



Diane Roy
Vice President, Regulatory Affairs

Gas Regulatory Affairs Correspondence
Email: gas.regulatory.affairs@fortisbc.com

Electric Regulatory Affairs Correspondence
Email: electricity.regulatory.affairs@fortisbc.com

FortisBC
16705 Fraser Highway
Surrey, B.C. V4N 0E8
Tel: (604) 576-7349
Cell: (604) 908-2790
Fax: (604) 576-7074
Email: diane.roy@fortisbc.com
www.fortisbc.com

September 20, 2018

B.C. Sustainable Energy Association
c/o William J. Andrews, Barrister & Solicitor
1958 Parkside Lane
North Vancouver, B.C.
V7G 1X5

Attention: Mr. William J. Andrews

Dear Mr. Andrews:

Re: FortisBC Energy Inc. (FEI)

Project No. 1598964

**Application for Acceptance of 2019-2022 Demand Side Management (DSM)
Expenditures Plan (the Application)**

**Response to the B.C. Sustainable Energy Association and Sierra Club of British
Columbia (BCSEA) Information Request (IR) No. 1**

On June 22, 2018, FEI filed the Application referenced above. In accordance with the British Columbia Utilities Commission Order G-138-18 setting out the Regulatory Timetable for the review of the Application, FEI respectfully submits the attached response to BCSEA IR No. 1.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 2

1 funding toward a Building Energy Retrofit Partnership that will provide financial
2 incentives to households and businesses to undertake retrofits that reduce greenhouse
3 gas emissions and energy bills. FEI is currently in discussion with the Ministry of Energy,
4 Mines, and Petroleum Resources regarding the integration of the Retrofit Partnership
5 with the current FEI program portfolio.” [pdf 15]

6 1.1 Please provide a copy of the 2016 Climate Leadership Plan.
7

8 **Response:**

9 The 2016 Climate Leadership Plan is provided as Attachment 1.1.

10 This document can also be found online at:

11 https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/clp/clp_booklet_web.pdf
12
13
14

15 1.1.1 Is it FEI’s understanding that the government’s objectives in proposing
16 in the Climate Leadership Plan to “allow FortisBC to expand their
17 incentives by at least 100 per cent, to encourage further adoption of
18 technologies that reduce emissions of gas fired equipment” are
19 particularly oriented toward achieving GHG emissions reductions, in
20 furtherance of BC’s legislated GHG emissions reductions targets?
21

22 **Response:**

23 FEI understands that enabling the expansion of its incentives to encourage further adoption of
24 higher efficiency gas equipment was one of a number of actions outlined in the Climate
25 Leadership Plan to assist in achieving BC’s GHG emissions reduction targets.

26 The Climate Leadership Plan states on page 5 that “These actions are expected to reduce
27 annual greenhouse gas emissions by up to 25 million tonnes below current forecasts by
28 2050...” and on page 6 highlights “developing new energy efficiency standards for gas fired
29 boilers” and “enabling further incentives to promote adoption of efficient gas equipment” as
30 actions to reduce industry and utility sector emissions among a number of additional actions
31 targeting various sectors in BC.
32
33
34

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 3

1 1.2 Please confirm that the terms of DSM Regulation Adequacy addressed in Table
2 3-2 reflect the most recently updated version of the Regulation.

3

4 **Response:**

5 Confirmed. Table 3-2 in the Application reflects the DSM Regulation effective March 24, 2017.

6

7

8

9 1.2.1 Please discuss what mechanisms were added or amended in the
10 Demand-Side Management Regulation to “create the regulatory
11 framework for FEI to meet the Climate Leadership Plan incentive
12 expansion requirement,” as FEI states on pdf p. 8 of the Application.

13

14 **Response:**

15 In the March 2017 amendment to the DSM Regulation, two of the amendments supported the
16 expansion of FEI DSM programs.

17 First, section 3 (1) (f) was added under Adequacy to include one or more demand-side
18 measures to support BC Energy Step Code adoption. Second, the MTRC cap under Cost
19 Effectiveness, Section 4 (1.5) (b) (iii) was increased from 33.3 percent to 40 percent.

20

21

22

23 1.2.1.1 Is it FEI’s understanding that the changes to the Regulation
24 are primarily intended to result in increased reductions in
25 GHG emissions in furtherance of BC’s legislated GHG
26 emissions reduction targets?

27

28 **Response:**

29 The amendments as noted in the response to BCSEA IR 1.2.1 support the expansion of FEI
30 DSM programs to enable further adoption of higher efficiency natural gas equipment and
31 achieve natural gas energy savings in support of BC’s GHG emission reduction targets. In
32 addition to the prior-noted amendments, the March 2017 changes to the DSM Regulation also
33 broadened the scope of the Low Income area to enable reaching more low income customers
34 and implemented a minimum expenditure amount to support the development of and
35 compliance with energy conservation standards.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 4

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33

1.3 Please provide a copy of the Pan-Canadian Framework on Clean Growth and Climate Change.

Response:

A copy of the Pan-Canadian Framework on Clean Growth and Climate change is included as Attachment 1.3.

The Framework can also be found online at:

http://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf

In section 3.2 Built Environment, the Pan-Canadian Framework states:

“The approach to the built environment will include (1) making new buildings more energy efficient; (2) retrofitting existing buildings, as well as fuel switching; (3) improving energy efficiency for appliances and equipment; and (4) supporting building codes and energy efficient housing in Indigenous communities.” [p. 15 (pdf 15)]

1.3.1 Does FEI agree that the cited quotation gives a fair summary of the intentions of the Pan-Canadian Framework regarding buildings?

Response:

FEI agrees that the cited quotation outlines the primary action areas for buildings that are included in the Pan-Canadian Framework.

1.3.2 How does FEI interpret “fuel switching” in this quotation?

Response:

FEI interprets “fuel switching” in this quotation to mean shifting from a higher carbon emission fuel source to one that produces lower emissions.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 5

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33

1.3.3 Does FEI propose any measures in the 2019 – 2022 DSM Plan to encourage program participants to switch from gas appliances or equipment to electric appliances or equipment or vice versa? If so, please list them.

Response:

No, FEI does not propose any measures in the 2019-2022 DSM Plan to encourage program participants to switch from gas appliances or equipment to electric appliances or equipment or vice versa.

1.4 Please provide more information on the Building Energy Retrofit Partnership:

Response:

The following addresses BCSEA IRs 1.1.4, 1.1.4.1, 1.1.4.2, 1.1.4.3 and 1.1.4.4.

The Building Energy Retrofit Partnership (Partnership) resulted from a joint Government of Canada and Government of British Columbia initiative through the Low Carbon Economy Leadership Fund. The announcement regarding the program, released on December 15, 2017, noted that *“In British Columbia, a total of over \$320 million will be used to support the province’s climate objectives, including energy efficiency, reforestation, and organics diversion and processing”* and British Columbia will contribute *“...\$12 million toward the Building Energy Retrofit Partnership which will help communities across B.C. reduce their emissions, create jobs and drive our economy forward.”*¹

As the Partnership is a Government of British Columbia initiative and additional public information has not been released, FEI is unable to provide information regarding target retrofit volumes. Please refer to the response to BCUC IR 1.14.1 for information regarding the Partnership implementation timing and impacts to FEI cost-effectiveness.

¹ <https://www.newswire.ca/news-releases/government-of-canada-announces-funding-for-energy-efficiency-and-climate-action-in-british-columbia-664417063.html#>

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 6

1

2

1.4.1 Is it meant to increase number of energy efficiency retrofits achieved?
In rough terms, what portion of the total building stock is the Building
Energy Retrofit Partnership meant to affect?

3

4

5

6 **Response:**

7 Please refer to the response to BCSEA IR 1.1.4.

8

9

10

11

1.4.2 When does FEI expect retrofits to begin under the Building Energy
Retrofit Partnership? Is any spending on this planned in the 2019 –
2022 time-frame?

12

13

14

15 **Response:**

16 Please refer to the response to BCSEA IR 1.1.4.

17

18

19

20

1.4.3 Please confirm that the current Application does not include spending
under the Building Energy Retrofit Partnership.

21

22

23 **Response:**

24 Please refer to the response to BCSEA IR 1.1.4.

25

26

27

28

1.4.4 How would incentives under the Building Energy Retrofit Partnership
affect FEI's calculation of the cost-effectiveness metrics – TRC, mTRC,
UCT, participant cost test, RIM – of its DSM programs?

29

30

31

32 **Response:**

33 Please refer to the response to BCSEA IR 1.1.4.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 7

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33

1.5 Does FEI agree that the overall policy thrust from BC’s Climate Leadership Plan, the revised DSM Regulation, BC’s update GHG reduction targets, the Pan-Canadian Framework on Clean Growth and Climate Change and the Building Energy Retrofit Partnership is to prioritize GHG emissions reductions as a means to mitigate climate change and fulfill legal requirements and/or international commitments in relation to climate change? Please discuss.

Response:

FEI does not represent the Government of Canada nor the Government of British Columbia and believes an assessment of the prioritization of GHG emission reductions against other supporting activities in relation to legal requirements and international commitments regarding climate change is most appropriately addressed by the respective Governments. FEI notes, however, that the initiatives noted in the above question focus on a number of actions to meet GHG emission reduction commitments, grow the economy and “reduce energy costs and improve affordability for households, businesses and institutions”².

1.6 Does FEI agree that GHG emissions reductions should be a priority in its planning, including in its 2019 – 2022 DSM Plan?

Response:

FEI believes it is important to include a number of priorities in its planning. These include supporting economic growth and maintaining energy affordability and customer choice while aligning with the provincial government’s goal to reduce GHG emissions. A priority in FEI’s 2019-2022 DSM Plan is achieving energy savings through energy efficiency and conservation. The achieved energy savings in turn support government policy to reduce carbon emissions.³

² <https://www.newswire.ca/news-releases/government-of-canada-announces-funding-for-energy-efficiency-and-climate-action-in-british-columbia-664417063.html> .

³ FEI 2019-2022 DSM Expenditures Plan Application, June 22, 2018, S 3.6, p 9-11.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 8

1 1.7 Does FEI prioritize DSM measures that achieve GHG reductions over other DSM
 2 measures in the 2019 – 2022 DSM Plan? If so, how? If not, why not, and what
 3 criteria will FEI use to prioritize measures?
 4

5 **Response:**

6 Not confirmed. The 2019-2022 DSM Plan prioritizes cost-effective measures to achieve energy
 7 savings and support market transformation to higher efficiency equipment and buildings. GHG
 8 reductions realized by customers as a result of increased energy efficiency and conservation
 9 will be an outcome of realized energy savings.

10
 11
 12

13 1.8 Does FEI's 2019 – 2022 DSM Plan represent an increase in intensity of GHG
 14 emissions reductions relative to the 2014 – 2018 DSM Plan and DSM plans of
 15 past years?
 16

17 **Response:**

18 FEI notes that a change has been made to the total energy savings for the 2019-2022 DSM
 19 Plan and that this response reflects the revised value. Please refer to the revised Application,
 20 Table 3-4, and Appendix A, Exhibit 6, provided in the Errata filed concurrently with these IR
 21 responses for further information on the changes made to the Application.

22 FEI assumes that by “increase in intensity of GHG emissions reductions”, BCSEA means to
 23 inquire if the 2019-2022 DSM Plan is anticipated to result in greater energy savings than was
 24 anticipated in the 2014-2018 DSM Plan. In the table below, FEI provides a comparison of the
 25 average per year energy savings (and resulting GHG reduction) forecast for each DSM Plan
 26 going back to the 2012-2013 DSM Plan (the 2012-2013 DSM Plan was the first to adopt the
 27 current DSM Plan format). The 2019-2022 DSM Plan represents an increase in average annual
 28 energy savings, and GHG emissions reductions, compared to the prior two DSM Plans.

	PLAN 2012-2013 <u>Average/year</u>	PLAN 2014-2018 <u>Average/year</u>	PLAN 2019-2022 <u>Average/year</u>
GJ (NPV)	7,869,023	4,700,694	9,187,910
GHG Reduction (tonnes)	406,042	242,556	474,096
<i>Note: Calculation changed to "per year" as DSM2012-2013 was for 2 years, DSM2014-2018 was for 5 years and DSM2019-2022 is for 4 years.</i>			

29
 30

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 9

1 **2.0 Topic: GHG emissions reductions**

2 **References: Exhibit B-1, Table 3-4 (pdf 16); Appendix A, sections 3, 4, 5, and 6,**
3 **pp. 9-40 (pdf 55-86):**

4 Table 3-4 shows aggregated GHG emissions reductions from proposed DSM measures.
5 Tables in sections 3, 4, 5 and 6 show per measure incentive costs, annual gas savings
6 and measure lifetimes.

7 The note to Table 3-4 characterizes GHG emission reductions as being “based on long
8 run combustion emission factor of 0.0516 tonnes CO₂eq for natural gas from Ministry of
9 Environment & Climate Change Strategy.”

10 2.1 Please confirm or otherwise explain that the GHG emissions reductions shown in
11 Table 3-4 are “burner tip” emissions, as opposed to lifecycle emissions; i.e. they
12 do not include upstream GHG emissions associated with the production,
13 transport and delivery of natural gas to the point of use.

14
15 **Response:**

16 This response also addresses BCSEA IR 1.2.2. FEI consulted with ICF Canada to provide this
17 response. FEI notes that a correction was made to Residential program area spillover and
18 Industrial program area energy savings in Appendix A, Exhibits 8 and 12. The following analysis
19 uses the corrected values. Please refer to the Errata filed concurrently with these IR responses
20 for further information.

21 Confirmed; the GHG emissions reductions shown in Table 3-4 consider combustion emissions
22 at the point of end use only and exclude upstream emissions associated with the production,
23 transport and delivery of natural gas to the point of end use.

24 The table provided in Attachment 2.1 displays per-participant gross annual GHG emission
25 reductions, aggregate net GHG emission reductions, and aggregate incentive costs per GHG
26 emission reductions for each energy-saving measure in FEI’s 2019-2022 DSM Plan across the
27 Commercial, Industrial, Low Income, and Residential program areas. All GHG emissions are
28 end-use combustion emissions only in CO₂-equivalent tonnes. All aggregate data is provided in
29 net present value (NPV) terms.

30 Incentive costs alone compared to energy and/or GHG reduction do not represent a suitable
31 metric for assessing natural gas DSM programs because this metric is too narrow. Using
32 incentive costs by themselves ignores other cost-effectiveness inputs, such as non-incentive
33 costs and avoided fuel supply costs which are represented in the well-established cost
34 effectiveness tests implemented by FEI in accordance with the California Standard Practice
35 Manual and as stipulated in the DSM Regulation. FEI’s DSM portfolio is cost-effective under the
36 DSM Regulation and advances BC’s Energy Objectives as set out in the *Clean Energy Act*.



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 10

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

2.2 For each DSM measure listed in sections 3, 4, 5 and 6, please provide annual GHG emissions reductions (specifying life cycle or “burner tip”) associated with the annual gas savings, as well as lifetime GHG emissions reductions (these may be “simple” as opposed to NPV) and the cost in incentive dollars per tonne of GHG emissions reductions.*

* Please contact BCSEA-SCBC if providing this information would be unduly burdensome.

Response:

Please refer to the response to BCSEA IR 1.2.1.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 11

1 **3.0 Topic: Guiding Principles**

2 **References: Exhibit B-1, section 6.3 Guiding Principles, p. 26 (pdf 31)**

3 For Principle # 10, FEI states:

4 “Programs will support market transformation by incenting efficient measures through
5 customers and/or trade allies (contractors, equipment manufacturers, distributors,
6 retailers, etc.), developing trade ally capacity, and supporting codes and standards
7 development and implementation.”

8 3.1 Does “market transformation” in the above passage refer to increased energy
9 efficiency performance and reduced GHG emissions? Please discuss.

10

11 **Response:**

12 No, “market transformation” in the above passage refers to utility incentives being phased out as
13 efficient equipment market saturation levels reach a point at which the efficient equipment is the
14 generally installed option, and the applicable regulatory body implements a regulation which
15 requires the efficient option as the minimum standard.

16

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 12

1 **4.0 Topic: Prioritization of equipment vs. building shell DSM measures**

2 **References: Exhibit B-1, Appendix A, pp. 13-14 (pdf 59-60):**

3 Analysis of the data provided in the tables in Section 3.4.1 Home Renovation Program
4 shows that over the course of the five-year Plan, FEI proposes to invest \$14.5 million in
5 furnace incentives at a cost of \$2.3 million per GJ saved, and \$5.7 million in attic
6 insulation at a cost of only \$675 thousand per GJ saved.

7 4.1 Why, given that the savings resulting from furnace incentives are so much more
8 costly than savings resulting from attic insulation, does FEI prioritize furnace
9 savings?

10
11 **Response:**

12 This response also addresses BCSEA IR 1.4.2.

13 FEI does not prioritize one measure over another, although the BC CPR generally informs
14 which measures to target in each program area.

15 FEI provides the following clarification to the following statement taken from information on
16 pages 13-14 in Appendix A and also provided in the preamble:

17 FEI proposes to invest \$14.5 million in furnace incentives at a cost of \$2.3 million
18 per GJ saved, and \$5.7 million in attic insulation at a cost of only \$675 thousand
19 per GJ saved.

20 FEI calculates incentive cost per GJ as customer incentive divided by a deemed energy savings
21 per participant. It is an independent output of program design per measure and is never used to
22 prioritize one measure over another. According to this methodology, the cost per GJ for attic
23 insulation (\$65 per GJ) is lower than furnace (\$81 per GJ) as developed through these program
24 inputs:

25 • A measure's incentive level is determined through internal analysis and industry
26 consultation and is set at a level that sufficiently offsets a customer's incremental cost to
27 encourage uptake.

28 • A measure's deemed savings is determined through evaluation reports, energy
29 modelling and pilot studies. The amount of energy savings for equipment is impacted by
30 Minimum Energy Performance Standards (MEPS). As MEPS become increasingly
31 stringent, incremental savings are being eroded over time. Alternatively, insulation
32 savings are not subject to MEPS, and therefore provides a larger incremental deemed
33 energy savings as an input for cost effectiveness tests.

34



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 13

1 Incentive cost per GJ for insulation is lower than furnaces due to increased deemed savings
2 which is not related to measure prioritization.

3 The cost per GJ for measures referred to in BCSEA IRs 1.4.1 through 1.4.3 is as follows:

- 4 • Furnace: \$81 per GJ
- 5 • Attic insulation: \$65 per GJ
- 6 • 0.67 EF Storage Tank Water Heater: \$67 per GJ
- 7 • Condensing Tankless Water Heater: \$105 per GJ
- 8 • Condensing Storage Tank Water Heater: \$145 per GJ

9
10
11

12

13 Savings from 0.67 EF Storage Tank Water Heaters are estimated to cost \$1.1 million in
14 incentives per GJ saved, while savings from Condensing Tankless Water Heaters are
15 only expected to cost \$830 thousand per GJ saved, and savings from Condensing
16 Storage Tank Water Heaters are expected to cost only \$355 thousand in incentives per
17 GJ saved.

18 4.2 Why does FEI similarly prioritize the more costly 0.67 EF water heaters over the
19 less costly condensing water heaters?

20

21 **Response:**

22 Please refer to the response to BCSEA IR 1.4.1.

23 FEI does not prioritize one measure over another. In addition, based on FEI's calculations, 0.67
24 EF water heaters are not more costly per GJ of savings:

- 25 • 0.67 EF Storage Tank Water Heater: \$67 per GJ
- 26 • Condensing Tankless Water Heater: \$105 per GJ
- 27 • Condensing Storage Tank Water Heater: \$145 per GJ

28

29

30

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 14

1
2 Over 15% of the Program's incentive budget is targeted for EnerChoice Fireplace
3 measures, at a cost of \$972 thousand per GJ saved, which is nearly 50% more costly
4 per unit of savings than attic insulation.

5 4.3 Why does FEI propose such a large fraction of the program budget for the
6 EnerChoice Fireplace measure?
7

8 **Response:**

9 Please refer to the response to BCSEA IR 1.4.1.

10 FEI proposes a large fraction of the program budget for EnerChoice Fireplaces due to the
11 forecast participation rate, which amplifies the measure's overall incentive expenditure. The
12 participation rate for EnerChoice Fireplaces was determined using a bottom-up approach based
13 on historical participation, as well as the recent introduction of Multi-Unit Residential Buildings
14 (MURBs) in the rebate eligibility criteria. Based on industry consultation, the inclusion of MURBs
15 is expected to represent a substantial market. As such, a measure's overall incentive
16 expenditure is an output of program design, and not a metric used to prioritize one measure
17 over another.

18 FEI provides the following clarification on the costs per GJ for attic insulation compared to
19 EnerChoice Fireplaces, demonstrating that fireplaces are one of the residential program area's
20 most cost effective measures:

- 21
- Attic insulation: \$65 per GJ
 - EnerChoice Fireplaces: \$32 per GJ
- 22

23

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 15

1 **5.0 Topic: BC Energy Step Code**

2 **References: Exhibit B-1, page 3, lines 23 & 24 and footnote 3 (pdf 8); Appendix A,**
3 **p 54 (pdf 100); Appendix A, section 9.2.2 Codes & Standards, p 53**
4 **(pdf 100):**

5 FEI states:

6 “More specifically, the DSM Regulation changes enable increased activity in support of
7 the BC Energy Step Code....” [pdf 8]

8 FEI also states:

9 “The BC Energy Step Code is a voluntary provincial standard within the BC Building
10 Code that provides a consistent approach to achieve higher energy-efficiency in
11 buildings that go beyond the requirements of the base BC Building Code, It does so by
12 establishing a series of measurable, performance-based energy-efficiency requirements
13 for construction that builders can choose to build to, and communities may voluntarily
14 choose to adopt in bylaws and policies. Source:

15 [https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-](https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/energyefficiency/energy-step-code)
16 [standards/energyefficiency/energy-step-code](https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/energyefficiency/energy-step-code) . [footnote 3, pdf 8]

17 “The BC Energy Step Code is a provincial standard that aims to encourage increased
18 energy efficiency for new buildings. It does so by establishing measurable performance-
19 based energy-efficiency requirements for new construction. Local governments
20 interested in better-than-code building energy efficiency have the option to reference the
21 BC Energy Step Code in their policies and bylaws, but are not required to do so.” [pdf
22 100]

23 5.1 Please expand on the description of the Step Code given in the application to
24 include a discussion of the five steps and the process and time-lines for higher or
25 more stringent levels of the Step Code to be adopted by or applied to local
26 governments.

27
28 **Response:**

29 Complete information about the five steps of the Step Code and the process and time-lines for
30 achieving higher steps can be found on the Province of British Columbia website
31 (www.energystepcode.ca). The BC Energy Step Code is a voluntary process designed to help
32 both government and industry chart a course to which all new construction across the province
33 achieves net zero ready by 2032. Local governments can adopt the Step Code at an
34 appropriate pace for their communities, enabling customer demand to grow, the market to
35 mature, and industry capacity to increase as services and products for the design and
36 construction of high-performance buildings become more widely available.

1 **BC Building Code Part 9 - Description of Five Steps of the BC Energy Step Code**

2 The BC Energy Step Code sets performance targets (please reference Table 1-3 below) for new
 3 construction in BC Building Code Part 9 (residential and some small commercial buildings), and
 4 groups them into “steps” that apply across various building types and regions of the province.
 5 The lower steps, Steps 1-3, are relatively straightforward to meet; the upper steps, Step 4-5, are
 6 more ambitious.

Table 1 Requirements for Part 9 Buildings Located in Climate Zone 4			
Step	Airtightness (Air Changes per Hour at 50 Pa Pressure Differential)	Performance Requirement of Building Equipment and Systems	Performance Requirement of Building Envelope
1	N/A	EnerGuide Rating % lower than EnerGuide Reference House: not less than 0% lower energy consumption or conform to Subsection 9.36.5.	
2	≤ 3.0	EnerGuide Rating % lower than EnerGuide Reference House: not less than 10% lower energy consumption or mechanical energy use intensity $\leq 60 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 45 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 35 \text{ W}/\text{m}^2$
3	≤ 2.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 20% lower energy consumption or mechanical energy use intensity $\leq 45 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 40 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 30 \text{ W}/\text{m}^2$
4	≤ 1.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 40% lower energy consumption or mechanical energy use intensity $\leq 35 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 25 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 25 \text{ W}/\text{m}^2$
5	≤ 1.0	mechanical energy use intensity $\leq 25 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 15 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 10 \text{ W}/\text{m}^2$

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 17

Table 2 Requirements for Part 9 Buildings Located in Climate Zone 5			
Step	Airtightness (Air Changes per Hour at 50 Pa Pressure Differential)	Performance Requirement of Building Equipment and Systems	Performance Requirement of Building Envelope
1	N/A	EnerGuide Rating % lower than EnerGuide Reference House: not less than 0% lower energy consumption or conform to Subsection 9.36.5.	
2	≤ 3.0	EnerGuide Rating % lower than EnerGuide Reference House: not less than 10% lower energy consumption or mechanical energy use intensity $\leq 90 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 60 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 55 \text{ W}/\text{m}^2$
3	≤ 2.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 20% lower energy consumption or mechanical energy use intensity $\leq 75 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 50 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 45 \text{ W}/\text{m}^2$
4	≤ 1.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 40% lower energy consumption or mechanical energy use intensity $\leq 45 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 40 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 40 \text{ W}/\text{m}^2$
5	≤ 1.0	mechanical energy use intensity $\leq 25 \text{ kWh}/(\text{m}^2\cdot\text{year})$	thermal energy demand intensity $\leq 15 \text{ kWh}/(\text{m}^2\cdot\text{year})$ or peak thermal load $\leq 10 \text{ W}/\text{m}^2$

Table 3 Requirements for Part 9 Buildings Located in Climate Zone 6, 7a, 7b and 8			
Step	Airtightness (Air Changes per Hour at 50 Pa Pressure Differential)	Performance Requirement of Building Equipment and Systems	Performance Requirement of Building Envelope
1	N/A	EnerGuide Rating % lower than EnerGuide Reference House: not less than 0% lower energy consumption or conform to Subsection 9.36.5.	
2	≤ 3.0	EnerGuide Rating % lower than EnerGuide Reference House: not less than 10% lower energy consumption or mechanical energy use intensity $\leq 100 \text{ kWh}/(\text{m}^2 \cdot \text{year})$	thermal energy demand intensity $\leq 70 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ or peak thermal load $\leq 55 \text{ W}/\text{m}^2$
3	≤ 2.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 20% lower energy consumption or mechanical energy use intensity $\leq 85 \text{ kWh}/(\text{m}^2 \cdot \text{year})$	thermal energy demand intensity $\leq 60 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ or peak thermal load $\leq 50 \text{ W}/\text{m}^2$
4	≤ 1.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 40% lower energy consumption or mechanical energy use intensity $\leq 55 \text{ kWh}/(\text{m}^2 \cdot \text{year})$	thermal energy demand intensity $\leq 50 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ or peak thermal load $\leq 45 \text{ W}/\text{m}^2$
5	≤ 1.0	mechanical energy use intensity $\leq 25 \text{ kWh}/(\text{m}^2 \cdot \text{year})$	thermal energy demand intensity $\leq 15 \text{ kWh}/(\text{m}^2 \cdot \text{year})$ or peak thermal load $\leq 10 \text{ W}/\text{m}^2$

1

2 **BC Building Code Part 3 - Description of Four Steps of the BC Energy Step Code**

3 The Step Code for Part 3 buildings currently sets performance targets for the following building
 4 archetypes located in Climate Zone 4: multi-unit residential buildings, office buildings, and retail
 5 buildings. The Step Code does not currently apply to other Part 3 building archetypes or climate
 6 zones 5, 6, 7a, 7b, or 8. The Part 3 BC Energy Step Code performance targets are shown in
 7 Tables 1-4 and 1-5 below).

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 19

1

Table 4 Requirements for Multi-Unit Residential Part 3 Buildings Located in Climate Zone 5		
Step	Equipment and Systems – Maximum Total Energy Use Intensity (kWh/m2-y)	Building Envelope – Maximum Thermal Energy Demand Intensity (kWh/m2-y)
1	Conform to Part 8 of National Energy Code of Canada for Buildings	
2	130	45
3	120	30
4	100	15

2

Table 5 Requirements for Retail and Office Part 3 Buildings Located in Climate Zone 5		
Step	Equipment and Systems – Maximum Total Energy Use Intensity (kWh/m2-y)	Building Envelope – Maximum Thermal Energy Demand Intensity (kWh/m2-y)
1	Conform to Part 8 of National Energy Code of Canada for Buildings	
2	170	30
3	120	20

3

4 **Process – BC Building Code Part 9 and Part 3 buildings**

5 All local governments are encouraged to develop a comprehensive strategy when considering
 6 incentivizing or adopting the BC Energy Step Code. While each community will need to
 7 establish a specific process that fits its circumstances, the following process is encouraged:

- 8
- review available resources
 - 9 • notify the Energy Step Code Council (ESCC) of intent to consult
 - 10 • conduct consultation and prepare policies and/or bylaws
 - 11 • submit final notification to the ESCC once the final plan is approved
 - 12 • proceed with implementation.

13

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 20

1 **Timelines – BC Building Code Part 9 and Part 3 buildings**

2 The Office of Housing and Construction Standards issued the *Provincial Policy: Local*
3 *Government Implementation of the BC Energy Step Code*⁴, which explains the policy intent of
4 the Step Code and its use and application by local governments and authorities. The Policy
5 establishes minimum timelines for implementing new requirements, beginning when the local
6 government gives notice to the Energy Step Code Council that they are initiating consultation
7 with industry on a proposed approach, and ending at the time the new requirement comes into
8 force. These timelines are summarized as follows:

- 9 • **Lower Steps:** New or expanded requirements for lower steps may be enforced no
10 sooner than six months after notification.
- 11 • **Upper Steps:** New or expanded requirements for upper steps may be enforced no
12 sooner than one year after notification.

13 Local governments may adjust these timelines in consultation with local industry and may obtain
14 guidance from the Energy Step Code Council. If a local government chooses to adopt a higher
15 step than was put out during consultation, or plans to change an existing program by
16 broadening the scope, increasing step level, or changing the approach, then the minimum
17 notification timeline should be reset. Requirements may not come into force until December 15,
18 2017 – though local governments may adopt bylaws in advance of this date.

