020-2022 DSM Plan. The increase in DSM investment aligns
30 with the trajectory of DSM investment levels selected through the past three IRP processes as

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1 shown in **Figure 5** below. Note that DSM investment in 2015 was set at \$35 million. This level
2 was established by the Government of Nova Scotia in the *Electricity Efficiency and Conservation*
3 *Restructuring (2014) Act*¹⁸ and is the investment level reflected in **Figure 5** below.

4
5 **Figure 5 – Demand Side Management Investment Levels Selected in Integrated Resource**
6 **Plans compared with Historic Investment**



7
8 As part of NS Power’s IRP scenario modeling and analysis, one of several levels of potential DSM
9 investment is selected as the most economic over the IRP planning horizon. In the 2014 IRP, a
10 modified low-DSM was selected as the most economic level of DSM. The 2020 IRP Scenario 2.0C
11 selected Base DSM, inclusive of DR (for the first time). The 2022 Evergreen IRP process identified
12 Base DSM levels as having the lowest NPV across the comparable DSM scenarios evaluated.

13
14 In November 2022, the Government of Nova Scotia passed amendments to the *Public Utilities Act*
15 under Bill 228.¹⁹ The amendments included replacing references to “energy efficiency and
16 conservation activities” with “demand-side management,” and expanding the definition of

¹⁸ S.N.S. 2014, c. 5.

¹⁹ S.N.S. 2022, c. 53.

1 “demand-side management” to include “strategic electrification of energy end uses [...]” under
2 Section 79A(b). Bill 228 also prescribed five-year terms for DSM purchase agreements and
3 portfolio-level evaluation of proposed cost-effective DSM programs.

4
5 Given that DSM activities have expanded outside traditional energy efficiency, achievement of
6 current planned investments in 2023 to 2025, and development of DSM investments in alignment
7 with the Base DSM profile identified in the evergreen IRP are increasingly important to achieving
8 the 2030 decarbonization goals.

9
10 Anticipated DSM-related activities in 2024 will include engagement with E1 and the Demand Side
11 Management Advisory Group (DSMAG) on the development of E1’s 2026-2030 DSM Plan; it is
12 anticipated that this will lead to an application before the NSUARB in 2025.

13 14 **5.3 Hybrid Peak / Load Management / Demand Response**

15 As a component of NS Power’s development of its electrification strategy report, it worked with
16 its consultant Energy and Environmental Economics (E3) to prepare load and system peak load
17 forecasts for various heating electrification scenarios. Of the heating electrification load profiles
18 considered, the hybrid peak electrification profile emerged as an opportunity for reduction of
19 system peak load requirements and was studied as part of the evergreen IRP. This scenario assumes
20 the adoption of mini-split heat pumps along with the retention of existing back up heating sources
21 (such as oil and natural gas) to operate during the colder/peak system demand periods in the winter
22 when heat pumps are less efficient. This potential program was discussed in NS Power’s 2023
23 Load Forecast Report; additional details are available as part of E3’s report *The Economics of*
24 *Electrification in Nova Scotia* which was shared with stakeholders via NS Power’s IRP website
25 on December 8, 2023.²⁰ The Evergreen IRP assumptions for this program incorporate a firm peak
26 reduction of approximately 100 MW by 2030.

27

²⁰ [The Economics of Electrification in Nova Scotia \(nspower.ca\)](https://www.nspower.ca)

1 To fully assess the value of the hybrid peak scenario, NS Power is committed to participating in
2 future study work to determine the corresponding cost impacts of potential customer programs
3 (please refer to the Action Plan Item 4b). This study, with engagement and participation from
4 multiple organizations including NS Power, will provide a balanced assessment of the cost impacts
5 of the hybrid approach and provide the necessary information to conduct a more refined
6 assessment of the program from an electricity system cost perspective.

7
8 In addition to the electrification strategy, the outcome of the 2020 IRP also pointed to the value of
9 Demand Response (DR) programming to reduce peak load requirements. NS Power (with support
10 from E1) is progressing demand response (DR) pilot programming with the intent of meeting 75
11 MW of DR peak load reductions by 2025. This includes work in the areas of direct load control
12 for residential, commercial, and industrial classes as well as NS Power’s ongoing time varying
13 pricing pilot program. Updates on DR program development will continue to be provided as part
14 of NS Power’s IRP Action Plan reporting.