19 In addition to notification timelines, item 3.3.6.3 of the Policy states 'During the transition period
20 (from now until at least 2020), local governments should not apply community-wide
21 requirements to meet the higher steps of the BC Energy Step Code', except in specific
22 circumstances where upper steps might be required when paired with appropriate benefits.

23
24
25

26 5.2 Are GHG emissions reductions relevant to the Step Code? Please discuss.

27
28

Response:

29 The BC Energy Step Code does not set GHG emissions reduction targets for new buildings.
30 The relevant provincial policy goal is to support "[taking] incremental steps to increase energy-
31 efficiency requirements in the BC Building Code to make buildings net-zero energy ready by

⁴ https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/guides/baguide_c2_sc_april2017.pdf

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 21

1 2032”.⁵ The BC Energy Step Code is a fuel neutral approach and provides builders and
2 developers flexibility in meeting the steps by applying all available energy efficient technologies.

3
4
5

6 5.3 Does FEI’s role in supporting Step Code objectives include the promotion of
7 measures the reduce GHG emissions over measures that do not or that only
8 cause slight GHG reductions? Please discuss.

9

10 **Response:**

11 The tiered incentive structure of FEI’s New Home Program and Commercial New Construction
12 program assists builders in reaching higher energy performance tiers, by implementing energy
13 efficient technologies. FEI’s Step Code incentives therefore reduce GHG emissions as a by-
14 product of attaining improved energy performance metrics.

15
16
17

18 5.4 Have any local governments in FEI service territory referenced the BC Energy
19 Step Code in their policies and/or bylaws? If so, which, and what Step Code
20 levels and time-lines for adoption have they referenced?

21

22 **Response:**

23 Adoption and consultation about the BC Energy Step Code is rapidly changing. The Province of
24 British Columbia maintains a current and updated list of local governments who have referenced
25 the BC Energy Step Code in their policies and/or bylaws, with a description of the extent of their
26 adoption. This list can be found at: http://www.energystepcode.ca/implementation_updates.

27
28
29

30 5.5 Please explain the incentives category in Appendix A, section 9.2.2 Codes &
31 Standards (pdf 100) regarding the BC Energy Step Code: to whom will incentive
32 payments be made, and for what activities?

⁵ <https://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/energy-efficiency/energy-step-code>



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 22

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

Response:

FEI will provide a \$500 incentive to support the BC Energy Step Code compliance process for Part 9 buildings. Of this \$500, \$100 will be paid to the energy advisor at the time of mid-construction blower door test. FEI recognizes that mid-construction provides the opportunity to advance air tightness as a key energy savings measure. \$400 will be paid to the builder/owner when construction of the Part 9 building is complete.

5.6 Does FEI intend to offer the same incentives regardless of whether or not a local government has adopted the Step Code?

Response:

In the case of Part 9 buildings, builders across the province can participate in the New Home Program's Step Code incentives even if their local government has not yet adopted a Step Code level for new construction. There are some program terms that have been incorporated to reduce free riders. For example, energy advisor support fees are not available after a local government adopts Step 3, as these builders would typically be familiar with the performance path and working with energy advisors.

In the case of Part 3 buildings, FEI intends to offer the same incentives, regardless of whether or not a local government has adopted the Step Code.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 23

1 **6.0 Topic: DSM Plan Expenditures**

2 **Reference: Exhibit B-1, p.6 (pdf 11):**

3 FEI states:

4 “The energy savings in FEI’s DSM Plan are generally consistent with the 2017 LTGRP
5 forecast Reference Case energy savings. From 2019 until 2022, FEI’s DSM Plan
6 forecasts eight percent higher energy savings than FEI’s 2017 LTGRP. FEI’s DSM Plan
7 indicates expenditures that average \$81.14 million per year (including inflation). For the
8 same period, the 2017 LTGRP Reference Case forecasts a theoretical estimate of DSM
9 expenditures that average \$42.80 million per year. However, energy savings and
10 expenditure figures are not directly comparable in absolute terms. By virtue of
11 representing a long term forecast and in contrast to FEI’s DSM Plan, the 2017 LTGRP
12 does not take into account the following factors:

- 13 • Non-incentive expenditures that support or enable DSM programs at the portfolio
14 level, such as enabling activities and conservation education outreach;
- 15 • Operational program delivery considerations, such as changes in required DSM
16 staffing levels, program eligibility requirements, or measure packaging and
17 marketing; and
- 18 • Emergence of new technologies more than five years into the future or
19 technologies which are currently unknown which may increase aggregate energy
20 saving opportunities and thus enable greater actual DSM program expenditures.”
21 [pdf 11, footnote numbers removed]

22 6.1 Please show, in detail, the expenditures that result in the proposal for \$38+
23 million per year more than was indicated in the LTGRP.

24

25 **Response:**

26 FEI notes that a correction was made to the inflated DSM Plan expenditures presented in Table
27 6-1 of the Application. The following analysis uses the corrected values. Please refer to the
28 Errata filed concurrently with these IR responses for further information.

29 As explained in FEI’s response to BCUC IR 1.2.4, the 2019-2022 DSM Plan represents a
30 bottom-up plan of specific DSM programs, whereas the results of the DSM analysis in the 2017
31 LTGRP display a theoretical estimate of future DSM activity as a function of cost-effectiveness
32 and, at the program area level, the ratio between incentive levels and measure incremental
33 costs. This presents a challenge for creating direct comparisons between the two documents.
34 Within this context, the three factors from the preamble, as further described in FEI’s response
35 to BCUC IR 1.2.4, fully account for the difference in expenditure levels.



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 24

1 The table below displays the detailed variance in planned annualized DSM expenditures of the
 2 2019-2022 DSM Plan and the 2017 LTGRP. Line 1 of the table breaks down the variance of
 3 \$38.34 million into incentives and non-incentives. Line 2 of the table displays how much of this
 4 variance is attributable to factors that, as outlined in FEI’s response to BCUC IR 1.2.4, can be
 5 isolated to create the closest possible comparison between the 2019-2022 DSM Plan and the
 6 DSM analysis in the 2017 LTGRP. These factors include Enabling Activities, the Low Income
 7 program area, and reasons 1 and 2 discussed in FEI’s response to BCUC IR 1.2.4. Line 3 of the
 8 table displays the remaining variance which, as explained in reason 3 of FEI’s response to
 9 BCUC IR 1.2.4, is difficult to assign to specific individual causes. This remaining variance
 10 accounts for 22 and 6 percent only of the total variance for incentives and non-incentives,
 11 respectively. Detailing the specific causes and associated expenditures that cause the
 12 remaining line 3 variance would require complicated analysis from all program teams which FEI
 13 would not be able to complete in the time allotted to respond to information requests. Given that
 14 the purpose and method for creating the 2019-2022 DSM Plan differ from the DSM analysis in
 15 the 2017 LTGRP, undertaking such an effort would have limited, if any, benefit.

Annualized Expenditures (million \$) - Absolute Variance (DSM Plan minus 2017 LTGRP)				
<u>Line</u>	<u>Incentives</u>	<u>Non-Incentives</u>	<u>Total</u>	
1. Raw Variance	\$ 17.03	\$ 20.37	\$	37.40
2. Best Comparison	\$ 8.80	\$ 17.95	\$	26.75
3. Remaining Variance	\$ 8.23	\$ 2.42	\$	10.65

16
17
18
19

20 6.2 Please confirm or otherwise explain that the three factors listed on page 6 (pdf
 21 11) fully account for the differences in expenditure levels between the 2019 –
 22 2022 DSM Expenditures Plan and the 2017 LTGRP Reference Case.

23
24

Response:

25 Please refer to the response to BCSEA IR 1.6.1.

26
27
28

29 6.3 Are new technologies, such as those referenced in the third factor above,
 30 represented in the DSM Plan?
 31



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 25

1 **Response:**

2 Yes, the Innovative Technologies program area identified in the DSM Plan investigates
3 emerging technologies and, depending on the results of this investigation, transitions such
4 technologies to the other program areas. Please see Section 8 of Appendix A of Exhibit B-1 for
5 further details about these listed technologies, including technology descriptions. As noted in
6 Section 8.1 of Appendix A of Exhibit B-1:

7 Innovative Technologies are considered to be a specified demand-side measure,
8 which means that the program and the technologies are only subject to the cost-
9 benefit test at the program area level. As such, the expenditures are evaluated
10 as part of the DSM portfolio as a whole. Also, per Section 4(4) of the DSM
11 Regulation, Innovative Technologies are not subject to the 40% portfolio MTRC
12 cap. Furthermore, due to the preliminary and investigative nature of Innovative
13 Technologies, it is challenging to effectively forecast energy savings from related
14 pilot studies. As such, projected savings from the Innovative Technology program
15 area have not been included in this DSM Plan. When results become available
16 via evaluation activities, any energy savings will be reported in DSM Annual
17 Reports.

18
19

20

21 6.3.1 If yes, please list those technologies, along with the Plan savings and
22 Plan costs associated with each.

23

24 **Response:**

25 Please refer to the response to BCSEA IR 1.6.3.

26

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 26

1 **7.0 Topic: Increase in incentives and resultant increase in savings**

2 **References: Exhibit B-1, p.7 (pdf 12); FEI 2017 LTGRP, Exhibit B-1, section 4.2.3.5**
3 **Reference Case C&EM Results Sensitivity to Incentive Level, p. 122**
4 **(pdf 147):**

5 FEI states:

6 “The 2017 LTGRP provides a sensitivity analysis [which] showed that, directionally,
7 energy savings increased at a lower rate than the estimated DSM expenditures when
8 applying a limited set of increasing measure level incentive values. This directionally
9 aligns with FEI’s DSM Plan forecasting eight percent higher energy savings for the 2019-
10 2022 period at 47 percent higher annual expenditures than the 2017 LTGRP.” [pdf 12]

11 FEI states in the 2017 LTGRP:

12 “Increasing the level of incentives by 44 percent for the aggregate C&EM portfolio yields
13 34 percent higher projected energy savings at 131 percent higher estimated
14 expenditures” [FortisBC Energy Inc. (FEI) 2017 Long Term Gas Resource Plan, p.122,
15 pdf p.147.]

16 The sensitivity analysis suggested that a 131% increase in expenditures could lead to a
17 34% increase in savings. A linear scaling of this result would suggest that a 47%
18 increase in expenditures could lead to an 11.5% increase in savings.

19 7.1 Please explain, in detail, why the savings are only 8% higher in the Plan instead
20 of 11.5% higher as suggested in the sensitivity analysis?

21

22 **Response:**

23 As explained in the responses to BCUC IRs 1.2.2 and 1.2.4, the method for preparing long term
24 DSM analyses (e.g., the BC CPR and the 2017 LTGRP DSM analysis) differs from the method
25 for preparing the 2019-2022 DSM Plan. The results of the DSM analysis in the 2017 LTGRP
26 display a theoretical estimate of forecast DSM activity as a function of cost-effectiveness and, at
27 the program area level, the ratio between incentive levels and measure incremental costs. In
28 contrast, the 2019-2022 DSM Plan represents a bottom-up plan of specific DSM programs and
29 requests BCUC acceptance of DSM portfolio expenditures. For the 2019-2022 DSM Plan, the
30 program areas use operational delivery considerations for specific programs that bundle
31 multiple measures in order to forecast expenditures, energy savings and cost-effectiveness in
32 the short term.

33 Given these differences, and as outlined in the response to BCUC IR 1.2.4, FEI uses the term
34 “alignment” to describe the relationship between energy savings and expenditures and denotes
35 this as “directional” to signal that this does not imply any claims about the exact slope of the
36 relationship between incentives versus energy savings. Both the DSM sensitivity analysis in the



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 27

1 2017 LTGRP as well as the comparison between the 2017 LTGRP Reference Case DSM
2 results and the 2019-2022 DSM Plan forecast increased energy savings at increased
3 expenditures and suggest that energy savings may increase at a lower rate than expenditures.

4 While it is possible that more savings could be achieved with increased expenditures, the 2019-
5 2022 DSM Plan as filed is cost effective under the DSM Regulation. Increasing expenditures by
6 as much as 131 percent, however, would almost certainly not result in a cost effective portfolio.

7
8
9

10 7.2 Would it be possible for FEI to achieve more savings within its proposed budgets,
11 consistent with the results of the sensitivity analysis? Please explain.

12
13 **Response:**

14 Please refer to the response to BCSEA IR 1.7.1.

15
16
17

18 7.3 Would it be possible for FEI to achieve the same level of savings with lower
19 incentives? Please explain.

20
21 **Response:**

22 Please refer to the response to BCSEA IR 1.7.1.

23
24
25

26 7.4 Would it be possible for FEI to achieve more savings cost-effectively were it to
27 increase its expenditures beyond the 47% proposal? Would it be possible for FEI
28 to achieve 34% higher energy savings by increasing its expenditures by 131%?

29
30 **Response:**

31 Please refer to the response to BCSEA IR 1.7.1.

32

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 28

1 **8.0 Topic: Incentives as a portion of total expenditures**

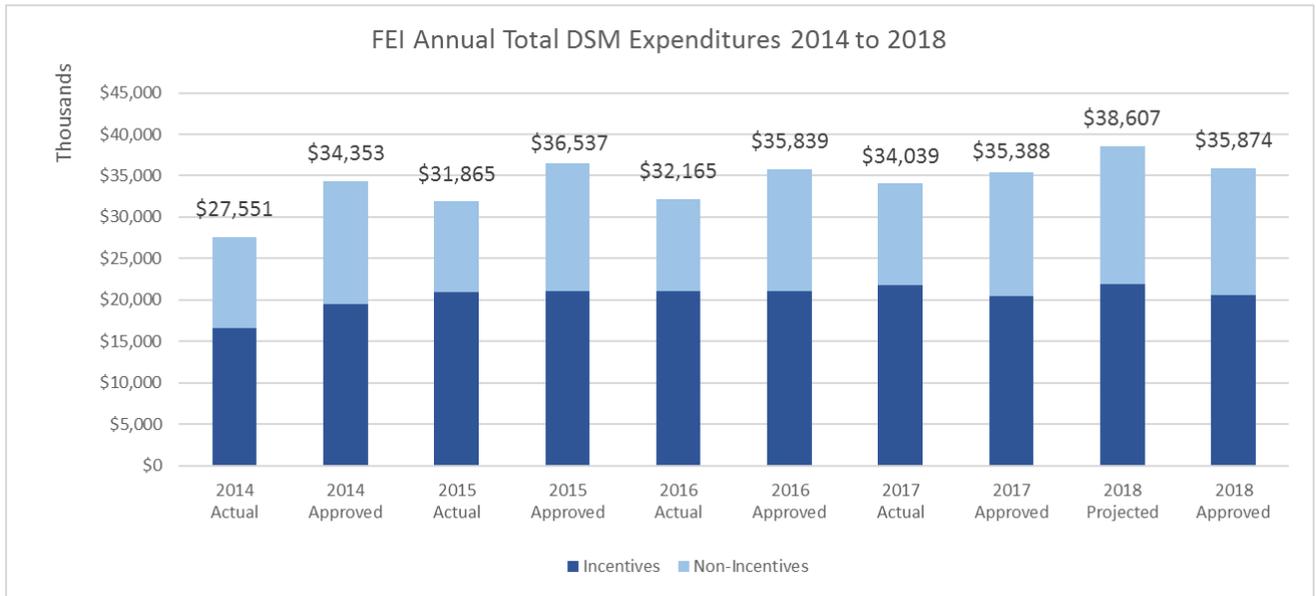
2 **Reference: Exhibit B-1, section 5 Historical Expenditure Levels, Table 5-1, p.19**
 3 **(pdf 24):**

4 8.1 Please provide a revised Table 5-1 showing, for each year between 2014 – 2022,
 5 inclusive, the following:

6
 7 8.1.1 Show total expenditures for each year as a stacked bar showing both
 8 incentives and non-incentives, rather than as a single bar showing only
 9 total expenditures, showing both forecast and actual figures for 2014 –
 10 2018.

11
 12 **Response:**

13 FEI notes that Table 5-1 in the Application should have been labeled as a figure. FEI interprets
 14 the use of the term ‘forecast’ in this request, to mean the approved plan expenditures for 2014-
 15 2018. The figure below shows FEI’s annual total actual and approved DSM Expenditures from
 16 2014 to 2018 as a stacked bar chart and includes both incentives and non-incentives.



17
 18 Please note that 2018 projected expenditures are as of July 2018 and are subject to change.
 19 Indications from this projection are that expenditures for 2018 will be above the approved plan
 20 and FEI intends to seek Commission approval for the potential overage in advance of year-end.
 21

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 29

1 8.1.2 Please provide expected participation by program for 2014 – 2022,
2 compared with actual participation by program achieved during 2014 –
3 2018.

4
5 **Response:**

6 This response also addresses BCSEA IR 1.8.1.2.1. In certain cases, program naming
7 convention has changed for the 2019-2022 DSM Plan from the 2014-2018 DSM Plan, and
8 therefore FEI has provided the requested information in two tables. Table 1 presents 2014-
9 2018 DSM Plan and 2014-2017 actual participation and Table 2 presents Plan participant
10 numbers for 2019-2022.

11 As shown in Table 1, for many programs participation has exceeded the Plan and in many
12 cases showed an increasing trend as the programs matured. For those programs that did not
13 meet or exceed planned participation:

- 14 • Some program launches were either delayed (i.e. Appliance Service Program and
15 Customer Engagement Tool as discussed in the 2014 DSM Annual Report) or
16 concluded (i.e. Commercial EnerTracker Program as discussed in the 2016 DSM Annual
17 Report) due to market conditions or for other reasons;
- 18 • Some programs were either redesigned or moved within the portfolio due to the
19 evolution of market conditions, change in partner collaborations, or as a result of
20 program evaluation;
- 21 • A number of external factors as outlined in response to CEC IR 1.16.1 acted in different
22 ways upon various program plans to impact FEI's ability to spend dollars and increase
23 participation.

24
25 Although unforeseen circumstances can arise to hinder participation rates, FEI notes the
26 following conditions that provide additional confidence in the estimation of participation rates
27 and energy savings included in the 2019-2022 DSM Plan:

- 28 • Many of its programs have matured over the period of the current 2014-2018 DSM Plan,
29 providing a better basis for participation estimates than was available when the 2014-
30 2018 DSM Plan was developed;
- 31 • FEI has gained experience in developing, implementing and improving DSM program
32 delivery during the current 2014-2018 DSM Plan that has been applied to the
33 preparation of the 2019-2022 DSM Plan;
- 34 • In spite of participation rates below Plan for some programs and the challenges outlined
35 in the response to CEC IR 1.16.1, FEI has been able to redesign and reallocate funding

1 to spend at or near Plan expenditures consistently during the latter years of the 2014-
 2 2018 DSM Plan period, as well as increase energy savings in each year of the current
 3 plan achieving close to Plan savings in 2017.

4 Please also refer to the responses to BCUC IRs 1.10.1 and 1.22.3.1 for discussion of how FEI
 5 intends to overcome barriers and mitigate risks for the 2019-2022 DSM Plan.

6 **Table 1: DSM Program Participation, 2014-2018**

Participant Count	2014 Plan	2015 Plan	2016 Plan	2017 Plan	2018 Plan	2014 Actual	2015 Actual	2016 Actual	2017 Actual
Total Portfolio	120,205	135,851	148,999	161,378	190,778	36,316	66,541	84,418	77,884
Residential	110,057	125,925	139,809	152,402	181,989	21,448	53,678	65,744	61,623
Energy Efficient Home Performance	2,940	3,276	3,360	3,780	4,200	1,577	2,010	2,251	2,505
Furnace Replacement Program	3,730	3,730	3,730	3,730	3,730	3,904	4,035	4,117	5,951
EnerChoice Fireplace Program	3,650	3,468	3,285	2,190	2,008	4,048	6,088	5,119	5,767
Appliance Service Program	14,250	14,250	14,250	14,250	14,250		21,380	19,743	15,394
Energy Star Water Heater Program	2,769	3,900	3,159	1,950	2,418	4,093	5,768	5,997	6,308
Low Flow Fixtures	9,500	9,500	9,500	9,500	9,500	5,457	10,116	1,273	3,959
Residential Energy Star Washers Promotion	0	0	0	0	0	866	501		
New Home Program	1,520	1,520	1,520	1,338	1,338	1,503	702	25	63
New Technologies Program	191	191	237	237	285				
Customer Engagement tool for Conservation Behaviours	71,250	85,500	99,750	114,000	142,500				
Financing Pilot	257	590	1,018	1,427	1,760				
RAP Program (Residential)	0	0	0	0	0		3,078	27,219	21,676
Commercial	1,728	2,078	1,835	2,036	2,189	4,907	994	1,297	803
Space Heat Program	143	143	204	204	204	240	267	234	203
Water Heat Program	105	115	128	141	144	113	132	128	128
Commercial Food Service Program	337	367	398	490	612	551	126	307	103
Customized Equipment Upgrade Program	70	87	78	78	78	42	56	64	69
Tracker Program	405	540	0	0	0	227	236	255	0
Continuous Optimization Program	117	270	467	567	600	51	70	36	40
Commercial Energy Assessment Program	524	524	524	524	524	123	49	27	46
Commercial Energy Specialist Program	27	32	36	32	27	31	32	27	31
RAP Program (Commercial)	0	0	0	0	0	0	26	219	183
MURB						3,529			
Industrial	28	36	40	49	48	12	13	15	27
Industrial Optimization Program	21	26	29	31	31	12	13	14	24
Specialized Industrial Process Technology Program	7	10	11	18	17			1	3
Low Income	8,392	7,812	7,315	6,891	6,552	9,949	11,856	17,362	15,431
Energy Savings Kits	7,087	6,378	5,740	5,174	4,677	9,503	10,538	12,640	10,828
Energy Conservation Assistance Program	1,236	1,359	1,495	1,645	1,810	434	1,305	1,941	2,218
REnEW	20	20	20	20	20	12	13	13	12
Low Income - Space Heat Top-Up	22	25	27	22	17		0	11	15
Low Income - Water Heating Top-Up	18	20	22	18	14		0	5	11
Non-Profit Custom Program	9	10	11	12	14		0	0	2,347
RAP Program (Low Income)								2,752	

7

8

1

Table 2: DSM Program Planned Participation, 2019 - 2022

Participant Count	2019 Plan	2020 Plan	2021 Plan	2022 Plan
Total Portfolio	129,831	137,267	142,183	147,717
Residential	110,640	116,685	120,420	124,960
Home Renovation Rebate Program	80,215	85,130	87,790	91,445
New Home Program	5,975	7,105	8,180	9,065
Rental Apartment Efficiency Program	24,450	24,450	24,450	24,450
Commercial	2,642	3,895	4,918	5,768
Prescriptive Program	2,232	3,466	4,429	5,256
Performance Program	102	114	127	144
Rental Apartment Efficiency Program	280	280	280	280
Performance Program - New Buildings	29	36	83	88
Industrial	100	100	118	118
Performance Program	23	23	28	28
Prescriptive Program	64	64	75	75
Strategic Energy Management Program	13	13	15	15
Low Income	16,449	16,586	16,727	16,871
Self Install Program	13,000	13,000	13,000	13,000
Direct Install Program	2,300	2,400	2,500	2,600
Prescriptive Program	1,104	1,141	1,182	1,226
Support Program	45	45	45	45

2

3

4

5

6

7

8

9

8.1.2.1 Please comment on FEI's historical success in predicting and achieving program participation.

Response:

10 Please refer to the response to BCSEA IR 1.8.1.2.

11

12

13

14

15

16

17

18

8.1.3 Please provide in graph and tabular form the incentive levels per gigajoule saved expected for 2019 – 2022 and incentive levels per GJ actually achieved for 2014 – 2018.

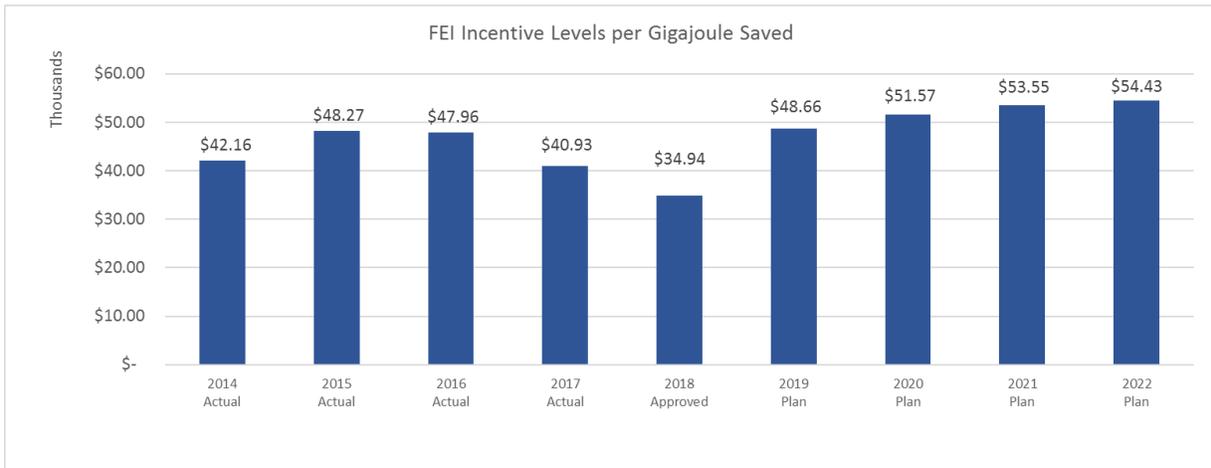
Response:

19 FEI notes that a change has been made to the energy savings for the 2019-2022 DSM Plan and
 20 that this response reflects the revised value. Please refer to Appendix A, Exhibit 6, provided in

1 the Errata filed concurrently with these IR responses for further information on the changes
 2 made to the Application.

3 The below table and chart show the incentive levels (\$) per gigajoule saved for the period of
 4 2014-2022 inclusive. Incentive costs alone do not represent a suitable metric for assessing
 5 natural gas DSM programs because this metric is too narrow. Using incentive costs by
 6 themselves ignores other cost effectiveness inputs, such as non-incentive costs and avoided
 7 fuel supply costs which are represented in the well-established cost effectiveness tests
 8 implemented by FEI in accordance with the California Standard Practice Manual and as
 9 stipulated in the DSM Regulation. FEI's DSM portfolio is required to pass the cost-effectiveness
 10 tests stipulated by this regulatory framework. FEI's DSM portfolio is cost-effective under the
 11 DSM Regulation and advances BC's Energy Objectives as set out in the *Clean Energy Act*.

	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Approved	2019 Plan	2020 Plan	2021 Plan	2022 Plan
Incentives	16,596,000	20,976,000	21,045,000	21,836,000	20,556,000	42,623,000	47,957,000	59,625,000	65,411,000
GJ saved	393,607	434,550	438,827	533,538	588,271	875,933	929,884	1,113,469	1,201,809
Incentives/GJ	\$ 42.16	\$ 48.27	\$ 47.96	\$ 40.93	\$ 34.94	\$ 48.66	\$ 51.57	\$ 53.55	\$ 54.43



13

14

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 33

1 **9.0 Topic: Coordination with electric utilities**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, p.9 (pdf 55).**
3 **Residential Energy Efficiency Program Area, Home Renovation**
4 **Program:**

5 FEI states:

6 “By design, the program enables partnerships with BC Hydro, FortisBC Inc., and all
7 levels of government.”

8 9.1 Please describe all efforts to develop working partnerships with BC Hydro and
9 FortisBC Inc.

10

11 **Response:**

12 Since 2009, FEI, BC Hydro, and FortisBC Inc. (FBC) have had a working partnership to provide
13 ongoing iterations of the province-wide Home Renovation Rebate Program. FEI’s working
14 partnership with the electric utilities includes, but is not limited to the efforts outlined below:

- 15 • The Home Renovation Program is offered as a single customer-facing program;
- 16 • Regularly scheduled meetings to facilitate knowledge sharing, identify program trends,
17 and discuss areas of opportunity and challenges to enable continuous program
18 improvement;
- 19 • Leverage each partner’s marketing channels to drive program awareness;
- 20 • In partnership with industry partners, the utilities facilitate the quality installation of
21 energy-efficiency equipment through various initiatives such as the development of
22 quality installation guides, contractor training, and Program Registered Contractor
23 directories;
- 24 • Support industry partners such as the Home Performance Stakeholder Council and its
25 efforts to address the various interests, opportunities, and challenges that exist in the
26 home performance industry; and
- 27 • Co-fund and share program evaluation and survey results to monitor program health and
28 to identify improvement opportunities.

29

30 FEI envisions that the partnership will continue to work similarly going forward.

31

32

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 34

1

2 9.2 Please describe FEI's vision of how potential partnerships with the electric
3 utilities might work.

4

5 **Response:**

6 Please refer to the response in BCSEA IR 1.9.1.

7

8

9

10 9.3 Does FEI envision that the Home Renovation Program would be a single
11 customer-facing program that is co-branded and sponsored by multiple parties?

12

13 **Response:**

14 As with the current Home Renovation Rebate Program, the Home Renovation Program will be
15 promoted as a single customer-facing program that is co-branded by FEI, BC Hydro, and FBC.
16 Additional third parties that provide time limited rebates, such as retailers and government, may
17 integrate their rebates into the Home Renovation Program platform.

18

19

20

21 9.4 Where certain end uses have efficient options with both electricity and natural
22 gas, for example, electric heat pump water heaters and condensing natural gas
23 demand water heaters, or condensing natural gas furnaces and electric heat
24 pumps, how does FEI envision the program would ensure that customers receive
25 unbiased information regarding their fuel and technology choices?

26

27 **Response:**

28 FEI will provide practical information to help customers make the most appropriate choices for
29 their individual circumstances. FEI will also provide information on gas energy-efficiency
30 measures and conservation tips that lead to energy savings, whereas FBC and BC Hydro will
31 do the same with respect to electricity energy-efficiency measures. For more in-depth
32 information on the relative climate impact of different technologies and fuel choices, customers
33 can refer to the Province's BC Home Energy Coach website (www.bcenergycoach.ca) or speak
34 to an energy advisor.



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 35

1
2
3
4
5
6
7
8
9

9.4.1 Would the relative climate impacts of the different technologies factor into the information provided to customers?

Response:

Please refer to the response to BCSEA IR1.9.4.

1 **Response:**

2 FEI did not compare lifecycle costs for customers of these three types of water heaters in
 3 developing its 2019-2022 DSM Plan; however, TRC and mTRC calculations take into account
 4 the benefit of natural gas savings against the measure cost over the equipment's measure life.

5 FEI provides the following lifecycle cost comparison which shows that 0.67 EF water heater
 6 storage tanks have the lowest lifecycle cost for customers.

7 **Table 1: Lifecycle cost comparison of water heater types**

	units	0.67 EF Storage Tank	0.95 EF Condensing Tankless	Electric Heat Pump
Efficiency/COP		0.67	0.95	2.00
Installed costs	\$	\$1,666	\$4,413	\$4,135
Operating costs	\$/year	\$287	\$202	\$371
Maintenance costs	\$/year	\$0	\$120	\$120
Measure life	years	13	20	13
Simple Lifecycle cost	\$	\$5,394	\$10,858	\$10,513
NPV Lifecycle cost	\$	\$5,116	\$9,750	\$10,212
Simple Cost/year of service	\$/yr	\$415	\$543	\$809
NPV Cost/year of service	\$/yr	\$394	\$488	\$786

8
9

10

11 10.2 Please explain how FEI arrived at its spillover rate estimates for 0.67 EF storage
 12 tank water heaters, condensing tankless water heaters and condensing storage
 13 tank water heaters.

14

15 **Response:**

16 Due to the difficulty in confirming and quantifying spillover, FEI has not been able to confirm
 17 spillover for the three types of water heaters, and therefore has not provided spillover rate
 18 estimates (the spillover rate applied is zero). However, FEI continues to include spillover
 19 identification and quantification on a program-by-program basis in its program evaluations.
 20 Please refer to the response to BCUC IR 1.8.1 for an explanation on how FEI seeks to identify
 21 spillover effects for its programs.

22

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 38

1 **11.0 Topic: Home Renovation Program, Building Envelope Measures**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 3.4.1**
3 **Home Renovation Program, p.13 (pdf 59):**

4 11.1 Regarding the building envelope measures that will be promoted through the
5 Home Renovation Program, are both natural gas heating savings and electric
6 cooling savings considered in determining the cost-effectiveness of the
7 measures?
8

9 **Response:**

10 FEI consulted Dunskey Consulting Services in the preparation of this response. Only natural gas
11 heating savings were considered when calculating the energy savings for insulation measures
12 in the Home Renovation Program. Increased insulation may provide some electric cooling
13 savings, but these savings are not significant due to the low number of cooling degree days in
14 most regions in BC. As such, electric cooling savings are not material, and only natural gas
15 savings are considered in determining the cost-effectiveness of building envelope measures at
16 this time.

17

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 39

1 **12.0 Topic: New Home Program**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 3.1, p. 9**
3 **(pdf 55)**

4 Regarding the New Home Program, FEI states:

5 “This program ... is being run in partnership with FortisBC Inc. ...” p.9 (pdf 55):

6 12.1 Please describe the operational aspects of the partnership with FortisBC Inc.

7
8 **Response:**

9 FEI and FBC jointly promote and administer the New Home Program in the following areas:

- 10 • Co-development of the program structure, process and procedures;
- 11 • Day-to-day administration of the program;
- 12 • Co-fund the development of marketing and communications pieces and cost share
13 media buys in the combined FEI and FBC service territory;
- 14 • Co-fund and share program evaluation and survey results to monitor program health and
15 to identify improvement opportunities;
- 16 • Share technological infrastructure including online application forms, databases and
17 websites; and
- 18 • Co-fund builder and energy advisor training with other program partners where
19 applicable.

20
21 FEI and FBC continuously seek ways to integrate operational aspects of the program to
22 streamline operations, reduce costs and add value for customers.

23
24

25

26 12.1.1 Is the New Home Program a single customer-facing program that is co-
27 branded by FEI and FortisBC Inc.?

28

29 **Response:**

30 The New Home Program will be promoted as a single customer-facing program that is co-
31 branded by FEI and FBC. Third parties that provide time limited rebates, such as local



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 40

1 governments or manufacturers, may integrate their rebates into the New Home Program
2 platform.

3
4
5

6 12.1.2 Where certain end uses have efficient options with both electricity and
7 natural gas, for example, electric heat pump water heaters and
8 condensing natural gas demand water heaters, or condensing natural
9 gas furnaces and electric heat pumps, how does the partnership
10 program ensure that customers receive unbiased information regarding
11 their fuel and technology choices?

12
13

Response:

14 FEI will provide practical information to help builders and new home buyers make the most
15 appropriate choices for their individual circumstances. FEI will provide information relevant to
16 building envelope, air tightness, energy-efficient natural gas technologies, while FBC will do the
17 same with respect to energy efficient electric technologies. For more in-depth information on the
18 climate impacts of different technologies and fuel choices, builders and new home buyers can
19 speak to their FEI Energy Solutions Manager, FBC Energy Efficiency Representative or an
20 energy advisor.

21
22
23

24 12.1.3 Are the relative climate impacts of the different fuels and technologies
25 factored into the information provided to customers?

26
27

Response:

28 Please refer to the responses to BCSEA IRs 1.9.4 and 1.12.1.2.

29

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 41

1 **13.0 Topic: Rental Apartment Efficiency Program**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 3.4.3**
3 **Rental Apartment Efficiency Program, p.17 (pdf 63):**

4 FEI forecasts that the program will install 24,450 aerators and showerheads per year of
5 the Plan.

6 13.1 What is FEI's estimate of the number of dwelling units in which these measures
7 will be installed?

8
9 **Response:**

10 FEI forecasts the program will install 24,450 water efficient devices in each year of the DSM
11 Plan, consisting of approximately 7,925 showerheads, 900 handheld showerheads, 7,813
12 bathroom aerators and 7,812 kitchen aerators across 9,000 dwelling units within 200 buildings.
13 The forecasts were derived from assessing program data from 2016 to 2017 that showed an
14 average 45 dwellings per building as well as aerator and showerhead rejection rates. In some
15 cases, the existing devices were unable to be removed without concerns of damaging the piping
16 system, or in other cases, the new water efficient devices were unable to fit or the tenants
17 declined them to be installed.

18
19

20

21 13.2 What is FEI's estimate of the eligible market, in terms of number of dwelling
22 units, for this program? In other words, what is the total number of dwelling units
23 in which aerators and showerheads could be installed if FEI reached every
24 eligible dwelling unit?

25

26 **Response:**

27 According to market data from Landcor Data Corporation (a property valuations and analysis
28 company) there are 12,789 Rental Apartment buildings located within British Columbia. In
29 accordance with the assumptions provided in the response to BCSEA IR 1.13.1, FEI estimates
30 approximately 575,500 dwelling units would be eligible to install the aerators and showerheads.

31

32

33

34 13.3 How many unique properties (buildings) does FEI estimate it will install the
35 24,450 aerators and showerheads in?



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 42

1

2 **Response:**

3 Please refer to the response to BCSEA IR 1.13.1.

4

5

6

7 13.4 How many unique properties (buildings) does FEI estimate are represented by its
8 response to 13.2 above regarding the eligible market for the Rental Apartment
9 Efficiency Program?

10

11 **Response:**

12 Please refer to the response to BCSEA IR 1.13.2.

13

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 43

1 **14.0 Topic: Rental Apartment Efficiency Program**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 4.4.4**
3 **Rental Apartment Efficiency Program, p. 26 (pdf 72):**

4 FEI states:

5 “To start, participants are provided with direct install of in-suite energy efficiency
6 upgrades completed by an agent of FortisBC. Next, participants are provided with
7 energy assessments, which may recommend building-level energy efficiency upgrades
8 such as condensing boilers, high efficiency water heaters and control upgrades. Lastly,
9 participants are provided with support in implementing the energy efficiency
10 recommendations and applying for rebates.” [pdf 72]

11 14.1 Please describe FEI’s planned process for motivating participants in the
12 residential portion of the Rental Apartment Efficiency Program to follow up with
13 building-level energy assessments and the installation of building level efficiency
14 improvements.

15
16 **Response:**

17 One of the Rental Apartment Efficiency Program goals is to convert participants who just have
18 the aerators and showerheads (“water efficient devices”) installed to also install building-level
19 upgrades such as condensing boilers and high efficiency water heaters. FEI recognizes that
20 energy efficiency is generally not a top priority for property owners and has designed the
21 program in order to minimize the costs, time and administration required to motivate
22 participation.

23 The program offers access to an Implementation Contractor (an energy efficiency expert) who is
24 the property owner’s single point of contact throughout the entire process. The Implementation
25 Contractor not only facilitates and coordinates the direct installation of the water efficient
26 devices but also assists with the building-level energy efficiency upgrades. The Implementation
27 Contractor conducts the building-level energy assessment to identify all the energy efficiency
28 opportunities and summarizes and presents these opportunities to the participant. The
29 Implementation Contractor may conduct several follow-ups over this period to determine the
30 participant’s level of interest and budget in order to install certain building level upgrades.

31 If the participant shows a commitment to install those upgrades, they can elect to take
32 advantage of implementation support. Implementation support includes creating a business
33 case outlining the cost saving benefits as well as summarizes actual quotes for equipment
34 installations from contractors, conducting a tendering process, assisting with equipment
35 selection, ordering and installations, and filling out the required paperwork needed to receive
36 any rebates available. Providing property owners with this level of support from an energy
37 efficiency expert is critical towards the installation of building-level energy efficiency



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 44

1 improvements. To date, 73 percent of the participants that chose to take advantage of the
2 implementation support are confirmed to implement the building level upgrades.

3
4
5

6 14.2 Based on FEI's response to 13.3 above, how many of the unique properties that
7 receive aerators and showerheads does FEI anticipate will also receive building-
8 level efficiency improvements?

9

10 **Response:**

11 Participation in the Rental Apartment Efficiency program requires that all buildings must install
12 aerators and showerheads, therefore all buildings that receive building-level efficiency
13 improvements have also had the aerators and showerheads installed. The building-level
14 measure participation counts are provided in Table 4.4.4 found on page 26 of Appendix A to the
15 Application (Exhibit B-1).

16

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 45

1 **15.0 Topic: Commercial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 4.2, p. 19**
3 **(pdf 65):**

4 FEI states:

5 “Meanwhile, rebates for mid-efficiency water heating appliances will be discontinued.
6 The availability of water heating equipment with efficiencies between 85% and 90% is
7 limited, and the market has not shown interest in these rebates for mid-efficiency
8 equipment.” [pdf 65]

9 15.1 Has FEI increased its estimates of participation in the high efficiency water
10 heater category as a result of discontinuing mid-efficiency water heater
11 incentives?
12

13 **Response:**

14 No, FEI did not increase its estimation of participation in the high efficiency water heater
15 category as a result of discontinuing mid-efficiency water heater incentives. Program data from
16 2014 to 2017 showed minimal mid-efficiency water heater program participation. As such, it
17 was decided to remove mid-efficiency water heaters from the program.

18 The planned increase in high efficiency water heater participation is based on increased market
19 demand observed in 2017 and market potential identified in the CPR.

20
21

22

23 15.2 If yes, please explain how much FEI projects this increase will be.

24

25 **Response:**

26 Please refer to the response to BCSEA IR 1.15.1.

27

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 46

1 **16.0 Topic: Commercial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, FEI 2019-2022 DSM Plan, Section 4.4.1, Prescriptive**
3 **Program, pp. 22-23 (pdf 68-69).**

4 FEI forecasts 280 participants for the Condensing Boiler measure per year, and 15
5 participants for the Mid Efficiency Boiler measure each year. The incremental cost for
6 the Condensing Boiler measure is estimated to be \$19,283 and the incremental cost for
7 the Mid Efficiency Boiler is estimated to be \$25,922. The annual savings for the
8 Condensing Boiler measure are estimated to be 396 GJ, and the annual savings for the
9 Mid Efficiency Boiler measure are estimated to be 894 GJ.

10 16.1 Please explain why the incremental cost for the Mid Efficiency Boiler measure is
11 higher than for the Condensing Boiler measure.

12
13 **Response:**

14 The boiler size, energy savings, and incremental cost of boiler measures in the 2019-2022 DSM
15 Plan are based upon weighted averages of past participation in the Prescriptive Program. FEI
16 assumes that program participation in the 2019-2022 DSM Plan years will follow a similar profile
17 to previous years in market.

18 The incremental cost of the Mid Efficiency Boiler measure is higher than the Condensing Boiler
19 measure because both the size and incremental cost of Mid Efficiency Boilers actually incented
20 in the Prescriptive Program to date and assumed in the 2019-2022 DSM Plan are greater than
21 for Condensing Boilers. While the incremental cost of a similarly sized Condensing Boiler is
22 higher than a Mid Efficiency Boiler, the incremental cost of all hot water boiler equipment also
23 increases with increased boiler capacity.

24 In the 2019-2022 DSM Plan, the Mid Efficiency Boilers measure has an average assumed rated
25 capacity of 2,630 MBH, while the Condensing Boiler measure has an average assumed rated
26 capacity of 1,400 MBH. Thus, the incremental measure costs presented in the 2019-2022 DSM
27 Plan reflect that the average Mid Efficiency Boiler incented is significantly larger than the
28 average Condensing Boiler.

29

30

31

32

33 16.2 Please explain why the forecasted savings for the Mid Efficiency Boiler measures
34 are so much higher than for the Condensing Boiler measure.

35

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 47

1 **Response:**

2 Similar to the response to BCSEA IR 1.16.1, the natural gas savings of the Mid Efficiency Boiler
3 measure is higher than the Condensing Boiler measure because both the size and natural gas
4 savings of Mid Efficiency Boilers actually incented in the Prescriptive Program to date and
5 assumed in the Application are greater than for Condensing Boilers. While the natural gas
6 savings of a similarly sized Condensing Boiler is higher than a Mid Efficiency Boiler, the natural
7 gas savings of all hot water boiler equipment also increases with increased boiler capacity.

8 In the Application, the Mid Efficiency Boilers measure has an average assumed rated capacity
9 of 2,630 MBH, while the Condensing Boiler measure has an average assumed rated capacity of
10 1,440 MBH. Thus, the natural gas savings presented in the Application reflects that the average
11 Mid Efficiency Boiler incented is significantly larger than the average Condensing Boiler.

12

13

14

15 16.3 Please explain why the Mid Efficiency Boiler is an appropriate, most-efficient
16 option for the 15 forecasted participants, and why they would not be better
17 served by Condensing Boilers.

18

19 **Response:**

20 Typically, mid-efficiency boilers are specified in instances where installation and/or operational
21 requirements cannot readily be met by condensing boilers. The main installation and
22 operational barriers that make mid efficiency boilers preferable to condensing boilers, in certain
23 cases, include:

24 • Retrofitting existing non-condensing equipment with condensing equipment may require
25 new venting, which may not be feasible due to boiler equipment location and/or the cost
26 of installing the appropriate venting; and

27 • Health care facilities often require their heating equipment to be capable of operating a
28 different fuel, other than natural gas, as back-up. While multi-fuel mid efficiency boilers
29 are common, condensing boilers do not have the capability of operating multiple fuel
30 sources.

31

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 48

1 **17.0 Topic: Commercial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 4.4.1,**
3 **Prescriptive Program, pp. 22-23 (pdf 68-69):**

4 FEI forecasts identical participation, incremental costs, and incentives for the Furnace
5 Replacement (baseline: Std.) and Furnace Replacement (baseline: Mid.) measures,
6 however the annual savings are estimated to be 7 GJ for the (Baseline Std.) measure
7 and 5 GJ for the (Baseline: Mid) measure.

8 17.1 Please confirm, or otherwise explain, that the difference in savings is only due to
9 the assumptions regarding the equipment that would otherwise be installed in the
10 absence of the FEI Program.

11
12 **Response:**
13 The Prescriptive Program proposes to provide incentives for early-replacement furnaces. In the
14 absence of an incentive program, customers would typically only purchase a new furnace in a
15 new build or at the end of the existing furnace’s useful life (end-of-life replacement) due to the
16 high capital cost of a furnace upgrade. Therefore, FEI claims the savings equal to the
17 difference in consumption between the high efficiency condensing furnace and either a standard
18 efficiency (7 GJ/year) or mid-efficiency furnace (5 GJ/year), depending on what type of furnace
19 was installed prior to the replacement. The methodology for estimating the savings follows the
20 early replacement methodology of the residential furnace program.

21
22
23
24
25 17.2 Please provide the criteria for receiving an incentive for the Furnace
26 Replacement (baseline: Std.) and Furnace Replacement (baseline: Mid.)
27 measures.

28
29 **Response:**
30 Criteria for receiving a Prescriptive Program incentive for Furnace Replacement includes:
31

- 32 • Meeting the Prescriptive Program Terms and Conditions;
- 33 • Having an existing standard or mid-efficiency furnace in operating condition at the time
34 of replacement;
- Installing an ENERGY STAR-certified high efficiency condensing furnace;



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 49

- 1 • Installing a two-pipe direct vent system; and
- 2 • Completing furnace commissioning and providing FEI a completed furnace
- 3 commissioning sheet.

4
5 Additional criteria may be identified during program design. The eligibility criteria of the
6 residential furnace program will be mirrored for the commercial furnace program where and
7 when feasible in commercial buildings.

8

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 50

1 **18.0 Topic: Commercial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 4.4.2,**
 3 **Performance Program – Existing Buildings, p. 24 (pdf 70):**

4 18.1 For each of the measures listed under the heading “Measure Details” please
 5 provide the basis for FEI’s estimation of the incremental cost and incentive.
 6

7 **Response:**

8 The basis for FEI’s estimation of incremental cost and incentives for each of the measures listed
 9 under the heading “Measure Details” is based on actual values from recent program history as
 10 provided in the table below.

Measure	Incremental Cost	Incentive
Studies - Retrofit	Program data: Performance Program - Existing Building, average energy study cost	50% of incremental cost
Capital Upgrade - Retrofit	Program data: Performance Program - Existing Building, average retrofit cost	Program data: Performance Program - Existing Building, average capital incentive
Recommissioning - Studies	Program data: Continuous Optimization Program, average study cost and FEI average commercial building size	75% of incremental cost
Recommissioning - O&M	Program data: Continuous Optimization Program, average retrofit cost and FEI average commercial building size	75% of incremental cost
Commercial Energy Assessment	Program data: Cost for FEI hire vendor to perform energy assessment	90% of incremental cost

11

12

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 51

1 **19.0 Topic: Commercial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, FEI 2019-2022 DSM Plan, Section 4.4.3, Performance**
3 **Program – New Buildings. p .25 (pdf 71):**

4 19.1 For each of the measures listed under the heading “Measure Details” please
5 provide the basis for FEI’s estimation of the incremental cost and incentive.
6

7 **Response:**

8 For each of the measures listed under the heading “Measure Details”, FEI’s assumptions
9 regarding incremental cost and incentive are provided below:

10 ***BC Energy Step Code - Whole Building***

- 11 • Modeling and construction of a Part 3 building that complies with Step 2, 3 or 4 of BC
12 Energy Step Code
 - 13 ○ Incremental costs are assumed on a broad portfolio of projects of differing sizes,
14 archetypes, and performance achieved over BC Building Code. Source of data
15 is the Integral Group, 2017 Metrics Research Summary Report completed for BC
16 Housing.⁶
 - 17 ○ Incentive is generally calibrated to cover approximately 50 percent of the
18 incremental costs for each Step of the BC Energy Step Code.

19 ***Non-BC Energy Step Code - Whole Building***

- 20 • Modeling and construction of a non-BC Energy Step Code Part 3 building that achieves
21 10 percent or greater performance over BC Building Code
 - 22 ○ Incremental costs assumed on a broad portfolio of projects of differing sizes and
23 performance achieved over BC Building Code. Source of data is weighted
24 average of past BC Hydro and FEI joint new construction program participants.
 - 25 ○ Incentive is generally calibrated to cover approximately 50 percent of the
26 incremental costs.

27 ***Early Engagement***

- 28 • Early program incentive to meet with FEI and develop energy modeling assumptions
 - 29 ○ Incentive and incremental cost assumed to be the cost of customer to engage
30 with FEI to develop energy modelling assumptions.

⁶ <https://www.bchousing.org/publications/BC-Energy-Step-Code-2017-Metrics-Summary.pdf>.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 52

1 **Non-BC Energy Step Code – Engineered Path**

- 2 • Engineered program incentives to encourage energy efficiency equipment installation for
3 new small and medium buildings
- 4 ○ Incremental costs and incentives based on average of existing Prescriptive
5 Program energy conservation measures eligible for new buildings (including
6 boilers and water heaters) and new energy conservation measures under
7 development (including HVAC Controls and condensing make-up air units)

8 **BC Energy Step Code Capacity Building – Charrettes**

- 9 • Incentive to complete a detailed design charrette for a BC Energy Step Code building
- 10 ○ Incremental costs and incentive are based on feedback from building designers
11 on typical full costs of design charrettes.

12 **Existing Program Participants**

- 13 • Incentives for participants with existing commitments in BC Hydro and FEI’s joint new
14 construction program
- 15 ○ Incremental costs and incentives are the based on the actual commitments
16 remaining in the joint new construction program developed from consultant
17 energy modeling.

18
19

20

- 21 19.2 For each of the measures listed under the heading “Measure Details” please
22 explain FEI’s assumptions regarding the activities and/or installations that are
23 included in each measure.

24

25 **Response:**

26 FEI interprets “activities and/or installations” as the Performance Program – New Buildings
27 participant activities being incented in each measure. For each of the measures listed under the
28 heading “Measure Details”, a brief description of what activities are being incented in the
29 measure and the associated program assumptions are presented below:

30 **BC Energy Step Code - Whole Building**

- 31 • Modeling and construction of a Part 3 building that complies with Step 2, 3 or 4 of BC
32 Energy Step Code

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 53

- 1 ○ Energy savings and incremental costs are assumed on a broad portfolio of
2 projects of differing sizes, archetypes, and performance achieved over BC
3 Building Code. Source of data is the Integral Group, 2017 Metrics Research
4 Summary Report completed for BC Housing⁷.
- 5 ○ Measure life is based on an average measure life of typical energy conservation
6 measures included in BC Energy Step Code buildings, including building
7 envelope and HVAC systems.

8 ***Non-BC Energy Step Code - Whole Building***

- 9 • Modeling and construction of a non-BC Energy Step Code Part 3 building that achieves
10 10 percent or greater performance over BC Building Code
- 11 ○ Energy savings, incremental costs, and measure life are assumed on a broad
12 portfolio of projects of differing sizes and performance achieved over BC Building
13 Code. Source of data is weighted average of past BC Hydro and FEI joint new
14 construction program participants.

15 ***Early Engagement***

- 16 • Early program incentive for program participants to meet with FEI and develop energy
17 modeling assumptions associated with both the BC Energy Step Code and Non-BC
18 Energy Step Code Part 3 buildings
- 19 ○ Incentive and incremental cost assumed to be the cost of customer to engage
20 with FEI to develop energy modelling assumptions.
- 21 ○ No energy savings are claimed.

22 ***Non-BC Energy Step Code – Engineered Path***

- 23 • Engineered program incentives to encourage energy efficiency equipment installation for
24 new, small and medium Part 3 buildings.
- 25 ○ Savings, incremental costs and measure life based on average of existing
26 Prescriptive Program energy conservation measures eligible for new buildings
27 (including boilers and water heaters) and new energy conservation measures
28 under development (including heat recovery ventilators and condensing make-up
29 air units).

⁷ <https://www.bchousing.org/publications/BC-Energy-Step-Code-2017-Metrics-Summary.pdf>.

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 54

1 **BC Energy Step Code Capacity Building – Charrettes**

- 2 • Incentive to complete a detailed design charrette for a BC Energy Step Code Part 3
3 building.
- 4 ○ Incremental costs are based on feedback from building designers on typical
5 costs of design charrettes.
- 6 ○ No energy savings are claimed.

7 **Existing Program Participants**

- 8 • Incentives for participants with existing commitments in BC Hydro and FEI's joint new
9 construction program for Part 3 buildings.
- 10 ○ Savings, incremental costs and measure life accounts for actual commitments
11 remaining in joint new construction program developed from consultant energy
12 modeling.

13
14
15

16 19.3 Who will receive the incentives for the listed measures?

17
18 **Response:**

19 Incentives will be issued to the eligible program participant. FEI anticipates that the eligible
20 program participants will be primarily as follows:

- 21 • Developers for multi-unit residential, retail and office buildings that are then operated by
22 stratas or other organizations;
- 23 • Municipal governments for civic buildings;
- 24 • Provincial and federal governments and governmental agencies for schools, hospitals,
25 public care centres, and other public buildings;
- 26 • University and colleges for education buildings and dormitories; and
- 27 • Privately owned companies for office, retail, rental apartment, and other buildings that
28 they develop, construct, and operate.

29

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 55

1 **20.0 Topic: Rental Apartment Efficiency Program.**

2 **Reference: Exhibit B-1, FEI 2019-2022 DSM Plan, Section 4.4.4. p. 26 (pdf 72).**

3 20.1 For each of the measures listed under the heading “Measure Details” please
4 provide the basis for FEI’s estimation of the incremental cost and incentive.

5
6 **Response:**

7 The estimates for the incremental cost and incentive values for Energy Assessments,
8 Implementation Support and Recirculation Controls were derived from the actual vendor costs
9 to conduct those activities. Since those measures are included as part of the Rental Apartment
10 Efficiency program, the participant receives them without cost. Therefore, the incremental cost
11 and incentive values are the same. The estimates for the incremental cost and incentives for
12 Condensing Boilers and Water Heaters were derived from program data of actual costs
13 associated with installs averaged by apartment buildings.

14
15

16

17 20.1.1 Why is the estimated incentive for the Condensing Boiler measure
18 equal to 74% of the incremental cost, while the estimated incentive for
19 the Water heater measure is equal to 13% of the incremental cost?

20

21 **Response:**

22 FEI assumes that the percentages presented in the question were calculated by dividing the
23 incentive over the incremental cost found in section 4.4.4 on page 26 of Appendix A to the
24 Application (Exhibit B-1). To provide context, the incremental cost and incentive values included
25 in section 4.4.4 are aggregated averages based on program data of actual costs and incentives
26 specifically for water heaters and condensing boilers in apartment buildings. These values will
27 vary significantly on a participant-by-participant basis due to differing retrofit costs and
28 incentives which are determined based on equipment types and capacity. As such, the
29 incentive ratio of incremental costs may show one participant with a high percentage and
30 another with a low percentage for the same measure type.

31 In general, condensing boilers do receive a larger incentive when compared to incremental
32 costs than that of water heaters. This is appropriate since condensing boilers require larger
33 upfront costs when compared to water heaters. FEI will continue to evaluate incentive levels
34 through consultations with industry and program partners and may modify accordingly to
35 optimize program participation.

36

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 56

1 **21.0 Topic: Industrial Energy Efficiency Program Area**

2 **Reference: FortisBC Energy Efficiency and Conservation Advisory Group**
3 **(EECAG), Meeting notes for May 30, 2018 Status Update Call**
4 **regarding the 2019 – 2022 DSM Expenditure Plan**

5 The notes say:

6 “EECAG Member: Total funding allocation to Industrial appears lower. Is that because
7 participation in Residential and Commercial is that much better than Industrial or is it
8 because lack of uptake from industrial customers? Why are you not seeing greater
9 uptake in Industrial programs?”

10 “FEI staff: Yes Industrial allocation is lower. Historically FEI believes this is due to a
11 number of issues including challenges in how our program design integrates with capital
12 planning cycles of industrial customers. FEI has been working with Key Account
13 Managers and Program staff to revise industrial programs and better align program
14 design with internal processes and planning cycles of our industrial customers. We
15 believe uptake in industrial programs will improve but will still take time to implement.”
16 [page 5]

17 21.1 Over what time-frame does FEI expect that “uptake in industrial programs will
18 improve”? Is this improved uptake reflected in the 2019 – 2022 DSM Plan?

19
20 **Response:**

21 FEI industrial programs are showing improved uptake in 2018, which FEI expects to continue
22 during the 2019-2022 period. In 2018, the Industrial program area is forecast to achieve a \$0.8
23 million increase in new Industrial Performance Program capital incentive commitments as
24 compared to 2017. Due to the long capital planning and implementation cycles there is typically
25 a one to two year lag between industrial project commitments and project completions. Thus,
26 FEI expects to fulfill the increased 2018 capital commitments in 2019 and 2020. Furthermore,
27 the addition of new Industrial Prescriptive Program measures has also resulted in new
28 opportunities for uptake in FEI industrial programs.

29 The increased uptake in Industrial Performance and Prescriptive Programs and introduction of
30 the FEI Industrial Strategic Energy Management Program is reflected in the 2019-2022 DSM
31 Plan participation numbers.

32

33

34

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 58

1 **22.0 Topic: Industrial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Prescriptive**
 3 **Program, Section 5.4.2. pp.31-32 (pdf 77-78).**

4 22.1 For each of the measures listed under the heading “Measure Details” please
 5 provide the basis for FEI’s estimation of the incremental cost and incentive.
 6

7 **Response:**

8 In 2017, FEI retained the Posterity Group to develop industrial prescriptive measures identified
 9 in the CPR and to recommend additional industrial prescriptive measures for the Industrial
 10 Prescriptive Program. The incremental cost for Industrial Prescriptive Program measures were
 11 developed in that study with the exception of “Process Boiler” and “Other Prescriptive
 12 Measures”.

13 The source of Prescriptive Program incremental costs referenced in the 2017 Posterity Study
 14 and for the remaining measures are as follows:

Measure	Source	Reference
Air Curtains, Small and Medium	2017 Posterity Group Study	Enbridge and Union Gas Joint TRM Input Assumptions, December 12, 2016
Air Curtains, Large	2017 Posterity Group Study	Illinois Technical Resource Manual v. 6.0, February 8, 2017, adjust to CAD
Direct Contact Water Heaters	2017 Posterity Group Study	Pacific Gas and Electric, Work Paper PGECOPRO106, Direct Contact Water Heater, Revision 4 (adjusted to CAD)
Steam Traps Survey	2017 Posterity Group Study	CLEAResult Market Characterization of Steam Trap Maintenance Practices, Rev 4, August 2016
Steam Traps Replacement	2017 Posterity Group Study	CLEAResult Market Characterization of Steam Trap Maintenance Practices, Rev 4, August 2016
Pipe Insulation	2017 Posterity Group Study	Illinois Technical Resource Manual v. 6.0, 2017 (adjusted to CAD)
Tank Insulation	2017 Posterity Group Study	2017 Michigan Energy Measures Database (adjusted to CAD)
Process Boiler	Actual Commercial and Industrial Prescriptive Program costs	Averages of historical incremental costs from past Prescriptive Program boiler participants
Other Prescriptive Measures	Assumed	Assumed to be an incremental cost that drives a TRC positive measure. Reflects additional measures to be identified and developed in plan period.