15
16 The 2030 Clean Power Plan incorporates Load Management activities consistent with the Hybrid
17 Peak program modeled in the Evergreen IRP. NS Power’s updated IRP Action Plan and Roadmap
18 supports the progression of the electrification strategy and annual updates on the progress of these
19 initiatives will be communicated as part of the IRP process. Next steps include commencing a
20 Hybrid Peak study in 2024 in partnership with other organizations in Nova Scotia.

21 22 **5.4 Green Hydrogen Projects**

23 In light of the increasing interest in the development of hydrogen-producing plants in Nova Scotia,
24 NS Power produced two sensitivity scenarios as part of the Evergreen IRP that evaluated both an
25 increase in system load requirements to support a generic green hydrogen plant and the potential
26 value of having a source of domestic hydrogen in the province for future hydrogen fuel enabled
27 fast-acting generation. However, the increase in load to meet hydrogen plant requirements was not
28 a base case assumption and the IRP Action Plan was developed around scenario outcomes that do
29 not include this additional large customer load on the grid. To ensure that any future developments
30 related to hydrogen development in the province are monitored and assessed, NS Power included

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1 Roadmap Item 11 (Hydrogen Tariff Impacts) to enable the assessment of the tariff impacts on the
2 Action Plan as they develop.

3
4 NS Power has had discussions with multiple potential green hydrogen project developers to
5 understand their requirements and provide information about the Nova Scotia Power system.
6 Currently, NS Power is working with two project developers, EverWind Fuels (EWF) and Bear
7 Head Energy (BHE), both of which intend to produce green hydrogen primarily for export, to
8 assess their needs from both an operational and tariff perspective.

- 9
- 10 • EWF has received Environmental Approval and Federal Government funding to support
11 their Point Tupper Hydrogen Production Plant, which is currently targeting to begin
12 production in 2025. It has acquired 530 MW of wind resources from three wind farm
13 developments and has indicated it will be adding solar resources as well to support its load
14 and green hydrogen requirements.
 - 15 • BHE is progressing the development of a Hydrogen Production plant planned for the Point
16 Tupper Industrial Park with planned first production in 2028. BHE has indicated that new
17 onshore and offshore wind have the potential to support its load requirements and the
18 production of green hydrogen.

19
20 A tariff construct to establish the utility services to be provided to the hydrogen developers and
21 the associated pricing is currently under development. The proposed tariff will be subject to
22 NSUARB approval and will be assessed within the context of the long-term electricity strategy
23 and the 2030 Clean Power Plan. Since the resource plan to 2030 described in this document is
24 based on a load forecast that does not include additional capacity or energy requirements to support
25 these large load customers, incremental resources to meet both the firm load and renewable energy
26 needs of the developers will be required. An assessment of this within the context of the 2030
27 resource plan and beyond will be completed as NS Power's understanding of future hydrogen
28 project development potential progresses.

29

1 On December 15, 2023, the Province of Nova Scotia released its Green Hydrogen Action Plan.²¹
2 The plan includes seven goals and 23 actions to help develop the sector in alignment with the
3 Province’s climate change goals. It will support both domestic use and export of green hydrogen.
4 The plan also identifies green hydrogen as a potential complementary fuel source for the electricity
5 system that can help meet peak or emergency demand; this approach is consistent with the
6 technical considerations incorporated into NS Power’s development of fast-acting generation
7 resources, described above.

8 The Green Hydrogen Action Plan identifies key considerations for Nova Scotia Power and
9 electricity sector stakeholders as they participate in the development of the green hydrogen
10 industry. In particular, Action 9 indicates that the Province will “Ensure that provincial investment
11 decisions relating to the green hydrogen sector are made in the best interest of utility ratepayers”
12 and notes that any potential costs to utility ratepayers remain subject to appropriate regulatory
13 approvals to maximize ratepayer benefits. Similarly, Action 12 indicates that the Province will
14 “Ensure the development of the green hydrogen sector aligns with Nova Scotia’s climate change
15 goals.” This includes the need for the green hydrogen sector to grow alignment with the 2030
16 Clean Power Plan.