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 59

1 The new Prescriptive Program incentives were determined based on recommendations from the
2 Posterity Group. The incentives were generally calibrated to be the lesser of the following
3 criteria:

- 4 • For measures with a measure life over 10 years, the incentive sufficient to reduce the
5 incremental measure cost to two years payback;
- 6 • The incentive equal to 50 percent of the incremental cost; or
- 7 • The incentive amount in other utility DSM programs that have seen success in
8 generating measure uptake.

9
10
11

12 22.1.1 For the measures “Tank Insulation, 1” Low Temp” and “Tank Insulation
13 1” High Temp,” what is the basis for FEI’s assumption that a \$16,145
14 incentive is appropriate for a \$134,968 incremental cost?
15

16 **Response:**

17 In the 2019-2022 DSM Plan FEI was conservative in assigning incremental costs for industrial
18 measures not yet in market. The insulation measures have several materials that meet the
19 qualifying criteria for the FEI Prescriptive Program incentive. Some of the materials, such as
20 mineral wool insulation, can be two to three times more expensive than foam insulation. Both
21 have similar insulating benefits and qualify for the incentive, but are often used for different
22 applications.

23 While the incremental cost presented in the 2019-2022 DSM Plan is conservative, reflecting a
24 higher cost material, the incentive was calibrated to avoid over-incenting the less expensive, but
25 still qualifying, insulation materials. As insulation costs vary significantly, in many cases the
26 incentive will still roughly cover 50 percent of the cost of the measure.

27 The pipe and tank insulation incentives were developed based on the findings of the Pacific Gas
28 and Electric industrial program that has been in market for several years. The insulation
29 incentive levels offered by FEI are similar to the Pacific Gas and Electric insulation incentives.

30
31
32

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 61

1 **23.0 Topic: Industrial Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Selected**
3 **Highlights, Section 5.2. p.27 (pdf 73):**

4 FEI states:

5 “FortisBC may run the SEM program jointly or in partnership with the existing BC Hydro
6 industrial SEM.”

7 23.1 Please confirm, or otherwise explain, that the intended reference was FEI rather
8 than FortisBC.

9

10 **Response:**

11 Confirmed. The intended reference was FEI rather than FortisBC.

12

13

14

15 23.2 If confirmed, please explain the process by which FEI will determine whether to
16 run the SEM program in partnership with BC Hydro or not.

17

18 **Response:**

19 Since filing the Application, BC Hydro and FEI have agreed to run the SEM jointly starting in
20 2019, conditional on approval of the Application.

21 FEI worked with consultants, customers and other utilities through direct engagement,
22 workshops and research to determine how to support industrial energy management. In
23 consultation with other utility DSM programs, it was noted that a natural gas-only industrial
24 strategic energy management is not best practice and typically SEM is conducted jointly with
25 electric utilities. FEI collaborated with BC Hydro to develop the framework for an incremental
26 addition to the existing BC Hydro Industrial SEM cohort and industrial energy management
27 program offers.

28 This approach was selected following consultation with BC Hydro and industrial customers. The
29 approach minimizes customer confusion and achieves cost-efficiencies.

30

31

32



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 62

1 23.3 If confirmed, please explain the criteria FEI will use in determining whether to run
2 the SEM program in partnership with BC Hydro or not.

3

4 **Response:**

5 The main driver that would prompt FEI to develop an SEM program independently would be if
6 BC Hydro withdrew their SEM program from market. Other drivers may include:

7 • If FEI receives consistently negative customer feedback on the joint SEM offer, which
8 has not been received during the current pilot; or

9 • If program evaluation suggests better alternatives to achieve energy management
10 savings.

11

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 63

1 **24.0 Topic: Low Income Energy Efficiency Program Area**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 6.4.3.,**
3 **Prescriptive Program, p.39 (pdf 85):**

4 24.1 Please explain the meaning of the term “Top Up” as used in the measure list.

5
6 **Response:**

7 The term “Top Up” is used when a Low Income program is very similar to an existing
8 Residential or Commercial program but has an enhanced Low Income incentive. The
9 equivalent Residential or Commercial incentive is enhanced for Low Income customers in
10 recognition of the fact that low income individuals and social housing providers have limited
11 financial resources and require a higher incentive to adopt energy efficient measures.

12
13

14

15 24.2 For some measures (e.g., 0.67 EF Storage Tank Water Heater Top Up) the
16 incentive is slightly more than the incremental cost, and for others it is slightly
17 less. Was this FEI’s intent? Please explain.

18

19 **Response:**

20 Yes, this was FEI’s intent. As this question accurately suggests, the variance is only a slight
21 variance. The main reason the incentive isn’t exactly the same as the incremental cost is to
22 support program marketing; it is beneficial to communicate and easier for a customer to
23 remember a rounded number. In the case of 0.67 EF Storage Tank Water Heater Top Up, the
24 incremental cost of \$246 is less easy to communicate and less easy for customers to retain than
25 the proposed incentive amount of \$250. Similarly, for a few programs, where the incremental
26 cost was not a round number, the incentive amount was rounded slightly up or slightly down in
27 order to arrive at an incentive amount that is favorable for communications.

28

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 64

1 **25.0 Topic: Conservation Education and Outreach Initiatives**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 7.2.,**
3 **Selected Highlights, p.42-43 (pdf 88-89):**

4 Regarding the Residential Customer Engagement Tool, FEI states:

5 “Based on industry research, gas savings for this type of initiative are estimated at
6 approximately 1% of total participant natural gas consumption. However, since these
7 savings are primarily based on behavior changes and there is uncertainty on their
8 relative magnitude, they cannot be effectively forecast at this time and have not been
9 included in this DSM Plan. Once savings are realized, they will be reported in the DSM
10 Annual Reports. FEI considers this to be an energy management program, and hence a
11 specified demand-side measure, as defined in the DSM Regulation.” [pdf 88-89]

12 25.1 Please explain the EM&V approach that FEI expects to use to determine the
13 magnitude of any savings.

14

15 **Response:**

16 Please refer to the response to BCUC IR 1.17.2.

17

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 65

1 **26.0 Topic: Conservation Education and Outreach Initiatives**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 7.4.2,**
3 **Residential Customer Engagement Tool, p.45, (pdf 91):**

4 FEI states:

5 “This program will provide customers with an online portal and home energy reports
6 where customers can access targeted energy conservation content. Other engagement
7 measures may be included in future years to foster behavior change.” [pdf 91]

8 26.1 Please describe FEI’s anticipated approach for using these tools.

9

10 **Response:**

11 FEI expects the Residential Customer Engagement Tool will enable FEI to reach residential
12 customers with targeted energy conservation content that FEI has not normally been able to
13 deliver through traditional communication outreach strategies. FEI plans to use this tool to
14 increase customer literacy of their energy usage by providing details of their specific home
15 energy consumption across appliance type and comparisons across similar buildings, and to
16 provide them with pathways to reduce their consumption. FEI intends to leverage both the
17 online portal and the home energy reports to drive behaviour change, increase DSM program
18 participation, and improve customer satisfaction levels.

19 FEI estimates that approximately 400,000 residential customers will have access to targeted
20 energy conservation content in 2019. This number is expected to grow to approximately
21 675,000 customers by 2022. Access to this targeted energy conservation content will be made
22 available through the online portal, which may include action plans, reward programs, seasonal
23 tips, links to contractors, and other related content. Further to having access to the online portal,
24 approximately 25 percent of those customers will be selected to receive home energy reports in
25 proportion with that growth rate. This translates to approximately 100,000 customers receiving
26 home energy reports in 2019, growing to approximately 170,000 in 2022. According to vendor
27 recommendations, home energy reports will be sent approximately six times per year and
28 include a consumption analysis, targeted recommendations, similar home comparisons and
29 energy saving tips. FEI will leverage both the online portal and the home energy reports to
30 reduce energy consumption through increasing customer literacy of their energy usage, driving
31 behaviour change, increasing DSM program participation, and improving customer satisfaction
32 levels.

33

34

35



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 67

1 **Response:**

2 FEI has not yet selected a third-party implementer for the Residential Customer Engagement
3 Tool.

4

5

6

7

26.1.3.1.1 If yes, who is the third-party implementer?

8

9 **Response:**

10 Please refer to the response to BCSEA IR 1.26.1.3.1.

11

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 68

1 **27.0 Topic: Enabling Activities**

2 **Reference: Exhibit B-1, Appendix A, FEI 2019-2022 DSM Plan, Section 9.2.3.,**
3 **Reporting Tool and Customer Application Portal, p.55 (pdf 101):**

4 FEI states:

5 “The Demand-side Management Tracking System (“DSMS”) Project will transition
6 FortisBC Inc. and FEI from their existing DSM tracking systems onto a new, joint system.
7 These tracking systems are used to manage DSM rebates from the application stage
8 through to payment, including application review, reporting, and customer
9 communications. The primary reasons for transitioning both utilities to a new system are:
10 an improved ability to operate joint programs by sharing a platform, the introduction of
11 online application forms for gas customers, improved reporting via integrated
12 dashboards, and a powerful communications management system.” [pdf 101]

13 27.1 Please describe how FEI and FortisBC will take advantage of the new joint
14 system to improve their ability to operate joint programs.

15

16 **Response:**

17 Joint program operation between FEI and FBC are expected to realize the following benefits
18 from the new system:

19 • Programs, measures, and other DSM information will only need to be updated in a single
20 system, rather than in both systems.

21 • The new joint rebate portal will streamline the application process, creating efficiencies
22 for internal users as well as customers.

23 • Program reporting will be holistic and more efficient. Rather than creating two separate
24 reports to obtain the same information, a single report will now contain all data required.

25 • New users will only need to be trained on a single system.

26 • Program representatives will have a single source of information while assisting
27 customers with rebate inquiries.

28



FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 69

1 **28.0 Topic: Demand Oriented DSM**

2 **Reference: none**

3 28.1 Does FEI propose to implement any pilot programs in the 2019-2022 Plan period
4 that will have a specific focus on gauging the opportunities to use DSM to obtain
5 capacity savings in order to defer infrastructure projects that would otherwise be
6 needed?

7
8 **Response:**

9 Please refer to the response to BCUC IR 1.3.1.

10

11

12

13

14 28.2 Is FEI applying for approval for any expenditures in the present Application to
15 address using DSM to obtain capacity savings that could defer infrastructure
16 projects that would otherwise be needed?

17

18 **Response:**

19 Please refer to the response to BCUC IR 1.3.1.

20

FortisBC Energy Inc. (FEI or the Company) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (the Application)	Submission Date: September 20, 2018
Response to BC Sustainable Energy Association and Sierra Club BC (BCSEA) Information Request (IR) No. 1	Page 70

1 **29.0 Topic: Funding Transfers and Accounting Treatment**

2 **Reference: Exhibit B-1, sections 9.1 & 9.2, pp. 35-36 (pdf 40-41)**

3 FEI states:

4 “FEI proposes that starting with 2019 it be permitted to transfer or “rollover” unspent
5 expenditures in a Program Area to the same Program Area in the following year.” [pdf
6 35]

7 and:

8 “Under the current approved treatment, \$15 million of expenditures are forecast in the
9 rate base DSM Deferral account each forecast year and the difference between the \$15
10 million forecast and actual expenditure levels, up to the approved amount, are
11 accounted for in FEI’s non-rate base DSM Deferral account, attracting a weighted
12 average cost of capital (WACC) return, in the year they are expended. [pdf 36; underline
13 added]

14 29.1 Please confirm that any “rollover” expenditures would only be put into rate base
15 when they were actually spent.

17 **Response:**

18 Confirmed. It is FEI’s intent that rollover amounts would only be put into rate base after they are
19 actually spent. As discussed in section 9.2 of the Application (Exhibit B-1), the accounting
20 treatment that FEI is seeking would place \$30 million of the proposed annual expenditures into
21 rate base in the spending year, with the remainder of actual expenditures (above \$30 million)
22 being placed into FEI’s non-rate base DSM deferral account. Only actual expenditures would
23 be placed in the non-rate base DSM deferral account and these would be added to rate base at
24 the beginning of the following year. As discussed in response to CEC IR 1.17.2, FEI expects
25 that expenditures will continue to be at least \$30 million each year. If approved, this accounting
26 treatment will ensure that only the actual expenditures will be added to the rate base and that
27 any rollover of the approved spending amounts will only be added to rate base if and after they
28 are actually spent.

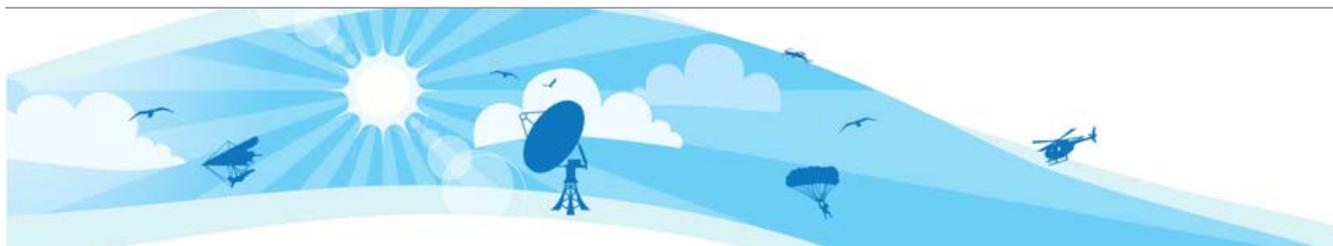
Attachment 1.1

Climate Leadership Plan

AUGUST 2016



Climate Leadership Plan



AUGUST 2016



For more information visit the website:
gov.bc.ca/ClimateLeadership

COPYRIGHT © 2016, PROVINCE OF BRITISH COLUMBIA. ALL RIGHTS RESERVED. THIS MATERIAL IS OWNED BY THE GOVERNMENT OF BRITISH COLUMBIA AND PROTECTED BY COPYRIGHT LAW. IT MAY NOT BE REPRODUCED OR REDISTRIBUTED WITHOUT THE PRIOR WRITTEN PERMISSION OF THE PROVINCE OF BRITISH COLUMBIA.



PRODUCTION OF THIS DOCUMENT INCLUDED ENVIRONMENTALLY FRIENDLY
BEST PRACTICES. PLEASE REDUCE, REUSE AND RECYCLE.



Table of Contents



B.C.'S VISION FOR CLIMATE LEADERSHIP	2
CLIMATE LEADERSHIP PLAN AT A GLANCE	5
PATHWAY TO THE PLAN	7
<i>CLIMATE CHANGE IS HAPPENING</i>	<i>8</i>
<i>BRITISH COLUMBIA IS TAKING ACTION</i>	<i>9</i>
<i>THE CLIMATE LEADERSHIP TEAM</i>	<i>10</i>
<i>PUBLIC AND STAKEHOLDER ENGAGEMENT</i>	<i>11</i>
<i>PROGRESS TO 2050 TARGET</i>	<i>12</i>
ACTION AREAS	14
<i>ACTION AREA: NATURAL GAS</i>	<i>15</i>
<i>ACTION AREA: TRANSPORTATION</i>	<i>18</i>
<i>ACTION AREA: FORESTRY AND AGRICULTURE</i>	<i>22</i>
<i>ACTION AREA: INDUSTRY AND UTILITIES</i>	<i>28</i>
<i>ACTION AREA: COMMUNITIES AND BUILT ENVIRONMENT</i>	<i>34</i>
<i>ACTION AREA: PUBLIC SECTOR LEADERSHIP</i>	<i>40</i>
NEXT STEPS ON CLIMATE LEADERSHIP	44
APPENDIX	46
<i>SUMMARY OF ACTION AREAS</i>	<i>46</i>

B.C.'s Vision for Climate Leadership



British Columbians are proud to be recognized worldwide as leaders in the fight against climate change. We have proven that you can cut emissions while creating jobs.

In 2008, the Province released our Climate Action Plan and the world took notice. Since then it has provided us with the foundation we needed to reach our first target to reduce greenhouse gas (GHG) emissions to 6 per cent below 2007 levels by 2012.

We knew then that carbon pricing had to be central to any plan to fight climate change. That is why British Columbia was the first jurisdiction in North America to introduce a broad-based, revenue-neutral carbon tax. We knew we had to get our own public sector emissions in order before asking industry and the general public to do the same, so we implemented our Carbon Neutral Government legislation. Along with California, we were also the first to implement a low carbon fuel standard.

Our plan recognized that there were fundamental policies that everyone had to get going on — like addressing the emissions that come from our built environment, helping buyers afford low-emission, electric and hydrogen fuel cell vehicles, and preparing our province for climate change with an adaptation strategy.

Since 2011, I have had the honour to serve as British Columbia's Premier, and I am proud to say we have continued this passionate commitment to fighting climate change through actions such as: renewing the Clean Energy Vehicle program; expanding the Carbon Neutral Capital Program to health authorities and public post-secondary institutions; providing funding for energy efficiency improvements in our local governments and First Nations; and working with partners here in Canada and the U.S. on initiatives to fight climate change.

Through these actions and others, British Columbia has demonstrated that we can reduce emissions while continuing to grow the economy and create jobs. We are already seeing proof — our province now has over 60,000 clean economy jobs.

Today, we continue to build on the work we started in 2008 by launching our new Climate Leadership Plan. While our 2008 strategy laid the foundation for large scale change, we are now developing a strategy to add targeted, coordinated, sector-specific actions. We started by consulting with experts and listening to British Columbians. Now we are taking action with an approach that recognizes that real sustainability means balancing environmental concerns with social and economic issues, such as affordability and job creation.

B.C. has the highest and most comprehensive carbon tax in North America. As climate leaders, we know we can achieve more working together with Canada's provinces, territories and the federal government, while respecting each other's jurisdictions. We support the adoption of B.C.'s price on carbon as a national benchmark, and increasing that price together in an effective and affordable way, once others catch up.

Revenue neutrality remains the core principle of British Columbia's carbon tax. The carbon tax can only increase if every dollar is returned to citizens in the form of tax relief. In that way, we tax the pollution we don't want and use the money for what we do want — money in people's pockets, jobs and opportunity.

The Province will also protect jobs by ensuring B.C.'s global competitiveness. As our Climate Leadership Team recommended, we will design a mechanism to protect the competitiveness of our industries that depend on energy and trade.

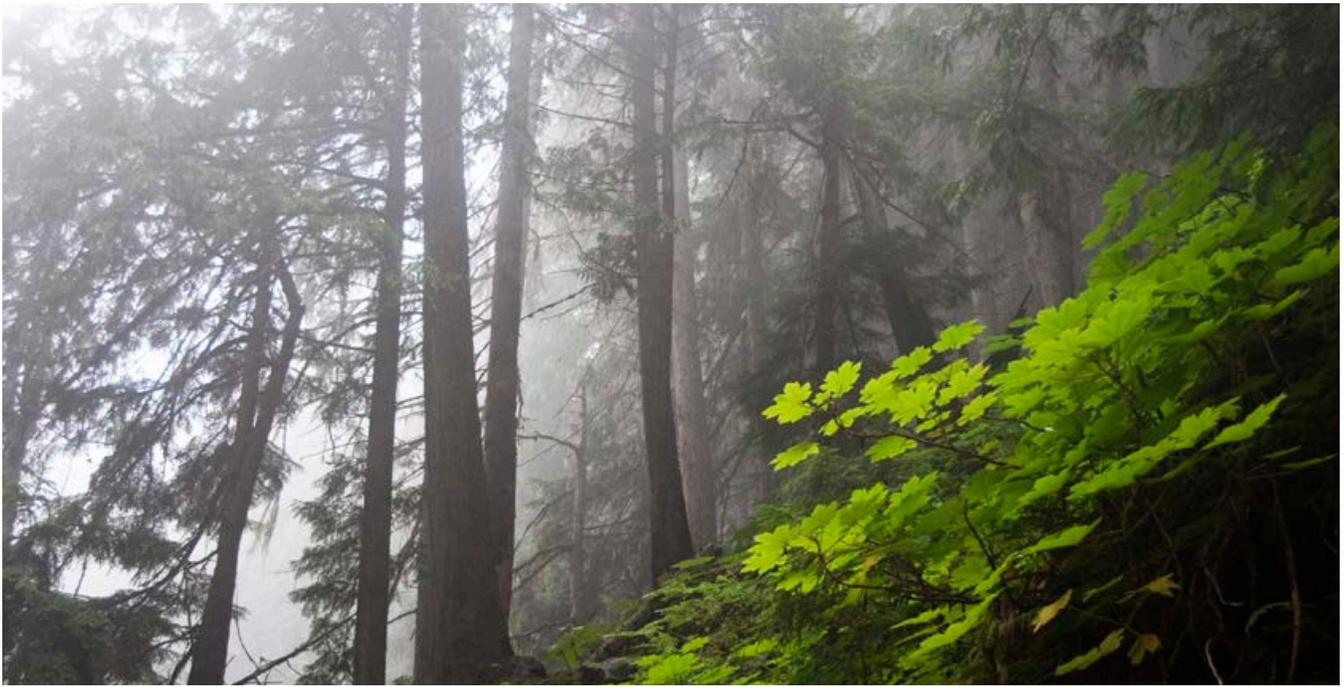
“British Columbia has the highest and most comprehensive carbon tax in North America.”

Carbon pricing is one of several key tools to tackle climate change. Technological breakthroughs and innovations are also required, as well as targeted actions to reduce greenhouse gas emissions, like the ones we are announcing today.

We are taking action across key areas where emissions are created, including upstream methane emissions mitigation, new transit options and energy-efficient building improvements. We are ensuring that we develop industries like liquefied natural gas in ways that are cleaner than competing jurisdictions, allowing us to ship it to other nations where it can reduce their reliance on higher carbon energy sources like coal and oil. By seizing the opportunity of a low carbon economy and securing global trade partnerships, we can create thousands of green jobs in areas like clean technology and clean energy, contributing to reductions in emissions not just here at home, but around the world.



Photo Credit: Adam Ryder/World Bank (<https://creativecommons.org/licenses/by-nc-nd/2.0/legalcode>)



B.C.'s Climate Leadership Plan must be a living, breathing strategy. It has to grow as we work with our partners across Canada to align policies to produce the most effective results. It must also engage our industry, communities and First Nations to find ways to achieve our goals together. This first set of actions cannot solve all of the issues we face — many will require complex strategies that account for a wide range of related factors. So we need to take the time to get them right.

B.C. is committed to reaching our 2050 target to reduce GHG emissions to 80 per cent below 2007 levels. That means continuing to update our plan, which we will do over the course of the following year and every five years after that.

This document will help you learn about the first new steps we are taking, as well as the ways that industry, First Nations, communities and individuals can participate in our mission to fight climate change.

The world is moving towards a lower carbon future and B.C. is well positioned to continue to lead this movement. With over 200 clean tech companies, abundant clean energy and natural resources, and a strategy to support innovation across all sectors, B.C.'s green economy is creating jobs today and the foundation for a secure tomorrow.

We applaud the federal government's renewed commitment to the fight against climate change, and look forward to working with them on the Pan-Canadian Framework. This is a critical issue that requires every level of government working together, alongside industry and communities, to create an integrated strategy to achieve our climate action goals. Our province is committed to being at the forefront of this fight and continuing to demonstrate climate action leadership.

We hope that you will join us in this important mission.

Sincerely,

A handwritten signature in black ink that reads "Christy Clark". The signature is fluid and cursive, with the first name "Christy" being larger and more prominent than the last name "Clark".

**HONOURABLE CHRISTY CLARK
PREMIER OF BRITISH COLUMBIA**

Climate Leadership Plan at a Glance



The Climate Leadership Plan is British Columbia's next step to fight climate change. This plan highlights the first set of actions we are taking to help meet our 2050 emissions reduction target of 80 per cent below 2007 levels, while building a clean economy.

These actions are expected to reduce annual greenhouse gas emissions by up to 25 million tonnes below current forecasts by 2050 and create up to 66,000 jobs over the next ten years.



Natural Gas

Natural gas offers an opportunity to grow British Columbia's economy, while helping other jurisdictions reduce their carbon footprint by transitioning to this cleaner burning fuel.

We are taking action in three key areas:

- ☑ Launching a strategy to reduce upstream methane emissions by 45 per cent;
- ☑ Developing regulations to enable carbon capture and storage; and
- ☑ Investing in infrastructure to power natural gas projects with British Columbia's clean electricity.

This action area is expected to reduce annual emissions by up to 5 million tonnes by 2050.



Transportation

Transportation is essential to keep British Columbia moving, but a significant source of our emissions.

The Province is launching new actions to reduce the impact of transportation, including:

- ☑ Increasing the requirements for our Low Carbon Fuel Standard;
- ☑ Amending regulations that encourage switching commercial fleets to renewable natural gas;
- ☑ Expanding support for zero emission vehicle charging stations in buildings; and
- ☑ Expanding the Clean Energy Vehicle program to support new vehicle incentives and infrastructure.

This is in addition to our 10-year transportation plan that will:

- ☑ Invest in infrastructure to reduce congestion;
- ☑ Create new rapid transit lines; and
- ☑ Shift more public transit to low carbon fuels.

In total, this action area is expected to reduce annual emissions by up to 3 million tonnes by 2050.



Forestry & Agriculture

Forestry and agriculture are foundational industries in British Columbia's economy. Our forests also offer incredible potential for storing carbon, so we are taking further action to:

- ☑ Rehabilitate under-productive forests;
- ☑ Recover more wood fibre; and
- ☑ Avoid emissions from burning slash.

Additionally, we are expanding a nutrient management program that will help improve the environmental performance of B.C.'s farms. This action area is expected to reduce annual emissions by up to 12 million tonnes by 2050.



Industry & Utilities

B.C.'s industrial sectors create good jobs for British Columbians, but they also require significant amounts of energy to power production. That is why we are taking action to reduce these emissions, including:

- ☑ Developing new energy efficiency standards for gas fired boilers;
- ☑ Enabling further incentives to promote adoption of efficient gas equipment; and
- ☑ Facilitating projects that will help fuel marine vessels and commercial vehicles with cleaner burning natural gas.

We are working with utilities on their demand-side management programs to make electrification projects and natural gas equipment more efficient. We are also committing to making B.C.'s electricity 100 per cent clean or renewable, with allowances to address reliability. These actions are expected to reduce annual emissions by up to 2 million tonnes by 2050.



Communities & Built Environment

Communities across B.C. play a critical role in the fight against climate change, particularly in the areas of buildings, waste, and planning. To build on progress already made in our communities, we are:

- ☑ Working with local governments to refresh the Climate Action Charter;
- ☑ Identifying tools to focus growth near transit corridors; and
- ☑ Supporting more resilient infrastructure.

We are also amending regulations to promote more energy efficient buildings, developing requirements to encourage net zero ready buildings, and creating a strategy to reduce waste and turn it into valuable resources. This action area is expected to reduce annual emissions by up to 2 million tonnes by 2050.



Public Sector Leadership

B.C.'s public sector is already leading the way in demonstrating how climate action can help reduce emissions. To continue this leadership, we are taking action with new strategies, including:

- ☑ Promoting use of low carbon and renewable materials in public sector buildings; and
- ☑ Mandating the creation of 10-year emissions reduction and adaptation plans for provincial public sector operations.

This action area is expected to reduce annual emissions by up to 1 million tonnes by 2050.

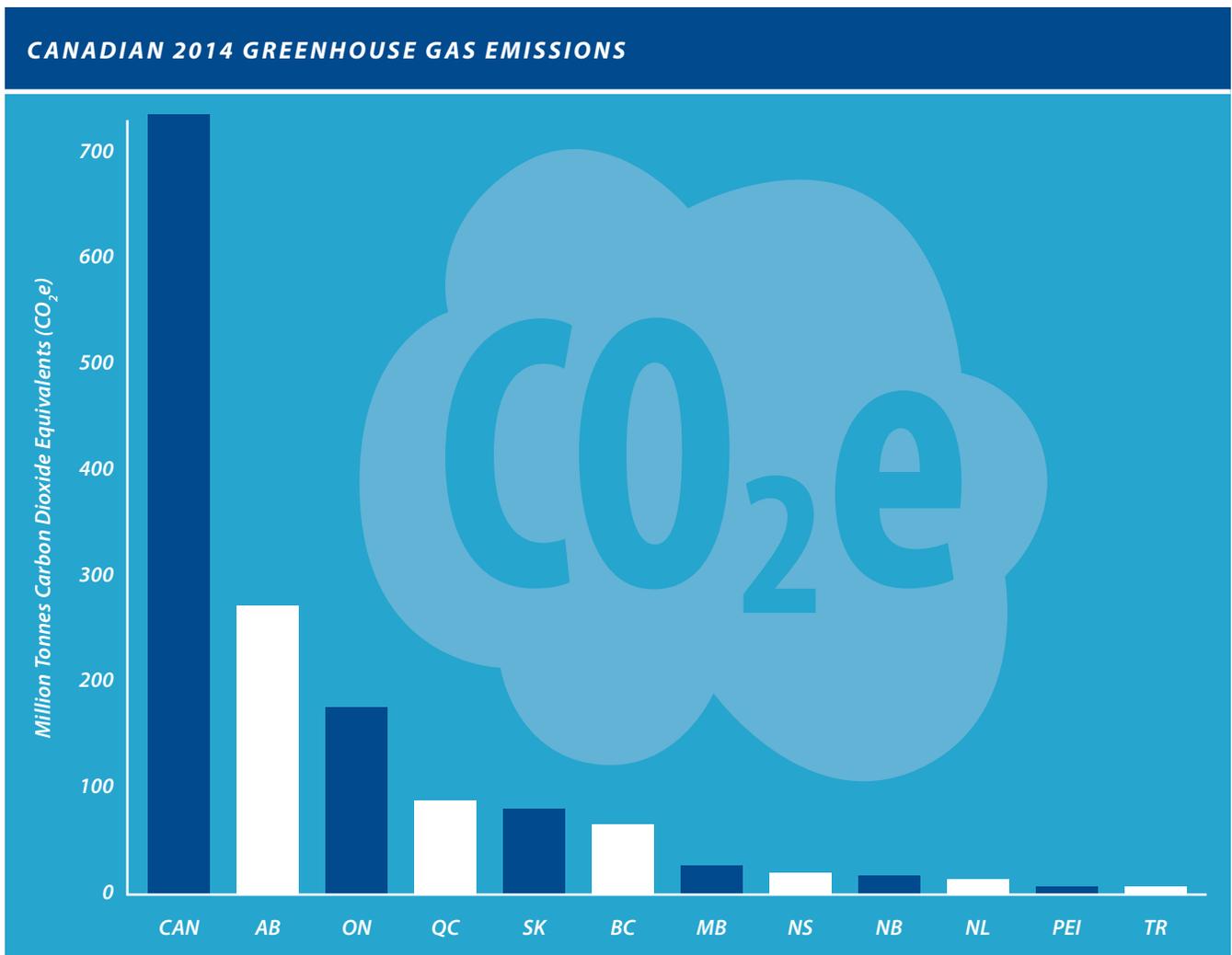
This set of 21 actions targets key areas we can act on now. The Climate Leadership Plan will be updated over the course of the following year as work on the Pan-Canadian Framework on climate action progresses.

Pathway to the Plan



The strategic actions included in this document represent the first steps the B.C. government is taking to update our climate action plan to work towards our 2050 goal. This plan is informed by the recommendations of our Climate Leadership Team, as well as our public engagement with British Columbians, industry, First Nations, communities and key stakeholders.

As we work with the federal government and our provincial and territorial partners to establish and implement a coordinated climate action plan, more actions will be announced. In this section you will learn what has driven the development of the actions being taken today, as well as a report on our progress to the 2050 target to date.



Climate Change is Happening

Climate change is one of the most critical issues humanity faces. It is an important battle that all governments need to demonstrate leadership on.

This year in Canada, we saw its impacts happening in real time, as out-of-control wildfires in British Columbia and Alberta displaced thousands of workers, families and residents. The evidence is in front of us — we have already seen considerable climate change in British Columbia over the past century.

ENVIRONMENTAL CHANGE IN B.C. LOOKING BACK

TEMPERATURE: Average temperature has increased over all of B.C. since 1900 (1.4°C per century).*

PRECIPITATION: Average precipitation has increased over most of southern B.C. (1900 – 2013).

GLACIERS: All glaciers in British Columbia have retreated from 1985 to 2005.

SEA LEVEL RISE: Average sea level has risen along most of the B.C. coast over the past 95 years.

* Winter is warmer on average than it was 100 years ago. Higher temperatures drive other climate systems and affect our environment and ecosystems.

The impacts of climate change will become more pronounced as we head towards 2050. That is why it is critical we continue to work to achieve our climate action goals. We must take action to mitigate these impacts today.

LOOKING TO 2050

TEMPERATURE

- » By 2050, B.C. is projected to be at least 1.3°C warmer and may be as much as 2.7°C warmer than in recent history.
- » Growing seasons will be longer; species ranges will shift; the winter tourism season will be shorter.

PRECIPITATION

- » By 2050, average annual rainfall may increase from 2 per cent to 12 per cent, with the potential for increased frequency of drier summers and increases in extreme rain events.
- » Dry conditions contribute to forest fire season severity; heavy rain impacts buildings and infrastructure.

GLACIERS

- » By 2100, B.C. is projected to lose up to 70 per cent of its glaciers.
- » This will impact the timing and volume of river flow, drinking water quality and quantity, agriculture and winter alpine tourism.

SEA LEVEL RISE

- » Sea level will continue to rise at most locations on the B.C. coast.
- » Coastal flooding frequency and magnitude is expected to increase.

Sources: Plan2Adapt, Pacific Climate Impacts Consortium; <http://www.plan2adapt.ca>; Relative Sea-level Projections in Canada and the Adjacent Mainland United States; Geological Survey of Canada. James, TS, et al, 2014; and Projected Deglaciation of Western Canada in the 21st Century; Nature, Clarke et al, 2015.

British Columbia is Taking Action

Increasing knowledge of the impacts of climate change is what drove the launch of our world-leading Climate Action Plan in 2008. This plan included a wide range of large-scale policies designed to reduce British Columbia's impact on the environment, and was foundational in driving us to reach our first target to reduce GHG emissions to 6 per cent below 2007 levels by 2012.

To read the original plan in detail, go to: <http://www2.gov.bc.ca/gov/content/environment/climate-change/policy-legislation-programs>.

By the end of 2012, all of the actions outlined in the first plan were underway or complete, including more than \$1 billion in climate action programs and tax incentives to encourage cleaner choices.

Since 2012, British Columbia has continued to invest in the innovation and infrastructure that will help us reach our 2050 target.

To date, an additional \$1.9 billion has been dedicated to keeping British Columbia on the path to a lower carbon economy, including investments such as:

- » \$50 million in clean energy and technology;
- » \$831 million for clean transportation;
- » \$300 million for transportation infrastructure;
- » \$24 million to improve the energy efficiency of homes and businesses; and
- » \$704 million for clean electricity infrastructure.



In 2016, British Columbia has continued engagement on climate action by participating in initiatives that align our climate action goals with our neighbours within Canada and internationally, including:

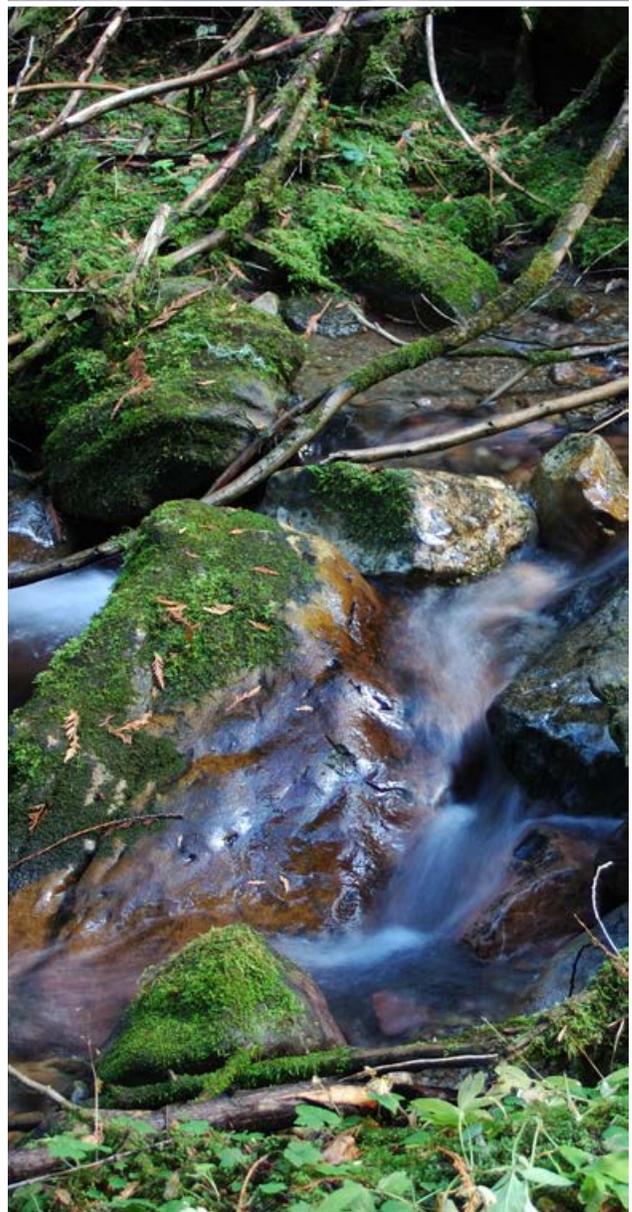
- » The ***Vancouver Declaration on Clean Growth and Climate Change***;
- » The ***Carbon Pricing Leadership Coalition***;
- » ***Under 2 MOU*** (Subnational Global Climate Leadership Memorandum of Understanding);
- » ***Pacific Coast Collaborative*** Climate Leadership Action Plan;
- » ***RegionsAdapt*** Initiative; and
- » ***International Zero-Emissions Vehicle Alliance***.

Now, the actions presented in this document outline the first steps we are taking under our new Climate Leadership Plan. This plan, which we will continue to update over the course of the following year and every five years after that, is creating strategies, programs, infrastructure, initiatives and incentives that will help us reach our 2050 target.

The Climate Leadership Team

In 2015, Premier Christy Clark challenged the world to meet or exceed the standard B.C. has set for climate action. She also announced that work was beginning to build on B.C.'s world-leading plan, including the formation of a Climate Leadership Team (CLT), made up of diverse leaders from British Columbia businesses, First Nations, local governments, communities, academia, and the environmental sector.

Through a series of collaborative working sessions, this team was asked to develop recommendations for actions that would maintain B.C.'s climate leadership. The CLT recommendations largely address carbon pricing and taking action to reduce emissions across the industry, transportation and built environmental sectors, while maintaining a strong economy.



The actions presented in this plan are driven by the hard work of the CLT. Throughout the action area descriptions, we have identified where they align with the CLT's recommendations. While they do not represent a full-scale implementation of all the CLT recommendations, we will continue to work on ways to take further action on their recommendations, particularly as our work with the federal government progresses and more funding opportunities for climate action become available.

To review the CLT's recommendations in detail, please visit: <http://engage.gov.bc.ca/climateleadership/>.

Public and Stakeholder Engagement

To inform the Province and the CLT's work, B.C. launched a public engagement campaign to invite input on the values and priorities British Columbians wanted to see in B.C.'s new climate action plan. We also conducted sector-specific engagements with stakeholders in B.C.'s various industries. Across two engagement periods we received considerable feedback, and affirmed the passionate commitment of British Columbians to fighting climate change.

Our engagement results to date include:

- » 27,000+ website visits;
- » 7,600+ feedback forms completed;
- » 300+ detailed submissions;
- » 7,400+ discussion guide downloads;
- » 8,200+ emails received; and
- » Input from over 300 organizations, local governments, and businesses via webinars, meetings, teleconferences, and email.

The initial survey presented four visionary goals for climate action, and asked British Columbians to prioritize which areas were most important to take action on, as well as priorities within each of those areas.

VISIONARY GOALS FOR CLIMATE ACTION



THE WAY WE LIVE:

- » Focus: buildings, communities, and waste.
- » Goal: communities are thriving and resilient in the face of climate change.



THE WAY WE TRAVEL:

- » Focus: movement of people and goods.
- » Goal: people and goods move efficiently and reliably, using clean transportation.



THE WAY WE WORK:

- » Focus: business, industry, products and services.
- » Goal: B.C.'s economy remains strong, and jobs continue to be created, while greenhouse gas emissions fall.



WHAT WE VALUE:

- » Focus: how we consider the cost of climate change to society when making decisions.
- » Goal: the cost of climate change to society is considered whenever British Columbians make important decisions.

Overall, the importance of a number of themes were repeated across the two engagement periods, particularly on issues such as transportation, clean technology and clean energy, the carbon tax, communities, climate adaptation and employment.

To see a summary of results from our consultations, go to: <http://engage.gov.bc.ca/climateleadership/>.

To achieve our goals, we need a shared vision that unites British Columbians in this important battle. That is why we listened to the priorities identified by British Columbians when developing this plan — fighting climate change must be a collaborative effort across government, industry, First Nations and communities.

The Province of British Columbia would like to thank all of the stakeholders that contributed to the development of this plan, from the Climate Leadership Team, to the individuals, communities, First Nations, businesses and organizations that participated in our public engagement campaigns.

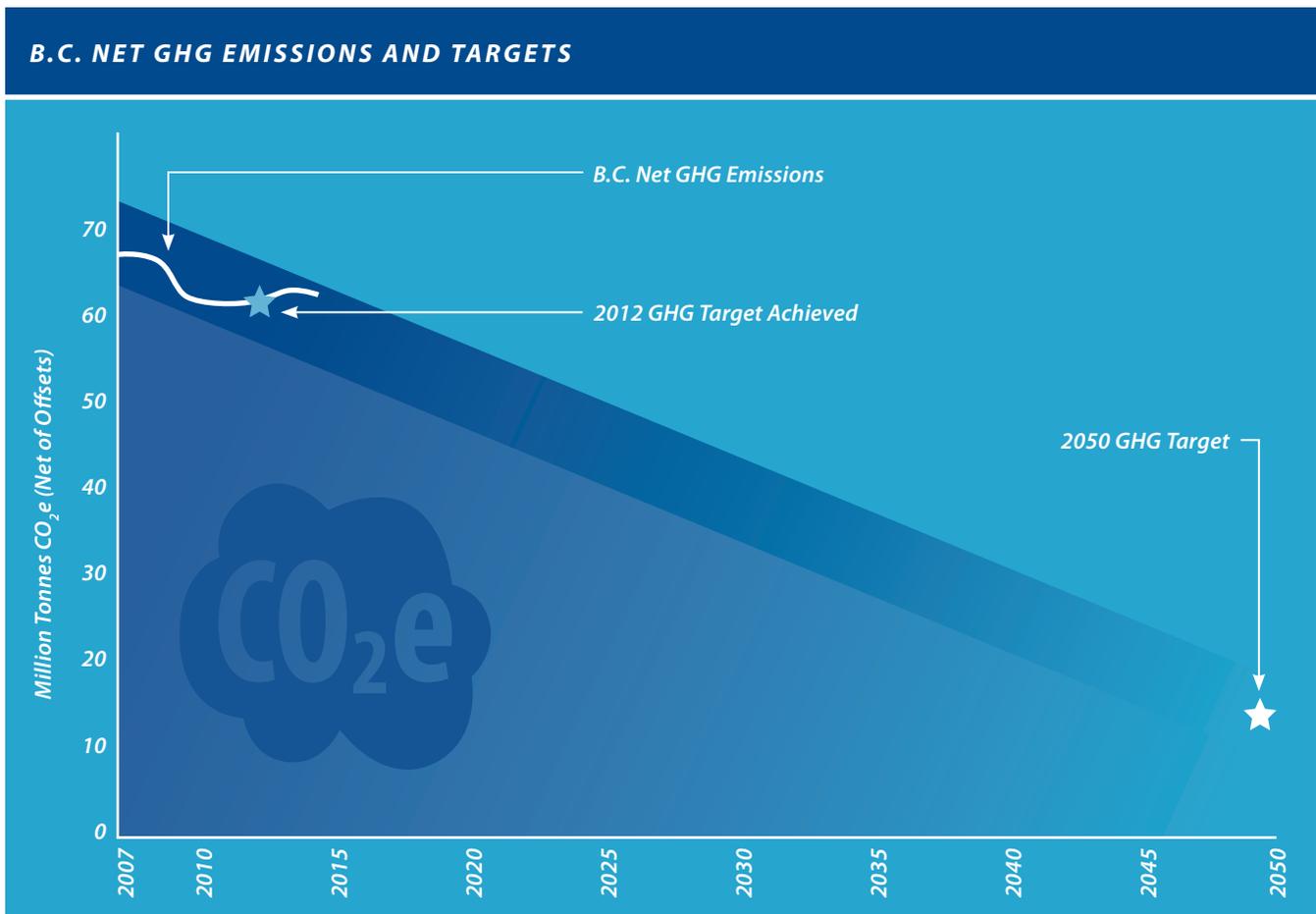
Fighting climate change is one of the most critical issues our world faces today, and any plan to combat it requires we listen to the voices of all those affected.

Progress to 2050 Target

Across all of this hard work and valuable contributions, one thing has clearly emerged — B.C. is committed to reaching our 2050 target of reducing GHG emissions to 80 per cent below 2007 levels. We have already made considerable strides towards that goal. In 2012, we reached our first interim target to reduce emissions to 6 per cent below 2007 levels.

Since that time, B.C.'s emissions levels have remained relatively unchanged. B.C.'s greenhouse gas emissions in 2014 were 62.7 million carbon dioxide equivalent tonnes (tCO₂e), including 1.8 million tonnes CO₂e in offsets from forest management projects, for a net reduction of 5.5 per cent since 2007. The 2014 greenhouse gas inventory for British Columbia can be viewed online at:

<http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/provincial-ghg-inventory>.

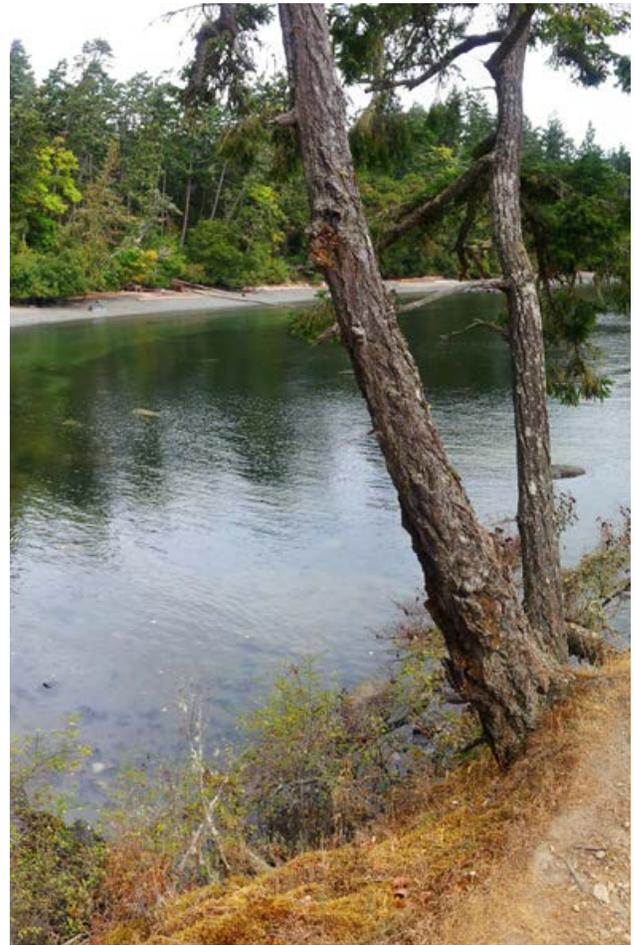


Without renewed action, emissions may begin to rise again. So we are taking action starting with the release of this plan.

Beyond overall GHG emissions reductions, further proof that our plan is working is evidenced in the way that carbon pollution is decoupling from Gross Domestic Product (GDP) growth. In their recommendations, the CLT noted that:

“This past year, global carbon pollution from fossil fuels levelled off, even as GDP continued to grow. It was the first time in nearly half a century that carbon pollution decoupled from GDP globally. The International Energy Agency, which reported the finding, cited policy action on energy efficiency and renewable energy as the main factor driving the change.

It was a remarkable signal and — as the impacts of climate change become increasingly visible and acute — it telegraphed a clear message to governments: Your efforts are essential, and you are making a difference. Keep going.”



In B.C., both GDP and population have been growing at rates comparable to the national average. Between 2007 and 2014, population growth in B.C. has been 8.1 per cent. Real GDP growth has been 12.4 per cent. With relatively stable emissions, this demonstrates a reduction in GHG intensities, both per capita and per dollar of economic output.

This decoupling shows that British Columbia has the ability to continue growing our economy and creating jobs, without a proportional increase in GHG emissions. However, we must be cautious in our approach, and each policy we implement must be tested before it is put into place to ensure that it is both environmentally and economically sustainable.

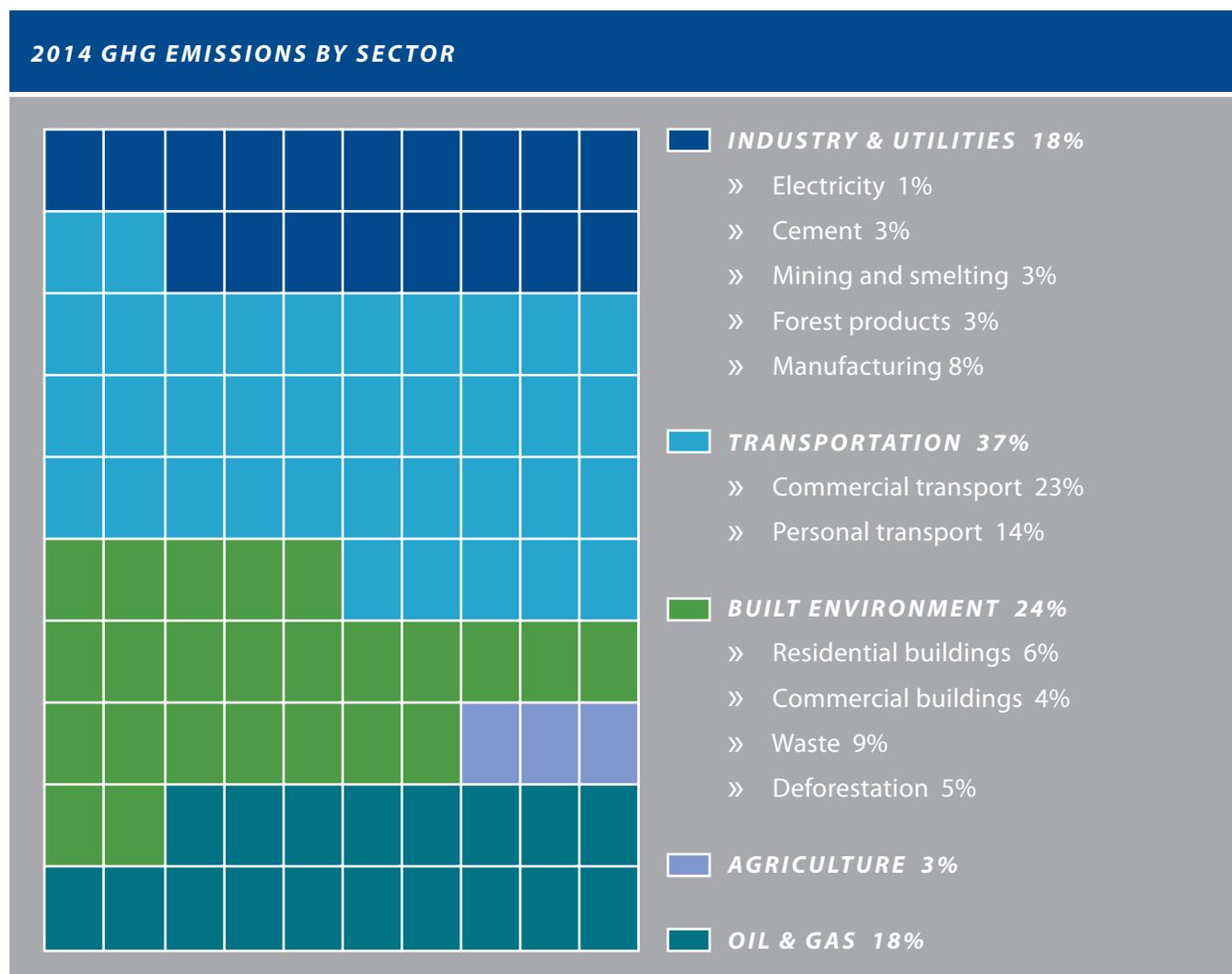
B.C.'s emissions per capita and per unit of GDP are well below the national average. Going forward, the rate of this decoupling needs to accelerate to hit our target. However, this information sends a clear message — our plan is working.

Action Areas



In the following sections of British Columbia's Climate Leadership Plan, we have identified the key areas where we can take action today: natural gas; transportation; forestry and agriculture; industry and utilities; communities and built environment; and public sector leadership.

While further actions will be announced over the course of the following year, these areas represent critical priorities where B.C. can take action to reduce GHG emissions that are not dependent on the work we are undertaking with the federal government on a Pan-Canadian Framework to fight climate change.



Note: In 2014, British Columbia's emissions were 62.7 million tonnes CO₂e, including 1.8 million tonnes CO₂e in offsets from forest management projects.



Action Area: Natural Gas

WHY NATURAL GAS MATTERS

Natural gas is a growing industry in B.C. that can secure our economy for generations to come, while creating good jobs for our citizens. Natural gas is also the cleanest burning fossil fuel, representing an opportunity to shift global economies off GHG-intensive fuels like coal and oil to reduce worldwide emissions. The sector is reducing emissions intensity as it grows and currently contributes about 18 per cent of B.C.'s total emissions.

B.C.'s climate action strategy and implementation of new technology by the natural gas industry has already contributed to a 37 per cent decrease in emission intensity per unit of production since 2000. We have also eliminated all routine flaring at oil and gas wells and production facilities. Our carbon tax, together with offset payments, has encouraged improved efficiency in the sector, including waste heat recovery, methane leak reduction and electrification of facilities.

Yet we must still do more. B.C.'s natural gas sector needs to meet the challenge of becoming one of the world's cleanest producers and distributors of this fuel, so that the benefits of this cleaner burning fuel can contribute to global GHG reductions when we ship it to markets seeking to transition away from more emissions intensive fuels.

Almost 40 per cent of the natural gas sector's emissions come from non-combustion sources such as venting and leaks. Establishing standards for these processes that will lead in North America will help the sector to curb emissions as operations continue.

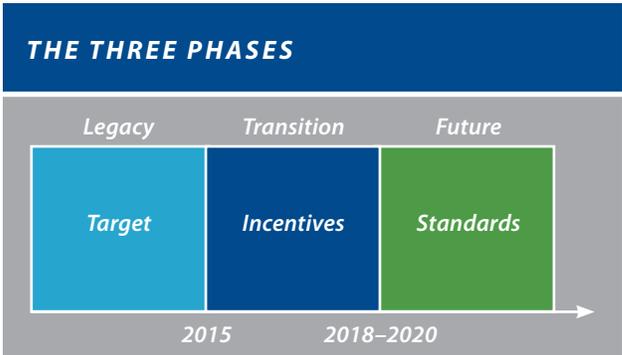


TAKING ACTION: LAUNCHING A STRATEGY TO REDUCE METHANE EMISSIONS

Oil and gas production accounts for approximately 11 million tonnes of annual GHG emissions in our province. Approximately 2.2 million tonnes of that total come from fugitive and vented methane emissions released during the production process.

As such, the CLT recommended that B.C. should set a goal to reduce fugitive and vented methane emissions by 40 per cent within five years, through regulating best practice leak detection and repair activities, as well as developing methane reduction and reporting best practices. They also recommended that after five years we determine if a more ambitious action is necessary.

Our first action for the natural gas sector is a methane emissions reduction strategy. This strategy is targeted at producing real, tangible reductions in emissions, while ensuring the industry remains competitive and has room to grow. B.C. will tackle methane emissions in three phases, using a combination of tools.



- » The legacy phase will include targets for reducing fugitive and vented emissions from extraction and processing infrastructure built before January 1st, 2015. This will include:
- A 45 per cent reduction of these emissions by 2025, estimated at an annual reduction of 1 million tonnes for 2025; and
 - A midpoint check in fall 2020 to determine progress towards this target, establish what happens if the target is not attained by 2025, and make adjustments if the target is not technically feasible.

- » The transition phase will offer incentives to drive methane emissions reductions for all applications built between 2015 and 2018, and to help tackle legacy infrastructure retrofitting. Incentives will include:
 - A Clean Infrastructure Royalty Credit Program, which will help stimulate investments in new technology to convert current infrastructure to less carbon intensive machinery. The pilot program will provide royalty deductions of up to 50 per cent of the cost of developing infrastructure that reduces fugitive or vented methane emissions from oil and gas; and
 - A new offset protocol to further encourage innovative projects that reduce methane emissions.
- » The future phase will establish standards that will guide the development of projects after the transition phase. This will include:
 - Developing and enforcing standards to reduce methane emissions for all applications; and
 - Making leak detection and repair mandatory, with protocols to be developed and enforced in alignment with other jurisdictions.

- » Coordination with western Canadian provinces and the federal government will also be a key part of our methane emissions reduction strategy, to ensure regulatory alignment, while allowing for flexible provincial approaches accounting for resource base and individual provincial needs.

**GET INVOLVED:
SWITCH YOUR TRUCK FLEET TO
NATURAL GAS**

Cleaner burning natural gas can help you reduce the environmental impact of your industrial truck fleet.

FortisBC will cover up to 90 per cent of the cost to convert your medium/heavy duty fleet to compressed natural gas or liquefied natural gas.

Check out the full range of transportation fuel incentives available:
<https://www.fortisbc.com/NaturalGas/Business/NaturalGasVehicles/Howwecanhelp/Incentives/Pages/default.aspx>.

MORE EFFICIENT ENGINES MEAN FEWER EMISSIONS

REM Technology Inc. is helping the natural gas industry lower its emissions through the use of two innovative new technologies called REMVue® AFR and SlipStream®. The REMVue® AFR is an engine management system used to control natural gas engines that compress natural gas from well-sites to processing plants. The system enables these engines to run more efficiently and reliably, while lowering the emissions created in the process. SlipStream® is designed to capture vented hydrocarbons like methane, and utilize them as fuel, either for a natural gas engine or process burner. Not only does this technology significantly reduce greenhouse gases, it reduces fuel costs for the engine or burner by up to 50 per cent. B.C.'s provincial offset standards and carbon pricing are helping drive these innovative offset projects.



TAKING ACTION: REGULATING CARBON CAPTURE AND STORAGE PROJECTS

Another important area where we have taken action to reduce the impact of natural gas development on climate change is Carbon Capture and Storage (CCS). CCS involves using innovative technology to capture waste carbon dioxide from industrial facilities and then transport it to a storage site, such as an underground geological formation, so it will not enter the atmosphere.

The Ministry of Natural Gas Development has developed a CCS regulatory policy framework to guide CCS development, ensure it is done safely, and provide transparency. In fall 2015, the first piece of legislation needed to enable CCS was passed. The Province is now collaborating with the BC Oil and Gas Commission to complete the regulatory policy framework and develop the additional legislative changes needed to allow CCS projects to proceed.



TAKING ACTION: USING ELECTRICITY TO POWER NATURAL GAS PRODUCTION AND PROCESSING

B.C.'s planned liquefied natural gas projects will create thousands of jobs and require additional volumes of natural gas production. The Province is committed to capitalizing on this opportunity while minimizing its carbon footprint. Production and processing (referred to as the "upstream" natural gas sector) typically requires the use of natural gas and diesel as fuel for industrial processes. Replacing those fuels with B.C.'s clean electricity could contribute to significant GHG reductions.

Capital funding will be necessary to develop upstream electrification of several key projects:

- » Peace Region Electricity Supply Project;
- » North Montney Power Supply Project; and
- » Other upstream electrification infrastructure.

Electrification of natural gas developments in the Montney formation in Northeast B.C. is currently proceeding with existing infrastructure to avoid GHG emissions by up to an estimated 1.6 million tonnes per year. Full electrification of the Montney Basin could avoid up to 4 million tonnes of emissions per year, minimizing the GHG footprint of upstream natural gas development to ensure that B.C. has the cleanest LNG in the world.