17

18 **5.5 Offshore Wind**

19 In September 2022, the provincial government announced a goal of leasing 5 GW of offshore wind
20 by 2030, with specific emphasis on supporting the green hydrogen industry. Seabed lease rights
21 for commercial scale projects are expected to be made available via a competitive commercial
22 process in 2025. First energy delivery is not currently anticipated until after 2030.

23

24 With development timelines that currently extend beyond 2030, offshore wind does not play a role
25 in the 2030 Clean Power Plan. Offshore wind could play a part in the future of Nova Scotia’s
26 energy mix, with several paths to market available to the industry:

27

²¹ <https://novascotia.ca/green-hydrogen/docs/green-hydrogen-action-plan.pdf>

- 1 1. Provincial demand for clean electricity or green fuels, particularly as post-2030 renewable
2 energy demand may increase in connection with economy-wide decarbonization.
- 3 2. Regional/national demand for clean electricity or green fuels under Canada’s 2035 Clean
4 Electricity Standard, in combination with significant transmission system expansion.
- 5 3. Demand for clean electricity from the United States.
- 6 4. International demand for low carbon, green fuels and chemical feedstock.²²

7
8 Given the potential installed capacity (5 GW) and market opportunities for offshore wind, NS
9 Power continues to monitor industry and local developments to inform future planning exercises.
10 NS Power has met with the Department of Natural Resources and Renewables and other partners
11 in recent months to review and support the work they are doing in this area. This is anticipated to
12 continue in 2024.

14 **5.6 Coal Generation Phase-Out**

15 The significant additions of new resources described above are designed to both enable coal phase-
16 out and support the forecast of continued load growth on the system. In parallel with these resource
17 additions, NS Power analyzed the timing of coal unit retirement and conversion as part of the
18 Evergreen IRP process in 2023. The IRP scenarios determined it was optimal to retain coal units
19 for firm capacity as late as the model allows with retirements and/or fuel switching occurring later
20 in the 2020s.²³

21
22 The coal unit retirement and phase-out dates provided in the 2023 10-Year System Outlook
23 continue to represent NS Power’s best estimate of when sufficient new resources will be added to
24 the system to offset retiring coal capacity, support increasing firm demand, and maintain supply
25 reliability for customers. These dates are summarized in **Figure 6** below.

²² [offshore-wind-roadmap.pdf \(novascotia.ca\)](#)

²³ [Nova Scotia Power Evergreen IRP \(nspower.ca\)](#); page 6

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1 **Figure 6 – Coal Retirement and Conversion Dates as reported in the 2023 10-Year System**
2 **Outlook**

Unit	Year	Notes
Lingan 1	2029	Converted to HFO operation (reliability resource)
Lingan 2	2025	Currently operating in Cold Reserve
Lingan 3	2029	Converted to HFO operation (reliability resource)
Lingan 4	2029	Converted to HFO operation (reliability resource)
Trenton 5	2027	
Trenton 6	2028	
Point Aconi	2028	
Point Tupper	2028	Converted to Gas operation

3
4 The dates provided above will continue to be evaluated as the timing of new resources, forecast
5 for demand growth, and policy factors continue to change in the future. NS Power will provide
6 updates as part of its annual 10-Year System Outlook report.

7
8 As new firm capacity resources are added to the system, retaining existing thermal units in cold
9 reserve can support commissioning, testing and establishment of reliable operations without
10 compromising the system’s planning reserve margin requirements. This will be considered and
11 assessed as plans for new resources are progressed.

12

**6.0 PROJECT ACCOUNTABILITIES, COORDINATION, AND RISK
MANAGEMENT**

NS Power believes that the Nova Scotia 2030 Clean Power Plan is a comprehensive and appropriate clean energy transition plan. It is based on extensive studies and stakeholder engagement.

6.1 Project Accountabilities

Figure 7 below summarizes the role of NS Power and the Province of Nova Scotia (NS Government) in each of the major projects/elements of the 2030 Clean Power Plan. Overall, the NS Government is responsible for the renewable energy projects and load management to meet 2030 RES targets. NS Power is responsible for building the required firm generation, transmission and supporting infrastructure to meet off coal targets and integrate the procured renewable energy.

Figure 7 – Project Accountabilities Matrix

2030 Projects	Accountability	NS Power Key Action Items	NS Government Key Action Items	Partner Key Action Items
Wind/Solar	NS Government	<ul style="list-style-type: none"> Develop and own grid integration assets for projects serving base customers Complete interconnection studies and assets 	<ul style="list-style-type: none"> Procure renewables from IPPs to reach RES targets 	<ul style="list-style-type: none"> IPPs develop, construct, and operate renewable projects
Battery Storage	NS Government and NS Power	<ul style="list-style-type: none"> Procure and finance 150 MW / 600 MWh storage through utility regulated model including competitive procurements for required products and services Integrate IPP energy storage projects into NS Power’s processes and operations 	<ul style="list-style-type: none"> Direct the contracting for up to 150MW additional grid-scale storage in 2024 targeting in-service in 2026 Initiate a procurement process for up to 100MW additional grid-scale storage in 2025 (4B) targeting in-service 2027-2028 	<ul style="list-style-type: none"> IPPs develop, construct, and operate additional grid-scale storage

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2030 Projects	Accountability	NS Power Key Action Items	NS Government Key Action Items	Partner Key Action Items
		<ul style="list-style-type: none"> • Complete interconnection studies and assets 		
Grid Stability and Renewable Integration Resources	NS Power	<ul style="list-style-type: none"> • Continue to identify required assets through IPP renewable project siting and detailed system studies. • Procure and finance through utility regulated model including competitive procurements for required products and services 	<ul style="list-style-type: none"> • Coordinate preferred IPP project siting based on detailed system studies. Incorporate into procurement processes. 	<ul style="list-style-type: none"> • IPPs develop renewable projects in compliance with NS Power’s Transmission System Interconnection Requirements (TSIR)
Hybrid Peak / Load Mgmt.	NS Government	<ul style="list-style-type: none"> • Provide detailed load studies and forecasts • Participate in broader sector study on Hybrid Peak opportunity • Collaborate in development of load management initiatives 	<ul style="list-style-type: none"> • Deliver load management initiatives through policies and program tools 	<ul style="list-style-type: none"> • E1 and other partners to support peak management, demand response, and efficiency programming
Reliability Tie	NS Power	<ul style="list-style-type: none"> • Procure and finance through utility regulated model including competitive procurements for required products and services • Continued engagement with NB Power on Stage 2 to Point Lepreau 	<ul style="list-style-type: none"> • Ensure coordinated review and issuance of required authorizations • Advocate for federal support and funding • Continued engagement with NB Government on extension to Point Lepreau 	
Fast-Acting Generation	NS Power	<ul style="list-style-type: none"> • Procure and finance through utility regulated model including competitive procurements for required products and services 	<ul style="list-style-type: none"> • Ensure coordinated review and issuance of required authorizations 	

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2030 Projects	Accountability	NS Power Key Action Items	NS Government Key Action Items	Partner Key Action Items
		<ul style="list-style-type: none"> • Complete interconnection studies and assets 		
Fuel Conversions	NS Power	<ul style="list-style-type: none"> • Procure and finance through utility regulated model including competitive procurements for required products and services 		

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6.2 Implementation Coordination

The Province of Nova Scotia and NS Power are both committed to meeting 2030 coal phase-out and 80 Percent Renewable Energy Standard targets. NS Power will participate in a Working Group for 2030 Clean Energy Targets with the Province to support cost-effective, timely, and successful program implementation. The Working Group will ensure close coordination between provincial staff and NS Power staff to support cost-effective, timely, and successful program implementation. The Working Group will also identify enabling conditions for the plan projects.

6.3 Risk Management

Delivering on the 2030 Clean Power Plan will require significant capital investments and new programs over the next six years. Risk management will be integral to implementation and reaching the 2030 environmental policy goals. Individual projects/elements of the plan will be implemented with detailed risk identification and mitigation strategies.