Broader electrification of the Montney formation will require considerable capital investments in electricity transmission from both the federal government and B.C. It will also require the design of programs to make electricity costs comparable to natural gas costs for upstream applications. To support this action, the B.C. government is in dialogue with the federal government to provide the necessary capital to develop the required infrastructure. Programs are also being developed to close the gap between electricity and natural gas costs. Construction of this infrastructure would begin once LNG companies make their final investment decisions.



Action Area: Transportation

WHY TRANSPORTATION MATTERS

Transportation is essential to our economy and way of life. It also accounts for 37 per cent of B.C.'s total emissions, making it a key area where climate action can make a significant impact.

Climate action in the transportation sector must focus on supporting interconnected communities and the efficient movement of goods and people. That means: encouraging adoption of efficient vehicles and creating associated cost savings; supporting innovation in clean vehicles and fuels that improve our air quality, while creating new jobs in the clean tech industry; and working to guide the development of safe and reliable transportation infrastructure that is built to withstand extreme weather events.

We have already made significant progress in this action area. Our low carbon fuel requirement is driving innovation and growing the diversity of commercially available low carbon fuels, leading to the avoidance of over 2.3 million tonnes of GHG emissions between 2010–2012.

B.C.'s 10-year transportation plan includes a commitment to one third of the funding for new rapid transit projects and expanding compressed natural gas fleets. Building on the success of the 2009 rapid transit Canada Line, the new Evergreen rapid transit line will link the communities of Burnaby, Port Moody and Coquitlam with Vancouver, increasing transit integration and capacity in Metro Vancouver.

We have also invested in an incentive program for clean energy vehicles, supported by aggressive charging infrastructure installations, which has led to the purchase of 2,700 electric and hydrogen fuel cell vehicles and the development of over 1,100 charging stations in the province. We now lead the country in clean energy vehicle sales per capita.

As our economy grows, so will our transportation needs. It is imperative that we maximize the efficiency of the entire goods movement chain, to lower our impact on the environment and ensure the competitiveness of our economy.

We also need to provide more transit alternatives to British Columbians, to reduce the overall rate of vehicle kilometres travelled per capita.

REDUCING DIESEL USE IN NANAIMO

Public transit helps people get where they need to go, while lowering the number of emission-producing vehicles on the road.

The Regional District of Nanaimo (RDN) is taking this a step further by committing to switching its remaining diesel-powered buses to buses powered by compressed natural gas (CNG) by 2017.

This switch will cut greenhouse gasses and make the RDN Transit the first conventional fleet in Canada to be completely CNG powered. The co-benefits of CNG buses include lower fuel costs and quieter engines.



Photo Credit: BC Transit

**TAKING ACTION:
INCREASING THE LOW CARBON
FUEL STANDARD**

British Columbia's Low Carbon Fuel Standard is reducing the carbon intensity of transportation fuels by 10 per cent by 2020, relative to 2010.

The Climate Leadership Team recommended that we increase this requirement in the future to continue to drive greenhouse gas reductions.

We are now taking action to increase British Columbia's Low Carbon Fuel Standard to 15 per cent by 2030. This action is expected to achieve up to a 3.4 million tonne reduction in annual greenhouse gas emissions.

**TAKING ACTION:
INCENTIVES FOR USING RENEWABLE
NATURAL GAS**

Natural gas is considered renewable when it is produced from sources of biogas such as organic waste or wastewater. B.C. will be amending the Greenhouse Gas Reduction Regulation to encourage emission reductions in transportation. This amendment will allow utilities to double the total pool of incentives available to convert commercial fleets to natural gas, when the new incentives go towards vehicles using 100 per cent renewable natural gas. The program will also:

- » Promote investments in natural gas fuelling stations at customers' facilities; and
- » Support the production of renewable natural gas resources through increased demand.

MOVING PEOPLE WITH TRANSIT

Transit is the backbone of a low carbon community and an integral part of a healthy built environment. That is why the Province is working to improve public transportation infrastructure in Metro Vancouver and in BC Transit communities across the province. This will include the purchase of more SkyTrain cars, improvements to bus exchanges and SkyTrain stations, enhanced SeaBus service, initial work towards new major rapid transit in Vancouver and Surrey, and the modernization of a variety of TransLink's transit infrastructure. Outside of the Lower Mainland, the Province will build new maintenance yards and bus depots, and purchase new, cleaner and more efficient buses. Combined with contributions from federal and local governments, these improvements will benefit residents across the province opening up more affordable, transit-friendly communities.



**TAKING ACTION:
INCENTIVES FOR PURCHASING A
CLEAN ENERGY VEHICLE**

B.C.'s Clean Energy Vehicle program is designed to encourage the use of zero emission vehicles (ZEVs) throughout the province. Residents, businesses, organizations and local governments that purchase or lease qualifying new ZEVs are eligible for incentives off the pre-tax sticker price for battery electric, fuel cell electric, plug-in hybrid electric, and hydrogen fuel cell vehicles. These incentives can be combined with B.C.'s SCRAP-IT program to get older, higher emission vehicles off the road.

The Clean Energy Vehicle program is being expanded to support new vehicle incentives and infrastructure, as well as education and economic development initiatives.

**GET INVOLVED:
BUY A CLEAN ENERGY VEHICLE**

Thinking of buying a clean energy vehicle? Learn about point-of-sale incentives that are available to help you purchase one through the Clean Energy Vehicle Program: www.gov.bc.ca/cleanenergyvehicleprogram.

Also, if you have an old gas guzzler that needs to be scrapped, see how we can help at: scrapit.ca.

If you're purchasing a clean energy vehicle and scrapping a gas guzzler, you could be eligible for both incentive programs.

**TAKING ACTION:
SUPPORTING VEHICLE
CHARGING DEVELOPMENT FOR ZERO
EMISSION VEHICLES**

Since vehicles represent such a significant portion of our emissions profile, policies that facilitate the adoption of zero emission vehicles like electric cars can make a significant impact in the fight against climate change. A major challenge for adoption of these vehicles is ensuring that owners can access charging stations.

That is why we are taking action to support the development of charging stations across the province. These actions include:

- » Developing regulations to allow local governments to require new buildings to install adequate infrastructure for electric vehicle charging; and
- » Developing policies to facilitate installing electric vehicle charging stations in strata buildings and developments.



TAKING ACTION:
**10-YEAR PLAN TO IMPROVE
B.C.'S TRANSPORTATION NETWORK**

B.C. on the Move is our 10-year plan to improve the province's transportation network that is already underway. It includes a comprehensive set of strategies that were driven by engagement of the public and key stakeholders, including actions that will help drive GHG reductions in a number of areas.

- » Transitioning to low carbon fuels:
 - Increasing the number of B.C. Transit compressed natural gas (CNG) buses and fuelling stations; and
 - BC Ferries is investing in 3 new vessels and conversion of 2 large vessels to dual fuel capable ferries that can run on either liquefied natural gas or ultra-low sulphur diesel.
- » Expanding transit:
 - Supporting the construction of new rapid transit in Vancouver; and
 - Developing rapid transit in Surrey.
- » Reducing congestion:
 - Replacing the George Massey Tunnel to reduce idling; and
 - Optimizing movement through Canada's Pacific Gateway.

To review the entire B.C. on the Move plan, visit:
<https://engage.gov.bc.ca/transportationplan/>.

GET INVOLVED:
**RIDE THE HOV LANE AND FIND A
CHARGING STATION**

Did you know B.C. allows approved electric vehicles to use high occupancy vehicle (HOV) lanes? Getting around in your electric vehicle has never been easier — especially with an ever growing network of charging stations. To find a station, go to: <http://pluginbc.ca/charging-stations/finding-stations/>.

**CLEANING UP WASTE COLLECTION
IN SURREY**

In 2012, the City of Surrey mandated that its waste collection services be carried out using compressed natural gas vehicles. As a result, the city's contractor, Progressive Waste Solutions (PWS), launched a state-of-the-art CNG fleet for waste collection in Surrey, helping reduce emissions while diverting waste from landfills. These trucks emit 23 per cent less carbon emissions and 90 per cent less air particulates compared to diesel trucks. The city is also developing the first fully integrated organic waste biogas processing facility in North America that will be completed in 2017. The facility will turn organic waste collected at curbside into biogas and nutrient rich compost. The biogas will in turn be used to fuel the waste collection fleet, while the compost will be used by local farmers to produce fruits and vegetables. It is another step Surrey is taking to close the loop and become a zero-waste city.





Action Area: Forestry and Agriculture

WHY FORESTRY AND AGRICULTURE MATTER

Forestry and agriculture are foundational sectors of the B.C. economy, and areas that offer significant opportunities to take action against climate change.

Agriculture accounts for about three per cent of our emissions, arising from manure management, agricultural soils, and the methane produced when animals such as cattle and sheep digest food.

Greenhouse gas emissions from vehicles and mills used in forestry are counted as a component in the transportation and industrial sectors. The level of carbon stored in British Columbia's forests fluctuates from year to year based on natural factors such as fires, pests or weather.

In 2014, forestry offset projects alone removed 1.8 million tonnes of CO₂ from the atmosphere, creating jobs and unlocking new revenue streams for First Nations, communities, forest companies and private owners.

In the agriculture sector, changes in fertilizer use and soil management hold the promise of reducing greenhouse gas emissions. Many greenhouse growers are taking innovative steps to reduce their use of fossil fuels by incorporating clean tech solutions such as biomass boilers, thermal curtains and heat storage systems. Provincial offset standards and carbon pricing are making these changes more economically viable, driving their adoption in the sector.

Furthermore, many farmers in B.C. are also reducing emissions while creating new business opportunities by maximizing the value of agricultural byproducts, turning their waste into valuable resources and demonstrating the way one of our oldest industries is adapting to climate change.

PRINCE GEORGE'S WOOD INNOVATION AND DESIGN CENTRE

The award-winning Wood Innovation and Design Centre in Prince George was designed to demonstrate the way that innovative forms of wood production and use can lead to a more sustainable and beautiful future.

It makes use of mass timber, a wood product made from laminating together many smaller pieces of spruce, pine or fir. This centre showcases how British Columbia forest products can be made to order with powerful structural properties, while having a much smaller carbon footprint than steel or concrete.

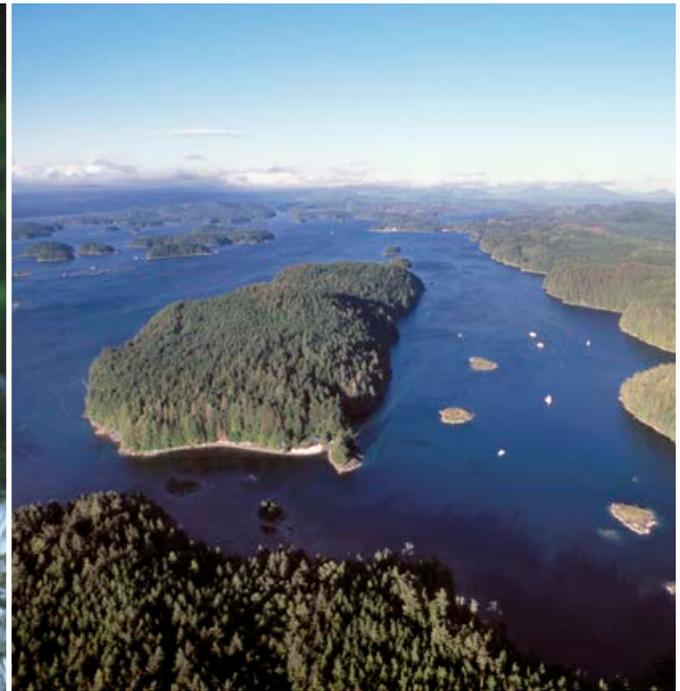
Most recently, it was awarded the Governor General's Medal in Architecture in 2016 for its use of innovative and sustainable building technologies, the highest honour that can be given to an architectural project in Canada.



PROTECTING THE GREAT BEAR RAINFOREST TO REMOVE GREENHOUSE GASSES

The Great Bear Rainforest is one of British Columbia's most spectacular natural wonders — and an effective means of removing significant GHG emissions from the atmosphere. Great Bear's North and Central Mid-Coast, South Central Coast and Haida Gwaii forest carbon projects use ecosystem-based management practices that protect areas of the forest that were previously slated for logging.

These projects were enabled through the British Columbia Forest Carbon Offset Protocol and atmospheric benefit sharing agreements, developed in collaboration with First Nations leaders. In addition to reducing emissions, they also support the area's biodiversity and cultural heritage, while creating local economic opportunities.



**TAKING ACTION:
ENHANCING THE CARBON STORAGE
POTENTIAL OF B.C.'S FORESTS**

B.C.'s forest ecosystem covers more than 54 million hectares and provides us with significant potential for climate change mitigation.

We can harness this opportunity to sequester atmospheric carbon dioxide in this tremendous public asset through intensive forest management practices and storing carbon in long-lived wood products. That is why the Climate Leadership Team recommended that we update current forest policy and regulation to increase carbon sequestration.

So we are taking action to do even more to harness the incredible power of our forests through the new Forest Carbon Initiative, which will:

- » Enhance the carbon storage potential of British Columbia's public forests; and
- » Increase the rate of replanting and fiber recovery by 20,000 hectares per year.

This initiative will focus on enhancing the carbon sequestration of Mountain Pine Beetle and wildfire impacted sites — capturing the carbon benefits of new reforestation, while avoiding emissions from burning slash. This work will build on existing forest management programs, such as the recently announced Forest Enhancement Society and Forest for Tomorrow.

The Forest Carbon Initiative will rehabilitate up to 300,000 hectares of impacted sites over the first five years of the program. By 2050, the ten-year program is expected to lead to an annual reduction in greenhouse gas emissions of up to 11.7 million tonnes.

IMPROVED WOOD FIBRE USE

B.C.'s Fibre Action Plan is helping to generate more value and less greenhouse gas emissions from the province's forest resources. Through a pilot project with primary harvesters and Zellstoff Celgar Pulp Mill in Castlegar, approximately 500,000 cubic metres of residual wood (the equivalent of over 12,000 loaded logging trucks) that would once have been left in the forest were utilized as a source of fibre for the mill over the past three years. This not only helped to decrease the risk of wildfire, it saved approximately 185,000 tonnes of CO₂e from reduced slash pile burning. Additionally, the project created new jobs and economic benefits for the forest sector.



THE CHEAKAMUS COMMUNITY FOREST

The Cheakamus Community Forest carbon offset project is located adjacent to the Resort Municipality of Whistler, within the traditional territories of the Squamish and Lil'wat Nations.

The project retains more carbon in the forest by using ecosystem-based management practices that include increasing protected areas and using lower-impact harvesting techniques. Revenues from this B.C. offset project help overcome barriers to balancing environmental and economic sustainability, boosting additional uses for the forest such as recreation, tourism, and habitat protection.



Photo Credits: Bob Brett

**TAKING ACTION:
DEVELOPING A NUTRIENT MANAGEMENT
PROGRAM TO REDUCE EMISSIONS**

In the agriculture sector, a nutrient management program is being developed to demonstrate best practices to reduce fertilizer use and GHG emissions, and is expected to lead to a nearly 100,000 tonne reduction of annual GHG emissions. This Nutrient Management Program will include:

- » Expanding trials to develop and demonstrate nutrient management best practices to the agriculture industry;
- » Increasing funding to the sector to implement Beneficial Management Practices that will promote better nutrient management and further reductions in GHG emissions; and
- » Scaling up monitoring of nutrient management benefits and developing longer term performance indicators to measure their success.



**GET INVOLVED:
ADAPT YOUR FARM FOR CLIMATE CHANGE**

The Farm Adaptation Innovator Program supports projects that help build capacity for British Columbia farmers to adapt to climate change. Learn more about this and other resources to enhance agriculture's ability to adapt to climate change: www.bcagclimateaction.ca/farm-level/adaptation-innovator-program/.

**GET INVOLVED:
BECOME A MORE SUSTAINABLE FARM**

Farming sustainably is good for the planet and good for business. The Environmental Farm Plan Program supports farm operations to complete agri-environmental risk assessments. After completing an Environmental Farm Plan, farmers can apply for funding to implement Beneficial Management Practices that help to increase agricultural and environmental sustainability. Learn more at: <https://www.bcac.bc.ca/ardcorp/program/environmental-farm-plan-program>.



CREATING RENEWABLE NATURAL GAS FROM MANURE AND ORGANIC WASTE

Expanding agricultural production in the Lower Mainland requires solutions to the issue of manure produced by the large numbers of dairy cattle. With support from the Ministry of Agriculture's innovation program, Seabreeze Farms in Delta has built an anaerobic digester that is turning manure and other organic waste into biogas, digestate (organic fertilizer) and bedding for cows.

The biogas is created by capturing methane that would otherwise have gone into the atmosphere. The biogas is cleaned and upgraded into renewable natural gas that displaces conventional natural gas with a renewable energy source.



Photo Credit: Delta Farmers Institute





Action Area: Industry and Utilities

WHY INDUSTRY AND UTILITIES MATTER

B.C. industry creates thousands of good jobs, but requires significant amounts of energy to drive their production systems. These large-scale users of energy represent almost 18 per cent of our total emissions.

We are already driving innovation in this area with our carbon tax, which covers approximately 60 per cent of the emissions in this sector. As the world shifts to a low-carbon economy, B.C.'s low-carbon electricity has become a competitive advantage for B.C.'s businesses, driving industry to create green jobs and products that are helping the world reduce GHG emissions.

The portion of BC Hydro's power generation portfolio that comes from clean or renewable resources is currently 98 per cent, already above the 93 per cent requirement in B.C.'s Clean Energy Act. Furthermore, B.C.'s abundant supply of clean burning natural gas represents enormous potential to shift our industrial sectors and global partners off the use of more GHG intensive fuels, particularly in areas such as fuelling marine transportation vessels.

British Columbia has also established the Innovative Clean Energy Fund, through which we have invested over \$70 million to support the development of clean energy and energy efficiency technologies in the electricity, alternative energy, transportation and oil and gas sectors.

TAKING ACTION: MAKING B.C.'S ELECTRICITY 100% RENEWABLE OR CLEAN

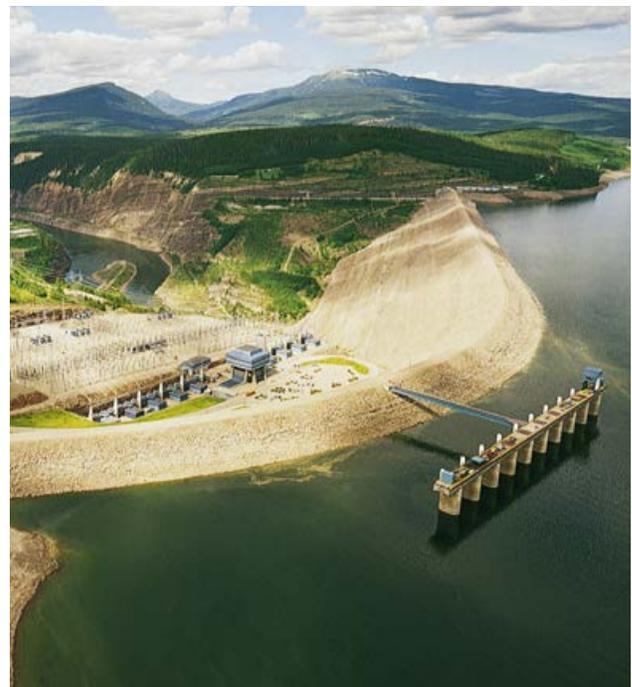
B.C.'s clean electricity supply is activating numerous opportunities to reduce GHG emissions across our industrial sectors. When an industry switches to electricity instead of fossil fuels, their emissions go down. The CLT recommended that we increase the target to 100 per cent clean energy on the integrated grid by 2025, while allowing for the use of fossil fuels for reliability. BC Hydro will focus on acquiring firm electricity from clean sources.

Going forward, 100 per cent of the supply of electricity acquired by BC Hydro in British Columbia for the integrated grid must be from clean or renewable sources, except where concerns regarding reliability or costs must be addressed. Acquisition of electricity from any source in British Columbia that is not clean or renewable must be approved by government through an Integrated Resource Plan, where it will be aligned with the specific reliability or cost concerns.

TAKING ACTION: EFFICIENT ELECTRIFICATION

Demand-side management (DSM) programs help customers reduce energy bills by fostering awareness of energy use and providing incentives to increase energy efficiency. These programs can take on an expanded role in climate leadership, helping customers to understand their GHG emissions and providing incentives for efficient electric technologies to reduce GHG emissions.

To advance efficient electrification, we are taking action by working with BC Hydro to expand the mandate of its DSM programs to include investments that increase efficiency and reduce GHG emissions.



RENEWABLE ENERGY IS CREATING GREEN JOBS

British Columbia's clean energy producers have reported investment of more than \$6 billion in First Nations communities and local economies, while fighting climate change and creating thousands of jobs throughout the north and interior regions. This growing sector has to date supported 15,970 direct, full-time equivalent (FTE) person years of construction employment in every region of the province, with another 4,543 FTE person years of employment projected for forthcoming projects. Furthermore, renewable power companies now employ 641 people in operational roles around the province, and new projects now under construction will support an additional 165 positions once completed. About 25 per cent of BC Hydro's energy supply now comes from independent power producers. The Province is also working with our neighbours in Alberta to investigate the opportunity for greater integration of our power systems, which would allow British Columbia to deliver more clean electricity to Alberta to reduce their reliance on fossil fuels to power industrial processes, thereby reducing their climate impact. British Columbia is truly demonstrating the business opportunity of renewable energy, while lowering our impact on the environment in the process.



SOLAR-POWERED T'SOU-KE

In 2013, T'Sou-ke Nation became the first Aboriginal community in the world to be designated a solar community. They have installed three solar demonstration projects. One demonstrates how remote 'off grid' communities can economically switch from diesel to solar. Another demonstrates how to be 'Net Zero' — which means no more electricity bills. Solar panels on their reservation are used to power all the administrative buildings, while sending their excess solar power back to the grid to contribute to British Columbia's clean energy profile. On sunny days, that excess can be up to 90 per cent of the power produced.

The profits of selling this power back to B.C. Hydro offsets their power bills during darker months. The project received \$400,000 in funding from the Province's Innovative Clean Energy Fund. Solar programs in Colwood, the Capital Regional District and several First Nations throughout B.C. have been modelled after T'Sou-ke's leadership. T'Sou-ke is now working on harnessing the energy of the wind and waves to create more clean energy for their community and the province. T'Sou-ke Eco Tourism has been boosted by this project, with over 2,000 people from all over the world visiting each year for solar tours and workshops.



TAKING ACTION:
**FUELLING MARINE VESSELS WITH
CLEANER BURNING LNG**

B.C.'s abundant supply of natural gas represents a significant opportunity for industry to lower their impact on the environment. For example, B.C. can help the world replace high-emission marine transport fuels with cleaner burning natural gas, leading to global reductions in GHG emissions.

The Greenhouse Gas Reduction Regulation allows utilities to invest in clean transportation and infrastructure to reduce GHG emissions by replacing the use of higher emitting diesel with natural gas in a variety of sectors.

In particular, FortisBC has been expanding the use of compressed natural gas (CNG) and liquefied natural gas (LNG) in the heavy duty transportation sector since 2012, under its Natural Gas for Transportation initiative. Since 2012, FortisBC has committed \$48 million in incentive funding towards the purchase of CNG and LNG vehicles.

These incentives translate to 485 CNG vehicles, 138 LNG vehicles, 6 mine haul trucks and 7 marine vessels that are in operation currently or will be in operation soon. These efforts will result in the reduction of over 74,000 tonnes of GHG emissions annually.

Recent amendments to the regulation will allow utilities to provide further incentives for the marine, mining and remote industrial power generation sectors. It is expected that by 2022 there will be an additional reduction of at least 300,000 tonnes of annual GHG emissions.

GET INVOLVED:
**MINIMIZE YOUR CARBON FOOTPRINT
WITH AN ENERGY MANAGEMENT SYSTEM**

Companies that implement energy management systems reduce energy costs and increase business competitiveness, while also minimizing their environmental impacts. The ISO 50001 Implementation Incentive offers up to \$80,000 of assistance to implement energy management projects that help facilities pursue compliance with the ISO 50001 standard. Learn more at: www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/innovative-clean-energy-solutions/innovative-clean-energy-ice-fund/iso-50001-implementation-incentive.

LNG FOR THE GLOBAL MARINE SECTOR

FortisBC is proposing to facilitate new investments in LNG marine bunkering in order to further transform the adoption of LNG as a marine fuel. This will also help position B.C. as a global marine bunkering centre on the west coast capable of providing LNG to a large number of natural gas vessels. The current level of global GHG emissions from ships coming into British Columbia is 70 million tonnes per year — higher than the total GHG emissions attributed to British Columbia in its entirety.





TAKING ACTION:
NEW ENERGY EFFICIENCY STANDARDS FOR GAS FIRED BOILERS

Gas fired package boilers are used in industrial systems across the province, contributing to B.C.'s overall emissions profile. New technologies can be used to improve the efficiency of these boilers, which will reduce emissions and operating costs. As such, the Province will develop a regulation to be implemented by 2020 that will set energy efficiency requirements for new and replacement gas fired package boilers, driving down emissions across a number of industries.

GET INVOLVED:
SAVE YOUR BUSINESS MONEY BY BECOMING MORE ENERGY EFFICIENT

Reduce the operating costs of your business by making energy efficiency upgrades. BC Hydro and FortisBC offer a variety of programs to help you improve your business' energy efficiency, including incentives for upgrades and opportunities to learn from experts. Find out more at:

<https://www.bchydro.com/powersmart/business/programs.html> and
<https://www.fortisbc.com/Rebates/RebatesOffers/Pages/default.aspx>.

TAKING ACTION:
EXPANDING INCENTIVES TO PROMOTE ADOPTION OF EFFICIENT GAS EQUIPMENT

Gas fired equipment is used for a variety of purposes, from space and water heating in industrial processes, to home fireplaces and commercial cooking equipment. FortisBC offers incentives to promote adoption of more efficient gas equipment for the residential, commercial and industrial sectors.

Now the Province is taking action to amend the Demand-Side Measures Regulation and allow FortisBC to expand their incentives by at least 100 per cent, to encourage further adoption of technologies that reduce the emissions of gas fired equipment.

MINING THE SUN IN KIMBERLEY

The City of Kimberley launched an innovative project to convert Teck's former Sullivan Mine Concentrator site into a solar energy project called SunMine. It includes 4,032 solar-cell modules, mounted on 96 solar trackers that follow the sun's movement to maximize the amount of energy captured. This has made it B.C.'s largest solar project and Canada's largest solar tracking facility. It was also the first solar project in British Columbia to begin selling power back to the BC Hydro grid. This important project was made possible through the Province's Innovative Clean Energy Fund, as well as an investment from Teck, who provided the land and site infrastructure, as well as a \$2 million contribution. SunMine is a community owned project that is well suited to capitalize on Kimberley's clear and sunny conditions.



Photo Credits: City of Kimberley



Action Area: Communities and Built Environment

WHY COMMUNITIES AND BUILT ENVIRONMENT MATTER

Communities and our built environment are key factors in the fight against climate change. While the built environment is a significant contributor to our overall emissions profile, it also represents a real ongoing opportunity for change.

From the way we construct buildings to the way we develop communities and manage our waste, our built environment is a significant area where new innovations are demonstrating what a sustainable future could look like. However, we must balance our choices, to ensure that our climate solutions are affordable.

Emissions from the built environment (including buildings, deforestation and waste) represent 24 per cent of British Columbia's total emissions. Yet emissions in this area are down 9.4 per cent since 2007, due to climate action in community planning, building regulations and waste diversion.

Changes in the realm of communities and the built environment have been driven by policies such as Official Community Plans and Regional Growth Strategies, the Climate Action Charter, and the Climate Action Revenue Incentive Program, which returns the carbon tax to local governments to support GHG reduction projects.

The Building Code and Energy Efficiency Act have improved standards for residential and commercial buildings, while programs like LiveSmart BC and the Home Energy Retrofit Offer have promoted efficiency upgrades. In the area of waste, B.C.'s Landfill Gas Management Regulation has required landfill operators to increase the amount of methane they capture. 60 per cent of British Columbians have access to curbside organic diversion programs that are helping us reduce the amount of methane that will be emitted from waste we send to landfills every year.

With life spans of 50–100 years, today's buildings and infrastructure will impact our energy use and emissions for the next century. Incorporating climate action in planning and development leads to less energy and infrastructure spending. Over time, these actions will result in lower emissions and reduced congestion, as well as improved air quality, liveability and health.



NORTH VANCOUVER'S CLIMATE ACTION LEADERSHIP

The City of North Vancouver has shown how communities can make impressive strides to lead in the fight against climate change. It prides itself on being a compact community that puts pedestrians, cyclists, and transit first, and for reducing its corporate emissions by 19 per cent since 2007. Overall community emissions have decreased by 6 per cent between 2005 and 2010. The city has made this progress through initiatives that focus on sustainable energy, development planning that enhances public transit, building bike and pedestrian routes, and making upgrades to city buildings to make them more energy efficient.



**TAKING ACTION:
REGULATIONS FOR MORE ENERGY
EFFICIENT BUILDINGS**

Combustion of fossil fuels for heating in buildings accounts for the majority of building emissions. When we use fossil fuels, we need to make sure we are using them as efficiently as possible.

With 98 per cent of electricity generated in British Columbia coming from clean sources, promoting the efficient use of electricity represents another opportunity to cut emissions further. At the same time we must ensure that we do not intensify issues around housing affordability. That is why we are amending the energy efficiency standards regulation to include:

- » Increased efficiency requirements for gas fireplaces and air source heat pumps, effective in 2018; and
- » High-efficiency technology requirements for natural gas space and water heating equipment, effective in 2020 and 2025 respectively.

**GET INVOLVED:
USE THE FIRST NATIONS CLEAN
ENERGY TOOLKIT**

First Nations in British Columbia are well placed to take advantage of the clean energy sector.

The British Columbia First Nations Clean Energy Toolkit is a step-by-step manual designed to inform First Nations about the kinds of clean and renewable energy sources available, how to begin looking into doing a clean energy project, and where to find resources.

Check it out at:
<https://www.cleanenergybc.org/wp-content/uploads/2016/04/BC-FN-Toolkit.pdf>.



**TAKING ACTION:
ENCOURAGING DEVELOPMENT OF NET
ZERO BUILDINGS**

Cleaner, more energy-efficient buildings can save owners and tenants money in the long run by lowering energy costs and avoiding carbon costs. Additionally, improved building envelopes and efficient technologies such as new heat pumps can make significant improvements in buildings. As such, we are implementing a number of policies to encourage the development of net zero buildings, including:

- » Accelerating increased energy requirements in the BC Building Code by taking incremental steps to make buildings ready to be net zero by 2032;
- » Developing energy efficiency requirements for new buildings that go beyond those in the BC Building Code, called Stretch Codes, that interested local governments could implement in their communities; and
- » Creating innovation opportunities and financial incentives for advanced, energy-efficient buildings, including an increase in funding for design and innovation.

The international Passive House standard is one of the most rigorous and advanced building performance standards in the world, achieving reductions in heating energy of up to 90 per cent compared to other buildings. Through a partnership between the Province's Innovative Clean Energy Fund and the Canadian Passive House Institute, architects, builders and building inspectors are receiving training in Passive House design principles.

**GET INVOLVED:
LEARN ABOUT PASSIVE HOUSING DESIGN**

Take a passive house design course and find out about training subsidies for building professionals at:
<http://canphi.ca/passive-house-courses/>.

**TAKING ACTION:
REFRESHING THE CLIMATE ACTION
CHARTER FOR COMMUNITIES**

The Climate Leadership Team recommended that British Columbia update the Climate Action Charter to align provincial and community goals. In response, we are refreshing our actions under the Climate Action Charter this year, which sets out a framework for British Columbia communities to become carbon neutral and to create complete, compact, energy-efficient urban and rural communities.

The Province will work with local governments to expand the progress made to date on reducing GHG emissions. The goal is to establish a plan for community action that takes advantage of provincial and federal actions, to maintain momentum at the community level through policies, programs and regulations that will:

- » Focus growth near major transit corridors for large urban communities;
- » Increase the use of decision support tools that provide the information needed to create more resilient green infrastructure; and
- » Strengthen the ability of communities to adapt to the impacts of climate change.

**GET INVOLVED:
UPGRADE YOUR HOME'S
ENERGY EFFICIENCY**

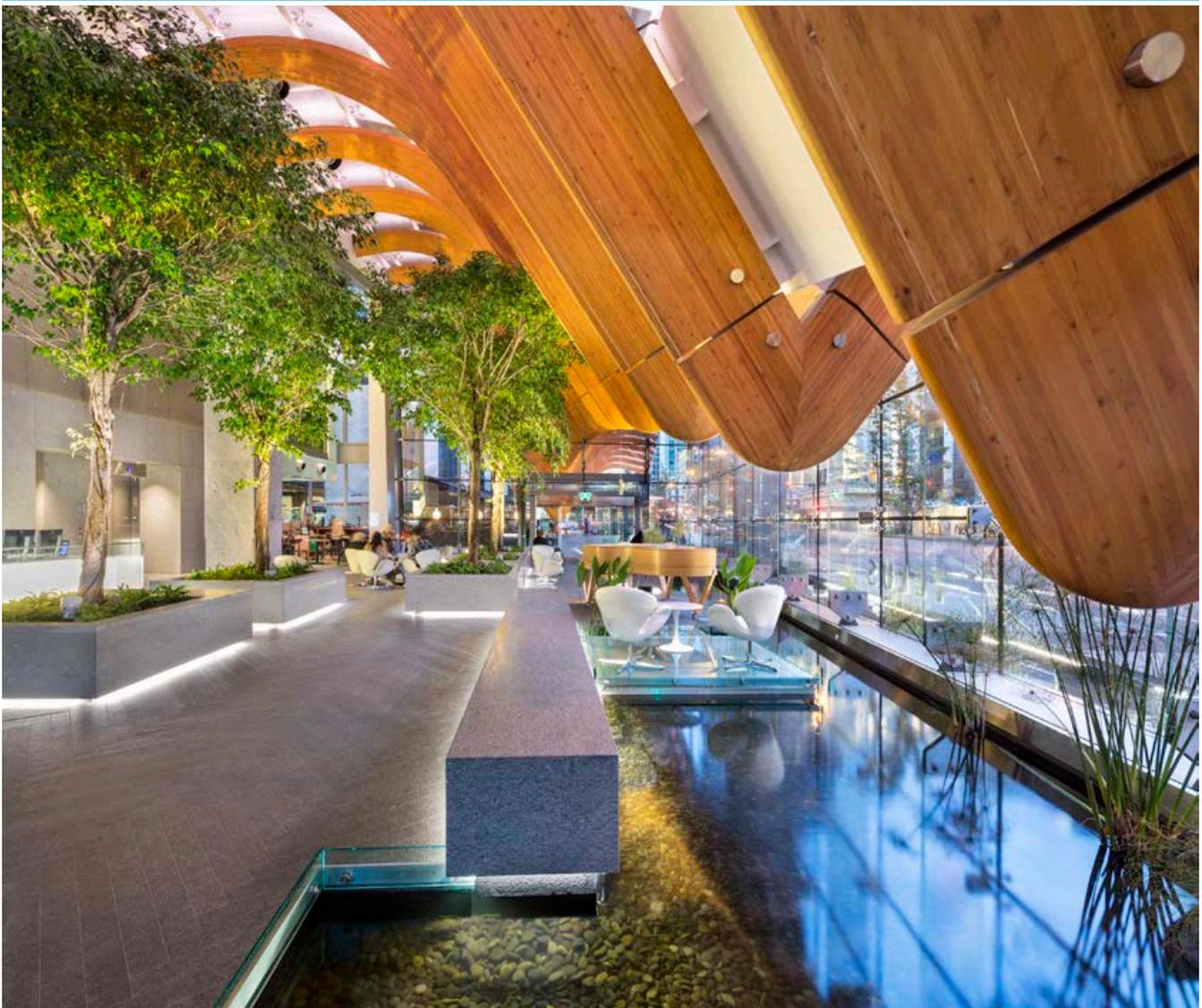
Home energy efficiency upgrades are a great way to save money and protect the environment. Did you know you can receive a rebate of up to \$1,700 for upgrading from oil heating to an electric heat pump?

For more information on this and other programs, check out British Columbia's energy efficiency programs:
www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/energy-efficiency-conservation/programs.

TELUS GARDEN AWARDED LEED PLATINUM CERTIFICATION

TELUS Garden, the company's new office in downtown Vancouver, is one of North America's greenest buildings. That is why the Canada Green Building Council awarded it the prestigious Leadership in Energy and Environmental Design (LEED) Platinum certification and it also received the impressive 2016 Architizer A+ Award for Office High Rise. Its innovative design includes: a district energy system that recovers energy that would normally be wasted and uses it to heat and cool air and water for both the office and residential towers, as well as the retail space; Vancouver's largest solar panel array; a rainwater capture system to irrigate its 10,000 sq. ft. of garden terraces; high-efficiency motion sensor lighting; charging stations for electric vehicles; and numerous other design elements that improve its environmental performance.

These sustainability features will contribute to a reduction in carbon emissions of more than 1,000 tonnes annually. Its innovative design was inspired by nature and advances the company's mission to create a healthier, more sustainable future, demonstrating what the built environment of the future could look like.





TAKING ACTION:
CREATING A STRATEGY TO TURN WASTE INTO RESOURCES

Landfill waste is a significant source of emissions, and an area where significant opportunity for improved performance on GHG emissions exists. The CLT recommended that British Columbia create a waste-to-resource strategy that reduces GHG emissions from organic waste. In response, we are taking the following actions:

- » Supporting materials exchange pilot projects that create innovative uses for waste products;
- » Creating a waste-to-resource strategy to reduce waste sent to landfill; and
- » Establishing a food waste prevention target of 30 per cent and increasing organics diverted from landfills to 90 per cent.

These actions are expected to reduce annual GHG emissions by up to 1.4 million tonnes.

TURNING WASTE INTO ENERGY

Emergent Waste Solutions (EWS) is a B.C. business that is deploying clean tech solutions to turn waste into valuable products and reduce greenhouse gas emissions, without using incineration.

Using a process called thermolysis, EWS's technology produces carbon from waste, such as wood fibre, rubber and plastics, for a wide variety of applications including biochar for agricultural uses, activated carbon for filtration, and carbon black for rubber product applications. The energy byproducts are syngas, used primarily to power its own operations, as well as bio oil and light diesel fuel, which can be used for home heating and other applications. Beyond the potential applications of this technology in B.C., EWS is opening a plant in Alberta, helping our neighbours turn their waste into valuable resources.





Action Area: Public Sector Leadership

WHY PUBLIC SECTOR LEADERSHIP MATTERS

Public sector operations are present in almost every community in the province, through schools, universities, colleges, crown corporations, health care services and others. B.C.'s public sector is also a significant buyer of clean tech goods, equipment and services.

As such, the Province is well positioned to serve as a catalyst for climate action at both the community and provincial levels. Public sector leadership engages 300,000 public servants to take action on climate change, and in turn reaches the two

million British Columbians that work, learn or visit government buildings each year. Buildings account for almost 77 per cent of B.C.'s provincial public sector emissions.

That is why as of 2010, the Greenhouse Gas Reduction Targets Act has required all public sector organizations (PSOs) to operate at carbon neutral. The Carbon Neutral Government commitment is achieved by measuring and reducing PSO emissions and offsetting the remainder by purchasing carbon offsets.

Over the first six years of this commitment, the provincial public sector has successfully achieved carbon neutrality each year, reducing a total of 4.3 million tonnes of emissions through reduction activities and investment of \$51.4 million in offset projects.

SURREY'S HIGH PERFORMANCE HOSPITAL

In 2014, the Fraser Health Authority partnered with Integrated Team Solutions to deliver a state-of-the-art critical care tower at Surrey Memorial Hospital. Recently LEED Gold certified, the eight storey tower incorporates efficient and sustainable design solutions, including air-to-water heat pumps, central lighting controls and electric vehicle charging stations. The tower, with estimated annual emissions of less than 1,100 tonnes CO₂e, is predicted to save nearly 4 GWh equivalent of energy each year compared to a standard building.



PhotoCredit: Ed White Photographics

**TAKING ACTION:
PROMOTING USE OF LOW CARBON
AND RENEWABLE MATERIALS IN
INFRASTRUCTURE**

Public sector infrastructure represents a considerable portion of B.C.'s built environment and is an area where the Province is demonstrating leadership in taking action to reduce GHG emissions. That is why we are developing policies to increase the use of low carbon and renewable materials in all public sector infrastructure, including:

- » Approving use of Portland-limestone cement in public sector infrastructure. This material reduces GHG emissions associated with existing cement manufacturing by approximately 10 per cent, while producing concrete with similar strength and durability. This cement has been popular in Europe for over 25 years now, but is new to Canada; and
- » Increasing use of B.C.'s wood products that store carbon and reduce emissions, through our Wood First program that drives innovation in forestry products, while promoting climate-friendly construction and supporting our forest-dependent communities.

**GET INVOLVED:
IMPROVE YOUR ENERGY
MANAGEMENT PRACTICES**

Looking for ways to improve the energy efficiency of your organization?

Check out FortisBC's Commercial Custom Design Program to learn about natural gas upgrade opportunities and their Custom Business Efficiency Program for electricity upgrade opportunities for customers. Learn about the full range of energy management programs for BC Hydro customers.

Find out more at:

<https://www.fortisbc.com/Rebates/RebatesOffers/Pages/default.aspx?type=business> and <https://www.bchydro.com/powersmart/business/programs/partners.html>.

**TAKING ACTION:
REDUCING EMISSIONS AND
PLANNING FOR ADAPTATION IN THE
PUBLIC SECTOR**

It is important for the Province to lead the way on developing emission reductions and adaptation planning strategies, and demonstrating them through our public sector operations. Not only does it reduce the overall emissions profile of our province, it helps industry and individuals understand how they can join the fight against climate change. These areas were clear priorities for public sector leadership that were identified in the CLT's recommendations.

To continue capitalizing on this opportunity, the Province is committing to:

- » Developing guidelines for public sector operations to reduce emissions and plan for climate change adaptation; and
- » Mandating the creation of 10-year emissions reduction and adaptation plans for provincial public sector operations.



CANADA'S GREEN UNIVERSITY

A forestry seedling greenhouse started the University of Northern British Columbia (UNBC) on the road to using renewable energy. Now the Prince George university is the first in Canada with its own wood-fuelled district heating system and has been branded as "Canada's Green University." This system, designed by Vancouver-based clean tech company Nexterra, uses wood pellets made from wood waste such as sawmill shavings from Prince George's local forestry industry to create bioenergy. This energy is then used to heat water, which is circulated to the existing hot water district heating system that heats the UNBC campus. This has reduced fossil fuel consumption at UNBC by 72 per cent, avoiding 3,700 tonnes of carbon emissions every year. This has shown both the City of Prince George, as well as visiting students and faculty, what is possible when you use wood waste as a fuel.



GOING SOLAR AT THE COLLEGE OF THE ROCKIES

The College of the Rockies has installed solar panels on the roof of the Cranbrook campus' Kootenay Centre, which will allow it to generate electricity year-round. This solar technology will produce 109,000 kilowatt-hours per year of electricity, enough to power 14 houses in the region for a year. It will also act as a teaching tool for students, both during construction and once the system is running. This project will continue the college's mission to be leaders in alternative energy, having already installed solar technology to power the heating system for their residence building, and a solar wall at Pinnacle Hall that draws heat into the building, improving air quality and reducing heating costs.



Next Steps on Climate Leadership



Taking action on climate change is a critical priority for the Province of British Columbia and the citizens we serve. In B.C., we know that climate action is necessary to protect our environment,

while seizing the opportunity of a low carbon economy that creates good jobs for British Columbians.

We are committed to achieving B.C.'s goal of reducing GHG emissions to 80 per cent below 2007 levels by 2050. However, the pathway to that goal is not always clear, as true sustainability means balancing environmental, economic and social concerns. An action that improves environmental performance cannot be considered sustainable if it works against our economic competitiveness, driving jobs and emissions to other jurisdictions, or if it raises the cost of living so that British Columbians struggle to make ends meet. There is no silver bullet here — real climate action demands careful planning, a flexible approach, and coordination with our partners here in Canada and around the world.

The federal government has signalled a reinvigorated commitment to climate action, and we look forward to the opportunity to help develop a Pan-Canadian Framework later this year, which will align provincial policies to work together to achieve our GHG reduction goals.

While there are areas we know we still need to take action on, many are dependent on our work with the federal government, whether that means identifying additional available funding opportunities or developing policies that align with our provincial and territorial partners to protect B.C.'s economic competitiveness.

A key area that we know will require further action is carbon pricing. Our carbon tax already leads the country — now we must work with our provincial and federal partners to develop a carbon pricing model that works for all. It is a complex issue that will require extensive coordination to ensure that it is effective.

We know that First Nations are interested in ensuring their communities are prepared to adapt to climate change, and are able to capture the economic benefit of mitigation activities, including reforestation and clean energy projects. With the establishment of this new framework for provincial action on climate change, the Province will be seeking the participation of First Nations in the economic and adaptation opportunities we have identified. We look forward to collaborating with them to capitalize on these new opportunities.

Another key area where you can expect to hear more in the coming year is adaptation. In 2010, the Province created a comprehensive strategy to address the changes we will see in B.C. as a result of climate change. We are now working with the federal government and other Canadian jurisdictions to improve our management of the risks associated with a changing climate.

The Province is also collaborating internationally through the Regions Adapt Initiative and the Pacific Coast Collaborative. Recent investments in flood protection and forest stewardship here in British Columbia will also increase our resilience to a changing climate.

Adapting to a changing climate depends on action by all levels of government, the private sector and civil society. As we move forward on climate action, we will look to maximize opportunities to extend our leadership in responding to the impacts of a changing climate.

While the actions we have outlined here represent what we can do today, it is important that we lay the foundation to support solutions with the potential to make an even bigger impact. That is what programs like British Columbia's Innovative Clean Energy (ICE) Fund are designed to do.

A recent investment from the ICE Fund is generating a lot of excitement — Carbon Engineering Ltd. has built the world's first direct air capture plant in Squamish. This technology captures atmospheric carbon dioxide right out of the air, and targets emissions that traditional fluestack carbon capture cannot reach. Their demonstration plant is already capturing and purifying a tonne of CO₂ every day. Carbon Engineering is looking at ways to turn the captured CO₂ into fuels like gasoline and diesel, which upon combustion would simply return the carbon to the air.

These innovations, along with continued deployment of clean and renewable electricity generation, could allow for the mass production of low carbon fuels, helping the world become less reliant on fossil fuel production and consumption. The technology represents an enormous opportunity for B.C. to bolster its economy while fighting climate change.

The Province will continue to identify opportunities where we can reduce GHG emissions today, while working with our partners to plan for the future, and investing in innovative projects that can help us reach our 2050 target even sooner. Additionally, our Climate Leadership Plan will be updated over the course of the following year as work on the Pan-Canadian Framework on climate action progresses.

We hope that you will get engaged, do your own part where you can, and continue to work with us on this important mission. If we want to ensure a great future for our children and grandchildren, then climate action must be a key priority. Join us in imagining what this bright future looks like and in taking action to make it a reality.

Sincerely,



HONOURABLE MARY POLAK
MINISTER OF ENVIRONMENT



Photo Credit: Stephen Hui

Appendix



Summary of Action Areas

The table on the following page summarizes the 21 climate actions across 6 sectors.

Emission reductions have been forecast through economic modelling or direct calculation by the responsible ministries. Input/output modelling was used to forecast cumulative direct and indirect economic activity (Gross Domestic Product) and jobs resulting from policies, except forest sector policies, which were forecasted by the Ministry of Forests, Lands and Natural Resource Operations.

The input/output modelling was undertaken using relevant economic and jobs factors provided by BC Stats.

All numbers in the following table are forecasts and subject to final policy decisions and budgets.

* 25,000,000 tonnes CO₂e is equal to 8.3 million new cars off the road for a year.

An average B.C. house creates 2 tonnes CO₂e per year. 25,000,000 tonnes CO₂e is equal to the emissions from 12.5 million B.C. homes in one year.

Action Areas	Emission Reductions in 2050 (Millions of tonnes CO ₂ e)	Job Creation	Economic Activity (\$ Millions)
NATURAL GAS	5	4,043	527
 <ul style="list-style-type: none"> » Strategy to Reduce Methane Emissions » Regulating Carbon Capture and Storage » Electricity to Power Natural Gas Production and Processing 			
TRANSPORTATION	3	41,525	4,573
 <ul style="list-style-type: none"> » Increasing the Low Carbon Fuel Standard » Incentives for Renewable Natural Gas » Incentives for Purchasing a Clean Energy Vehicle » Charging Stations for Zero Emission Vehicles » 10-Year Plan to Improve B.C.'s Transportation Network 			
FORESTRY & AGRICULTURE	12	19,942	681
 <ul style="list-style-type: none"> » Enhancing the Carbon Storage Potential of B.C.'s Forests » Nutrient Management Program 			
INDUSTRY & UTILITIES	2	554	53
 <ul style="list-style-type: none"> » Making B.C.'s Electricity 100% Renewable or Clean » Efficient Electrification » Fuelling Marine Vessels with Cleaner Burning LNG » New Energy Efficiency Standards for Gas Fired Boilers » Expanding Incentives for Efficient Gas Equipment 			
BUILT ENVIRONMENT	2	230	19
 <ul style="list-style-type: none"> » Regulations for More Energy Efficient Building » Encouraging Development of Net Zero Buildings » Refreshing the Climate Action Charter for Communities » Strategy to Turn Waste into Resources 			
PUBLIC SECTOR LEADERSHIP	1	3	-
 <ul style="list-style-type: none"> » Promoting Use of Low Carbon and Renewable Materials in Infrastructure » Reducing Emissions and Planning for Adaptation in the Public Sector 			
TOTAL	25*	66,297	5,853

FOR MORE INFORMATION VISIT THE WEBSITE:
GOV.BC.CA/CLIMATELEADERSHIP



Attachment 1.3

PAN-CANADIAN FRAMEWORK



on Clean Growth and Climate Change

Canada's Plan to Address Climate
Change and Grow the Economy



PDF version
Cat. No.: En4-294/2016E-PDF
ISBN: 978-0-660-07023-0

Photos: © Thinkstock, 2016

Aussi disponible en français

PAN-CANADIAN FRAMEWORK on Clean Growth and Climate Change

**Canada's Plan to Address Climate
Change and Grow the Economy**

FOREWORD

The Pan-Canadian Framework on Clean Growth and Climate Change presented here is our collective plan to grow our economy while reducing emissions and building resilience to adapt to a changing climate. It will help us transition to a strong, diverse and competitive economy; foster job creation, with new technologies and exports; and provide a healthy environment for our children and grandchildren.

The Pan-Canadian Framework is both a commitment to the world that Canada will do its part on climate change, and a plan to meet the needs of Canadians. We have built on the momentum of the Paris Agreement by developing a concrete plan which, when implemented, will allow us to achieve Canada's international commitments.

When First Ministers met last March in Vancouver, they agreed to take ambitious action in support of meeting or exceeding Canada's 2030 target of a 30 percent reduction below 2005 levels of greenhouse gas (GHG) emissions. First Ministers issued the Vancouver Declaration on Clean Growth and Climate Change and agreed that a collaborative approach between provincial, territorial, and federal governments is important to reduce GHG emissions and to enable sustainable economic growth.

The Pan-Canadian Framework builds on the leadership shown and actions taken individually and collectively by the provinces and territories, including through the Declaration of the Premiers adopted at the Quebec Summit on Climate Change in 2015. To note, the province of Saskatchewan has decided not to adopt the Pan-Canadian Framework at this time. The federal government has committed to ensuring that the provinces and territories have the flexibility to design their own policies and programs to meet emission-reductions targets, supported by federal investments in infrastructure, specific emission-reduction opportunities and clean technologies. This flexibility enables governments to move forward and to collaborate on shared priorities while respecting each jurisdiction's needs and plans, including the need to ensure the continued competitiveness and viability of businesses.

In the Paris Agreement, Parties agreed that they should, when taking action to address climate change, recognize and respect the rights of Indigenous Peoples. As we implement this Framework, we will move forward respecting the rights of Indigenous Peoples, with robust, meaningful engagement drawing on their Traditional Knowledge. We will take into account the unique circumstances and opportunities of Indigenous Peoples and northern, remote, and vulnerable communities. We acknowledge and thank Indigenous Peoples across Canada for their climate leadership long before the Paris Agreement and for being active drivers of positive change.

Pricing carbon pollution is central to this Framework. Carbon pricing will encourage innovation because businesses and households will seek out new ways to increase efficiencies and to pollute less. We will complement carbon pricing with actions to build the foundation of our low-carbon and resilient economy.

As Canada transitions to a low-carbon future, energy will play an integral role in meeting our collective commitment, given that energy production and use account for over 80 percent of Canada's GHG emissions. This means using clean energy to power our homes, workplaces, vehicles, and industries, and using energy more efficiently. It means convenient transportation systems that run on cleaner fuels, that move more people by public transit and zero-emission vehicles, and that have streamlined trade corridors. It means healthier and more comfortable homes that can generate

as much power as they use. It means more resilient infrastructure and ecosystems that can better withstand climatic changes. It means land use and conservation measures that sequester carbon and foster adaptation to climate change. It means new jobs for Canadians across the country and opportunities for growth. It means leveraging technology and innovation to seize export and trade opportunities for Canada, which will allow us to become a leader in the global clean growth economy and will also help bring down the cost of low-emission technologies. It means healthier communities with cleaner air and healthy and diverse ecosystems across the country.

We will maintain a sustained focus on implementation of the Pan-Canadian Framework, consistent with the commitment under the Paris Agreement, to increase the level of ambition over time.

The Pan-Canadian Framework is a historic step in the transition to a clean growth and resilient economy. It is informed by what we have heard from Canadians. We will continue to grow our economy and create good jobs as we take ambitious action on climate change. We will work to ensure that the Pan-Canadian Framework opens new opportunities for Canadian businesses to not only maintain but also enhance their competitiveness. We will continue to engage Canadians to strengthen and deepen our action on clean growth and climate change. And we are committed to transparently assessing and reporting to Canadians on our progress.

Together, we have developed a Pan-Canadian Framework on Clean Growth and Climate Change. This is Canada's plan to address climate change and grow the clean economy.

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	How we developed the Framework	2
1.2	Pillars of the Framework	2
1.3	Elements of collaboration	3
1.4	Emissions trajectory to 2030	5
2	PRICING CARBON POLLUTION	7
3	COMPLEMENTARY ACTIONS TO REDUCE EMISSIONS	9
3.1	Electricity	11
3.2	Built environment	15
3.3	Transportation	18
3.4	Industry	20
3.5	Forestry, agriculture, and waste	22
3.6	Government leadership	24
3.7	International leadership	26
4	ADAPTATION AND CLIMATE RESILIENCE	27
4.1	Translating scientific information and Traditional Knowledge into action	29
4.2	Building climate resilience through infrastructure	31
4.3	Protecting and improving human health and well-being	32
4.4	Supporting particularly vulnerable regions	33
4.5	Reducing climate-related hazards and disaster risks	35
5	CLEAN TECHNOLOGY, INNOVATION, AND JOBS	37
5.1	Building early-stage innovation	38
5.2	Accelerating commercialization and growth	40
5.3	Fostering adoption	42
5.4	Strengthening collaboration and metrics for success	44
6	PATHWAY TO MEETING CANADA'S 2030 TARGET	45
7	REPORTING AND OVERSIGHT	46
8	LOOKING AHEAD	47
	ANNEX I: FEDERAL INVESTMENTS AND MEASURES TO SUPPORT THE TRANSITION TO A LOW-CARBON ECONOMY	48
	ANNEX II: PROVINCIAL AND TERRITORIAL KEY ACTIONS AND COLLABORATION OPPORTUNITIES WITH THE GOVERNMENT OF CANADA	52



INTRODUCTION

In Canada and abroad, the impacts of climate change are becoming evident. Impacts such as coastal erosion; thawing permafrost; increases in heat waves, droughts and flooding; and risks to critical infrastructure and food security are already being felt in Canada. The science is clear that human activities are driving unprecedented changes in the Earth's climate, which pose significant risks to human health, security, and economic growth.

Taking strong action to address climate change is critical and urgent. The cost of inaction is greater than the cost of action: climate change could cost Canada \$21-\$43 billion per year by 2050, according to 2011 estimates from the National Round Table on the Environment and the Economy. Businesses and markets are increasingly considering climate risks. In recent years, severe weather events have cost Canadians billions of dollars, including in insured losses. Indigenous Peoples, northern and coastal regions and communities in Canada are particularly vulnerable and disproportionately affected. Geographic location, socio-economic challenges, and for Indigenous Peoples, the reliance on wild food sources, often converge with climate change to put pressure on these communities. Much has been done to begin addressing these challenges, including by Indigenous Peoples.

Acting on climate change will reduce risks and create new economic opportunities and good jobs for Canadians. There is already a global market for low-carbon goods and services worth over \$5.8 trillion, which is projected to keep growing at a rate of 3 percent per year. Clean growth opportunities will benefit all sectors and regions. Canada will remain globally competitive through innovation, including through the development and promotion of innovative technologies with the potential to address climate change globally. This includes clean technology to enable the sustainable development of Canada's energy and resource sectors, including getting these resources to market, as Canada transitions to a low-carbon economy. Innovation can help further reduce emissions and the cost of taking action at home. Canadian technologies and solutions can also be exported abroad and deployed around the world, creating new markets and partners for Canadian businesses and supporting global action to reduce emissions.

The federal government will continue to work in close collaboration with other countries on climate solutions, including with partners across North America. A number of provinces and territories have already joined or are exploring entry into regional and international efforts to reduce GHG emissions.

Canadian municipalities will also continue to be important partners in developing and implementing climate solutions locally, as well as through international collaboration with other municipalities around the world.

The international community has agreed that tackling climate change is an urgent priority and also an historic opportunity to shift towards a global low-carbon economy. The adoption of the Paris Agreement in December 2015 was the culmination of years of negotiations under the United Nations Framework Convention on Climate Change. The Paris Agreement is a commitment to accelerate and intensify the actions and investments needed for a sustainable low-carbon future, to limit global average temperature rise to well below 2 °C above pre-industrial levels, and to pursue efforts to limit the increase to 1.5 °C. This will require taking action on long-lived GHGs such as carbon dioxide and short-lived climate pollutants such as methane, hydrofluorocarbons and black carbon.

As a first step towards implementing the commitments Canada made under the Paris Agreement, First Ministers released the Vancouver Declaration on Clean Growth and Climate Change on March 3, 2016.

1.1 How we developed the Framework

The development of the Pan-Canadian Framework was informed by input from Canadians across the country, who made it clear that they want to be part of the solution to climate change. Under the Vancouver Declaration, First Ministers asked four federal-provincial-territorial working groups to work with Indigenous Peoples; to consult with the public, businesses and civil society; and to present options to act on climate change and enable clean growth. The working groups heard solutions directly from Canadians, through an interactive website, in-person engagement sessions, and independent town halls.

Representatives of Indigenous Peoples contributed their knowledge and expectations for meaningful engagement in climate action and provided

important considerations and recommendations either directly to working groups or to ministers, which helped shape this framework.

Ministers also reached out to Canadians, businesses, non-governmental organizations, and Indigenous Peoples to hear their priorities. In addition, ministerial tables were convened to provide their advice, including the Canadian Council of Ministers of the Environment, Ministers of Innovation, Ministers of Energy, and Ministers of Finance.

ENGAGING CANADIANS:

The Let's Talk Climate Action website was launched on April 22, 2016 to gather ideas and comments from Canadians about how Canada should address climate change. By the submission deadline of September 27, 2016, over 13,000 ideas and comments were received. In addition, consultations by governments and working groups on clean growth and climate change were held across Canada.

1.2 Pillars of the Framework

The Pan-Canadian Framework has four main pillars: pricing carbon pollution; complementary measures to further reduce emissions across the economy; measures to adapt to the impacts of climate change and build resilience; and actions to accelerate innovation, support clean technology, and create jobs. Together, these interrelated pillars form a comprehensive plan.

Pricing carbon pollution is an efficient way to reduce emissions, drive innovation, and encourage people and businesses to pollute less. However, relying on a carbon price alone to achieve Canada's international target would require a very high price.