Overall, industry wide risks that will need to be addressed include:

1. Supply chain: There continue to be constraints in the global electricity industry supply chain due to factors such as high demand/capital build-out across the industry, extreme weather and other one-time events, general inflation, and geopolitical events. This is leading to longer lead times, price increases and volatility, and lack of equipment availability.

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- 1 2. Inflationary cost pressures: Inflation has trended above historical averages leading to
2 product and service price increases above forecast. Although inflation indices have been
3 declining more recently, future inflation can lead to project cost risk and cost uncertainty
4 as suppliers refrain from providing long-term price commitments or require indexed price
5 commitments.
- 6 3. Human resources: The electricity industry continues to face a shortage of talent due to high
7 demand in both the electricity industry and adjacent industries, such as housing and other
8 construction. This is leading to cost pressures, staffing challenges, and ultimately project
9 delays. Talent shortages have the potential to affect NS Power, its partners across the
10 province, and its contractors and suppliers.
- 11 4. Project approvals: The 2030 Clean Power Plan requires the approval of large, capital-
12 intensive projects such as IPP wind deployment and NS Power transmission builds. These
13 projects will need clear First Nations, Community and Stakeholder support to receive
14 environmental approvals. IPP projects will require interconnection facility approvals and
15 inclusion in fuel cost recovery. NS Power projects will require regulatory approval for cost
16 recovery within electricity rates. These cost recovery mechanisms are critical to the
17 execution of the resource development plans identified above.
- 18 5. Transition planning: The electricity load in Nova Scotia is expected to continue to grow
19 and the comparative cost of potential supply resources will continue to shift. NS Power
20 will work with the NS Government to ensure the transition plan continues to reflect
21 requirements to meet 2030 environmental policy targets and updated load forecasts.
- 22 6. Evolving Policy Landscape: The policy landscape for electricity system planning continues
23 to evolve rapidly. The Clean Electricity Regulations represent one area where continued
24 development is anticipated. Other areas where policy changes could impact system
25 planning through 2030 (and beyond) include North American Electric Reliability
26 Corporation (NERC) and Northeast Power Coordinating Council (NPCC) criteria and
27 requirements as well as provincial and federal policies related to electrification (which

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1 influences load forecasts). NS Power will continue to be responsive to changes in the
2 policy landscape via its IRP Roadmap.

3

1 **7.0 CONCLUSION**

2 The Nova Scotia 2030 Clean Power Plan is a comprehensive clean energy transition plan that is
3 aligned with NS Power’s most recent IRP Action and Roadmap update. Delivering on this plan
4 will require significant investments, program activities, engagement, and coordination across
5 multiple parties including NS Power, the Provincial Government, renewable procurement
6 administrators, third party IPPs, Mi’kmaw Partners, community groups, and E1 over the next six
7 years to achieve the plan.

8
9 Pursuant to NS Power's accountabilities under the matrix provided in Figure 7, the Company
10 understands its obligations in delivering the associated capital investments, customer programs,
11 and in assisting other parties in satisfying their respective obligations where applicable. NS Power
12 will participate in a Working Group for 2030 Clean Energy Targets with the Province to support
13 cost-effective, timely, and successful program implementation. The Working Group will also
14 identify enabling conditions for the plan projects.

15
16 The transition described in the 2030 Clean Power Plan will require significant investments, from
17 multiple parties, over a relatively short timeframe. NS Power is committed to continuing to work
18 with the provincial and federal governments, rights-holders, our stakeholders and partners to
19 ensure an equitable transition that best manages costs for customers and provides safe and reliable
20 electricity.

21
22 NS Power and the Province are in alignment on what must be done to reach 2030 Decarbonization
23 Goals, and that the Province’s 2030 Clean Power Plan provides clarity on those requirements and
24 responsibilities. Significant progress has been made on the action items above, even in the time
25 since the Board directed the development of this plan in September 2023. Risk management,
26 stakeholder engagement, and coordination between key stakeholders are the structures being put
27 in place to facilitate the achievement of the transformation of Nova Scotia's power system. The
28 Company would be pleased to provide updates to the NSUARB regarding progress as part of its
29 regular IRP Action Plan reporting.