Complementary climate actions can reduce emissions by addressing market barriers where pricing alone is insufficient or not timely enough to reduce emissions in the pre-2030 timeframe. For instance, tightening energy efficiency standards and codes for

vehicles and buildings are common sense actions that reduce emissions, while also helping consumers save money by using less energy.

Canada is experiencing the impacts of climate change, so there is also a need to **adapt and build resilience**. This means making sure that our infrastructure and communities are adequately prepared for climate risks like floods, wildfires, droughts, and extreme weather events, including in particularly vulnerable regions like Indigenous, northern, coastal, and remote communities. This also means adapting to the impacts of changes in temperature, including thawing permafrost.

A low-carbon economy can and will be a strong and thriving economy. Taking action now, to position Canada as a global leader on clean technology innovation, will help ensure that Canada remains internationally competitive and will lead to the creation of new good jobs across the country. Investing in **clean technology, innovation, and jobs** will bring new and in-demand Canadian technologies to expanding global markets. These investments will help improve the efficiency and cost-effectiveness of mitigation and adaptation measures and will equip Canada's workforce with the knowledge and skills to succeed.

In implementing the Pan-Canadian Framework on Clean Growth and Climate Change, federal, provincial and territorial governments will review progress annually to assess the effectiveness of our collective actions and ensure continual improvement. First Ministers commit to **report regularly and transparently** to Canadians on progress towards GHG-reduction targets, on building climate resilience, and on growing a clean economy.

Our governments will continue to recognize, respect and safeguard the **rights of Indigenous Peoples** as we take actions under these pillars.

1.3 Elements of collaboration

The Pan-Canadian Framework reaffirms the principles outlined in the Vancouver Declaration, including

- recognizing the diversity of provincial and territorial economies and the need for fair and flexible approaches to ensure international

competitiveness and a business environment that enables firms to capitalize on opportunities related to the transition to a low-carbon economy in each jurisdiction;

- recognizing that growing our economy and achieving our GHG-emissions targets will require an integrated, economy-wide approach that includes all sectors, creates jobs, and promotes innovation;
- recognizing that a collaborative approach between provincial, territorial, and federal governments is important to reduce GHG emissions and enable sustainable economic growth;
- recognizing that provinces and territories have been early leaders in the fight against climate change and have taken proactive steps, such as adopting carbon pricing mechanisms, placing caps on emissions, involvement in international partnerships with other states and regions, closing coal plants, carbon capture and storage projects, renewable energy production (including hydroelectric developments) and targets, and investments in energy efficiency;
- recognizing that the federal government has committed to ensuring that the provinces and territories have the flexibility to design their own policies to meet emission-reductions targets, including their own carbon pricing mechanisms, supported by federal investments in infrastructure, specific emission-reduction opportunities and clean technologies;
- recognizing the commitment of the federal government to work with provinces and territories to complement and support their actions without duplicating them, including by promoting innovation and enabling clean growth across all sectors;
- strengthening the collaboration between our governments and Indigenous Peoples on mitigation and adaptation actions, based on recognition of rights, respect, cooperation, and partnership;
- recognizing the importance of Traditional Knowledge in regard to understanding climate impacts and adaptation measures;

- recognizing that comprehensive adaptation efforts must complement ambitious mitigation measures to address unavoidable climate change impacts; and
- implementing a collaborative, science-based approach to inform Canada's future targets that will increase in stringency as required by the Paris Agreement.

Governments recognize the unique circumstances of the North, including disproportionate impacts from climate change and the associated challenges with food security, emerging economies and the high costs of living and of energy.

Federal, provincial, and territorial governments will work collaboratively to grow the economy, create good-paying and long-term jobs, and reduce GHG emissions in support of meeting or exceeding Canada's 2030 target. These actions will be supported by strong, complementary adaptation policies to build climate resilience. Indigenous Peoples will be important partners in developing real and meaningful outcomes that position them as drivers of climate action in the implementation of the Pan-Canadian Framework. All governments across Canada are committed to ambitious and sustained action on climate change, building on current actions and future opportunities.

THE FEDERAL GOVERNMENT'S RENEWED RELATIONSHIP WITH INDIGENOUS PEOPLES:

The federal government also reiterates its commitment to renewed nation-to-nation, government-to-government, and Inuit-to-Crown relationships with First Nations, the Métis Nation and Inuit, based on the recognition of rights, respect, cooperation, and partnership, consistent with the Government of Canada's support for the United Nations Declaration on the Rights of Indigenous Peoples, including free, prior and informed consent.

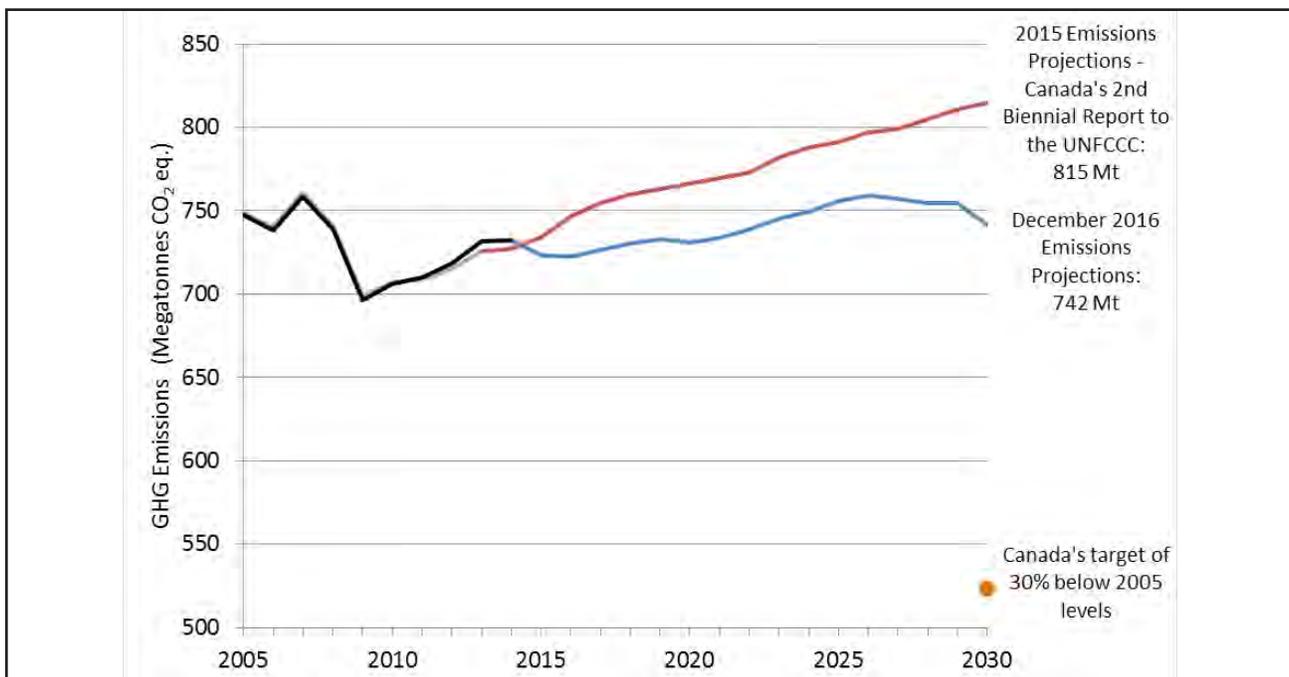
1.4 Emissions trajectory to 2030

The graph below highlights that total Canadian GHG emissions are projected to be 742 megatonnes (Mt) in 2030 under the December 2016 emissions projections (Environment and Climate Change Canada)¹. Canada's target is 523 Mt.

Projections from the December 2016 emissions projections include revised forecasts for GDP and oil and gas prices and production². Also incorporated are new federal, provincial, and territorial government measures that have legislative or

funding certainty as of November 1st, 2016 and were not included in the 2015 emissions projections. These include: federal measures for increasing energy efficiency of equipment in buildings; Ontario's commitment to join the Western Climate Initiative cap-and-trade system; Alberta's coal phase-out, carbon levy, and oil sands emissions cap; Quebec's regulations for new high-rise buildings; and, British Columbia's low carbon fuel standard.

Figure 1: Emissions Projections to 2030



1 Canada's 2016 greenhouse gas emissions projections to 2030 will be released by Environment and Climate Change Canada in December 2016.

2

December 2016 Assumptions	Scenarios		
	Low	Reference	High
Average Annual GDP Growth (2014-2030)	1.0%	1.7%	2.3%
2030 WTI Oil Price (2014 US\$/bbl)	42	81	111
2030 Henry Hub Natural Gas Price (2014 US\$/GJ)	2.89	3.72	4.62
2030 GHG Emissions (Mt CO2eq.)	697	742	790



PRICING CARBON POLLUTION

Overview

Carbon pricing is broadly recognized as one of the most effective, transparent, and efficient policy approaches to reduce GHG emissions. Many Canadian provinces are already leading the way on pricing carbon pollution. British Columbia has a carbon tax, Alberta has a hybrid system that combines a carbon levy with a performance-based system for large industrial emitters, and Quebec and Ontario have cap-and-trade systems. With existing and planned provincial action, broad-based carbon pricing will apply in provinces with nearly 85 per cent of Canada's economy and population by 2017, covering a large part of our emissions.

The federal government outlined a benchmark for pricing carbon pollution by 2018 (see Annex I). The goal of this benchmark is to ensure that carbon pricing applies to a broad set of emission sources throughout Canada and with increasing stringency over time either through a rising price or declining caps. The benchmark outlines that jurisdictions can implement (i) an explicit price-based system (a carbon tax or a carbon levy and performance-based emissions system) or (ii) a cap-and-trade system. Some existing provincial systems already exceeded the benchmark. As affirmed in the Vancouver Declaration, provinces and territories continue to

have the flexibility to design their own policies to meet emissions-reduction targets, including carbon pricing, adapted to each province and territory's specific circumstances.

“THERE IS A GROWING CONSENSUS AMONG BOTH GOVERNMENTS AND BUSINESSES ON THE FUNDAMENTAL ROLE OF CARBON PRICING IN THE TRANSITION TO A DECARBONIZED ECONOMY.”

World Bank, State and Trends of Carbon Pricing 2015

The following **principles** guide the pan-Canadian approach to pricing carbon pollution, and they are broadly based on those proposed by the Working Group on Carbon Pricing Mechanisms:

- Carbon pricing should be a central component of the Pan-Canadian Framework.

- The approach should be flexible and recognize carbon pricing policies already implemented or in development by provinces and territories.
- Carbon pricing should be applied to a broad set of emission sources across the economy.
- Carbon pricing policies should be introduced in a timely manner to minimize investment into assets that could become stranded and maximize cumulative emission reductions.
- Carbon price increases should occur in a predictable and gradual way to limit economic impacts.
- Reporting on carbon pricing policies should be consistent, regular, transparent, and verifiable.
- Carbon pricing policies should minimize competitiveness impacts and carbon leakage, particularly for emissions-intensive, trade-exposed sectors.
- Carbon pricing policies should include revenue recycling to avoid a disproportionate burden on vulnerable groups and Indigenous Peoples.

NEW ACTIONS

1) Provincial and territorial actions on pricing carbon pollution are described in Annex II.

2) The federal government will work with the territories to find solutions that address their unique circumstances, including high costs of living and of energy, challenges with food security, and emerging economies. The federal government will also engage Indigenous Peoples to find solutions that address their unique circumstances, including high costs of living and of energy, challenges with food security, and emerging economies.

3) The overall approach will be reviewed by 2022 to confirm the path forward.

“CARBON PRICING IS THE MOST PRACTICAL AND COST-EFFECTIVE WAY TO LOWER GHG EMISSIONS WHILE ENCOURAGING LOW-CARBON INNOVATION.”

Canada's Ecofiscal Commission



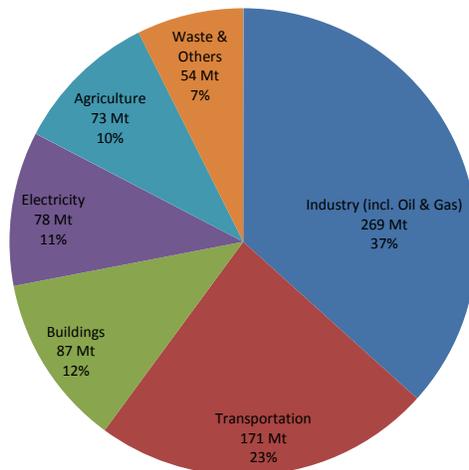
COMPLEMENTARY ACTIONS TO REDUCE EMISSIONS

Overview

To reduce emissions, meaningful action will need to be taken across all regions and sectors of the economy. Many of the things that Canadians do every day—like driving cars and heating homes—produce GHG emissions. Many activities that drive economic growth in the country, like extracting natural resources, industrial and manufacturing activities, and transporting goods to customers, also

produce emissions. The policies that help drive down emissions can also help the economy to keep growing by cutting costs for Canadians, creating new markets for low-emission goods and services, and helping businesses use cleaner and more efficient technologies that give them a leg up on international competitors.

Emissions by sector in 2014
(megatonnes of CO₂ eq.)



Federal, provincial, and territorial governments will work together to make sure new actions build on and complement existing plans, policies, programs, and regulations and reflect lessons learned from past experience. New policies will be designed to focus on GHG-emission outcomes and will recognize flexibility for regional differences, including through outcomes-based regulatory equivalency agreements. Indigenous Peoples will be involved in defining and developing policies to support clean energy in their communities.

In developing policies, a number of factors will be considered, including:

- economic, environmental, and social impacts and benefits;
- how individual policies will work with carbon pricing;
- the need to consider and mitigate the impacts on emissions-intensive trade exposed sectors (e.g., resource sectors that are price takers on the global market), including the need to avoid carbon leakage;
- co-benefits such as improved health due to air pollutant reductions, and jobs and business growth;
- opportunities to realize near-term climate and health benefits through reducing emissions of short-lived climate pollutants; and,
- benefits for ecosystems and biodiversity.



FALLING COSTS OF RENEWABLE ENERGY:

Between 2010 and 2015, the costs for new utility-scale solar photovoltaic (PV) installations declined by two-thirds, while over the same period the cost of onshore wind fell by an estimated 30 percent on average (IEA, 2016)

Governments will be supporting the actions outlined in the Pan-Canadian Framework through policies and investments. Federal actions are described in Annex I, and provincial and territorial key actions and collaboration opportunities with the Government of Canada are described in Annex II.



3.1 Electricity

Canada already has one of the cleanest electricity systems in the world. About 80 percent of electricity production comes from non-emitting sources, more than any other G7 country. While electricity emissions are going down in large part due to the move away from coal-fired power toward cleaner sources, electricity generation is still Canada's fourth-largest source of GHG emissions.

Clean, non-emitting electricity systems will be the cornerstone of a modern, clean growth economy. Transformations to electricity systems will be supported by federal, provincial, and territorial governments, and, undertaken by utilities, private-sector players, and Indigenous Peoples.

The approach to electricity will include

- (1) increasing the amount of electricity generated from renewable and low-emitting sources;
- (2) connecting clean power with places that need it;
- (3) modernizing electricity systems; and
- (4) reducing reliance on diesel working with Indigenous Peoples and northern and remote communities.

Provinces and territories have already taken action on moving from traditional coal-fired generation to clean electricity. Ontario and Manitoba have already phased out their use of coal, Alberta has plans in place to phase out coal-fired electricity by 2030, Nova Scotia has created a regulatory framework to transition from coal to clean electricity generation, and Saskatchewan has a coal-fired generating unit with carbon capture technology, which captures 90 percent of emissions. New capacity will come from non-emitting sources—including hydro, wind, and solar—as well as natural gas. Energy efficiency and conservation will make added contributions to clean electricity systems.

ONTARIO'S COAL PHASE-OUT:

On April 15, 2014, **Ontario** became the first jurisdiction in North America to fully eliminate coal as a source of electricity generation. This action is the single largest GHG-reduction initiative in North America, eliminating more than 30 Mt of annual GHG emissions and equivalent to taking seven million vehicles off the road. On November 23, 2015, Ontario passed the *Ending Coal for Cleaner Air Act*, permanently banning coal-fired electricity generation in the province.

SASKATCHEWAN'S BOUNDARY DAM INTEGRATED CARBON CAPTURE AND STORAGE PROJECT:

is the world's first commercial-scale, coal-fired carbon capture and storage electricity project, and it is able to capture and sequester up to 90 percent of its GHG emissions.



WIND POWER:

Wind capacity in Canada grew 20 times between 2005 and 2015, and there is strong potential for further growth. For example, 4 wind farms in **Prince Edward Island** now generate almost 25 percent of the province's electricity requirements.

ALBERTA'S COAL PHASE-OUT:

Alberta's commitments to end emissions from coal-fired electricity and replace it with 30 percent renewable energy by 2030 are expected to achieve cumulative emission reductions of 67 Mt between now and 2030, and emissions in 2030 will be at least 14 Mt below what is forecast under the status quo. This reduction is the equivalent of taking 2.8 million cars off the road. This move will improve air quality and the health of Albertans and other Canadians. It will also ensure reliability, encourage private investment, and provide price stability for all Albertans.

Connecting clean power across Canada through stronger transmission-line interconnections will help reduce emissions and support the move away from coal. Many provinces already trade electricity across their borders, and there is potential to increase these flows, consistent with market rules and fair competition among electricity producers.

THE CANADIAN ENERGY STRATEGY:

Provinces and territories are already taking a cooperative approach toward sustainable energy development through the Canadian Energy Strategy, which was released by premiers in July 2015. As agreed under the Vancouver Declaration and building on the Quebec Summit on Climate Change in 2015, federal, provincial, and territorial energy ministers are collaborating on specific actions through the Canadian Energy Strategy, to contribute to the Pan-Canadian Framework on Clean Growth and Climate Change. Actions include energy conservation and efficiency, clean energy technology and innovation, and deployment of energy to people and global markets.

Modernizing electricity systems will involve expanding energy storage, updating infrastructure, and deploying smart-grid technologies to improve the reliability and stability of electric grids and to allow more renewable power to be added. As a leader in the development and deployment of innovative energy-storage solutions and smart-grid technology, Canadian clean technology producers stand to benefit from increased investments in our electricity systems.

Many Indigenous Peoples, as well as northern and remote communities in Canada rely on diesel fuel to produce electricity and heat. Opportunities exist for clean electricity infrastructure, distributed energy systems, renewable energy microgrids, as well as grid connections and hybrid systems, which will enhance wellbeing, create local economic opportunities, and contribute to better air quality and a cleaner environment overall. Investing in clean energy solutions will advance the priorities of Indigenous Peoples, as well as northern and remote communities to transition away from diesel.

COLVILLE LAKE SOLAR PROJECT –

Colville Lake, Northwest Territories is located north of the Arctic Circle, and it is served with a winter road that is open just a couple of months each year. To reduce diesel use in this remote, off-grid community, a solar/diesel/battery hybrid electricity system has been installed. This system has allowed the diesel generators to be shut down for extended periods in the summer. This innovative energy solution has reduced diesel use and related emissions by 20-25 percent per year.

Taking these actions will have a number of benefits beyond reducing GHG emissions. Phasing out coal and reducing the use of diesel will reduce harmful air pollutants, which have significant implications for human health and associated health-care costs. Designing and building clean-power technologies and transmission lines represents major economic opportunities for Canada. Increasing the amount of clean and renewable electricity sold to the United States could also bring new revenue to utilities and provinces, respecting open-access rules under the authority of the U.S. Federal Energy Regulatory Commission.

THE CANADA INFRASTRUCTURE BANK:

The federal government is creating the Canada Infrastructure Bank, which will work with provinces, territories, and municipalities to further the reach of government funding directed to infrastructure, including clean electricity systems.



COMMUNITY-BASED ENERGY GENERATION:

In May 2015, **New Brunswick** introduced legislation to allow local entities to develop renewable-energy sourced electricity generation in their communities. This legislation will allow universities, non-profit organizations, cooperatives, First Nations, and municipalities to contribute to NB Power's renewable energy requirements.

NEW ACTIONS

1. Increasing renewable and non-emitting energy sources

Federal, provincial, and territorial governments will work together to accelerate the phase out of traditional coal units across Canada, by 2030, as recently announced by the federal government (see Annex I) and to build on provincial and territorial leadership.

The federal government has announced it will set performance standards for natural gas-fired electricity generation, in consultation with provinces, territories, and stakeholders (see Annex I).

Federal, provincial, and territorial governments will work together to facilitate, invest in, and increase the use of clean electricity across Canada, including through additional investments in research, development, and demonstration activities.

2. Connecting clean power with places that need it

Federal, provincial, and territorial governments will work together to help build new and enhanced transmission lines between and within provinces and territories.

3. Modernizing electricity systems

Federal, provincial, and territorial governments will work together to support the demonstration and deployment of smart-grid technologies that help electric systems make better use of renewable energy, facilitate the integration of energy storage for renewables, and help expand renewable power capacity.

4. Reducing reliance on diesel working with Indigenous Peoples and northern and remote communities

Governments are committed to accelerating and intensifying efforts to improve the energy efficiency of diesel generating units, demonstrate and install hybrid or renewable energy systems, and connect communities to electricity grids. This will be done in partnership with Indigenous Peoples and businesses. These actions will have significant benefits for communities, such as improving air quality and energy security, and creating the potential for locally owned and sourced power generation.



RAMEA WIND-HYDROGEN-DIESEL ENERGY PROJECT:

The off-grid community of Ramea in Newfoundland and Labrador hosts one of the first projects in the world to integrate generation from wind, hydrogen, and diesel in an isolated electricity system. Since 2010, the Ramea Wind-Hydrogen-Diesel Energy Project has successfully produced approximately 680 000 kilowatt hours of renewable energy.



3.2 Built environment

In Canada, using energy to heat and cool buildings accounted for about 12 percent of national GHG emissions in 2014 or 17 percent if emissions from generating the electricity used in buildings is also included. The emissions in this sector—created by burning fossil fuels and leaks in air conditioning systems—are projected to grow modestly by 2030 unless further action is taken.

In a low-carbon, clean growth economy, buildings and communities will be highly energy efficient, rely on clean electricity and renewable energy, and be smart and sustainable. Making the built environment more energy efficient reduces GHGs, helps make homes and buildings more comfortable and more affordable by lowering energy bills, and can promote innovation and clean job opportunities. Most building owners and architects estimate that retrofitting commercial and institutional buildings pays off in less than ten years, according to data from the Canada Green Building Council. Residential energy efficiency improvements helped Canadians save \$12 billion in energy costs in 2013, an average savings of \$869 per household.

The approach to the built environment will include (1) making new buildings more energy efficient; (2) retrofitting existing buildings, as well as fuel switching; (3) improving energy efficiency for appliances and equipment; and (4) supporting building codes and energy efficient housing in Indigenous communities.

Advances in clean technologies and building practices can make new buildings “net-zero energy”, meaning they require so little energy they could potentially rely on their own renewable energy supplies for all of their energy needs. Through research and

development, technology costs continue to fall, and government and industry efforts and investments will accelerate that trend. These advances, supported by a model “net-zero energy ready” building code, will enable all builders to adopt these practices and lower lifecycle costs for homeowners.



EFFICIENCY NOVA SCOTIA:

Canada's first energy efficiency utility—works with more than 100 local partners, and it has helped 225 000 program participants complete energy efficiency projects, saving Nova Scotians \$110 million in 2016 alone. For example, the [HomeWarming](#) service is funded by the province of Nova Scotia as part of a long-term plan to upgrade all low-income homes in Nova Scotia, over the next 10 years.

At the same time, action is needed on existing buildings, since more than 75 percent of the building stock in 2030 will be composed of buildings already standing today. This can be supported by innovative policies like labelling a building's energy performance, establishing retrofit codes, and offering low-cost financing for retrofits.

Housing for Indigenous communities is particularly pressing. New housing will be built to high-efficiency standards and existing housing will be retrofitted. Indigenous Peoples have also identified the need to incorporate Traditional Knowledge and culture into building designs. Governments will partner with Indigenous Peoples in the design of relevant policies and programs.

Energy efficiency standards for equipment and appliances save consumers and businesses money on energy bills. An early market signal by the government, in the form of an intention to introduce standards by a specific year, can motivate the market to accelerate the uptake of the targeted technologies. Regulations can be supported by actions to educate consumers, to demonstrate benefits, and to overcome market barriers.

Construction in Canada is a \$171 billion industry, and it employs well over a million people. New building codes will spur innovation and support Canadian businesses in developing more efficient building techniques and technologies. Investments in retrofits to improve energy efficiency have been shown to be strong job creators, providing direct local benefits, creating local jobs, and reducing energy bills.



NET-ZERO ENERGY BUILDINGS:

Construction costs for net-zero energy buildings have dropped 40 percent in the past decade, and they are continuing to fall. The benefits of net-zero energy buildings are significant. Estimated operating costs for a net-zero energy ready house is 30 percent to 55 percent less than for a typical house, depending on region, fuel type and occupant behaviour. For example, on a -32 °C day, the Riverdale NetZero Project (a semi-detached duplex in Edmonton, Alberta) only needs 6500 W of power for heat—the same amount of heat produced by four toasters.

NEW ACTIONS

1. Making new buildings more energy efficient

Federal, provincial, and territorial governments will work to develop and adopt increasingly stringent model building codes, starting in 2020, with the goal that provinces and territories adopt a “net-zero energy ready” model building code by 2030. These building codes will take regional differences into account. Continued federal investment in research, development, and demonstration, and cooperation with industry will help to reduce technology costs over time.

2. Retrofitting existing buildings

Federal, provincial, and territorial governments will work to develop a model code for existing buildings by 2022, with the goal that provinces and territories adopt the code. This code will help guide energy efficiency improvements that can be made when renovating buildings.

Federal, provincial, and territorial governments will work together with the aim of requiring labelling of building energy use by as early as 2019. Labelling will provide consumers and businesses with transparent information on energy performance.

Provincial and territorial governments will work to sustain and, where possible, expand efforts to retrofit existing buildings by supporting energy efficiency improvements as well as fuel switching, where appropriate, and by accelerating the adoption of high-efficiency equipment while tailoring their programs to regional circumstances. The federal government could support efforts of provinces and territories through the Low Carbon Economy Fund and infrastructure initiatives.

3. Improving energy efficiency for appliances and equipment

The federal government will set new standards for heating equipment and other key technologies to the highest level of efficiency that is economically and technically achievable.

4. Supporting building codes and energy efficient housing in Indigenous communities

Governments will collaborate with Indigenous Peoples as they move towards more efficient building standards and incorporate energy efficiency into their building-renovation programs.

SOCIAL HOUSING RETROFITS:

To help fight climate change, Ontario invested \$92 million in 2016 to retrofit social housing buildings to reduce GHG emissions by installing energy efficient boilers, insulating outer walls and mechanical systems, and installing more energy efficient windows and lighting. Ontario's Climate Change Action Plan builds on this initial investment by committing up to \$500 million more for social housing retrofits over the next five years.

Aki Energy in **Manitoba** is a non-profit Aboriginal social enterprise that works with First Nations to start green businesses in their communities and to create local jobs and strong local economies. Aki Energy is committed to helping First Nations lower the utility bills to heat buildings, and it has installed over \$3 million in cost-effective renewable energy technologies in partnership with Manitoba First Nations.



3.3 Transportation

The transportation sector accounted for about 23 percent of Canada's emissions in 2014, mostly from passenger vehicles and freight trucks. Transportation emissions are projected to decline slightly by 2030 if no further action is taken. Governments are already working to make all modes of transportation more efficient and convenient, but more action is needed.

Low-carbon transportation systems will use cleaner fuels, will have more zero-emission vehicles on the road, will provide convenient and affordable public transit, and will transport people and goods more efficiently.

The approach to transportation will include (1) setting and updating vehicle emissions standards and improving the efficiency of vehicles and transportation systems; (2) expanding the number of zero-emission vehicles on Canadian roads; (3) supporting the shift from higher to lower-emitting types of transportation, including through investing in infrastructure; and (4) using cleaner fuels.

Emissions standards for cars and trucks ensure new engines are more fuel efficient. Retrofitting freight trucks to reduce wind resistance can also cut emissions. And streamlining how goods are transported can improve the overall efficiency of transportation systems.

Zero-emission vehicle technologies include plug-in hybrids, electric vehicles, and hydrogen fuel-cell vehicles. Many of these are becoming increasingly affordable and viable, and governments can help accelerate these trends, including by investing in charging and fueling infrastructure.



ELECTRIFICATION OF TRANSPORTATION:

Québec has committed to take significant action on the electrification of transportation by 2020, including by increasing the number of electric and plug-in hybrid vehicles registered in Québec to 100 000; adding 5000 electric-vehicle jobs and generating \$500 million in investments; reducing the amount of fuel used each year in Québec by 66 million liters; and cutting annual GHG emissions from the transportation sector by 150 000 tonnes.

Shifting from higher- to lower-emitting modes of transportation includes things like riding public transit or cycling instead of driving a car, and transporting goods by rail instead of trucks. Improving public transit infrastructure and optimizing freight corridors can help drive these shifts.

Using cleaner fuels such as advanced biofuels can reduce the lifecycle carbon intensities of all fuels across transportation systems, as well as in other sectors like industry and buildings.

Taking these actions will have additional environmental and economic benefits beyond reducing GHG emissions. Efficiency improvements can help Canadians and businesses save money by spending less on fuel and reducing the costs of transporting goods. New, cleaner fuels can create opportunities for resource sectors. Businesses that develop new fuel and vehicle technologies will create jobs, help the economy grow, and give those businesses a competitive edge.

NEW ACTIONS

1. Setting emissions standards and improving efficiency

The federal government will continue its work to implement increasingly stringent standards for emissions from light-duty vehicles, including fuel-efficient tire standards, and to update emissions standards for heavy-duty vehicles.

The federal government will work with provinces, territories, and industry to develop new requirements for heavy-duty trucks to install fuel-saving devices like aerodynamic add-ons.

The federal government will take a number of actions to improve efficiency and support fuel switching in the rail, aviation, marine, and off-road sectors.

2. Putting more zero-emission vehicles on the road

Federal, provincial, and territorial governments will work with industry and other stakeholders to develop a Canada-wide strategy for zero-emission vehicles by 2018.

Federal, provincial, and territorial governments will work together, including with private-sector partners, to accelerate demonstration and deployment of infrastructure to support zero-emission vehicles, such as electric-charging stations.

3. Shifting from higher- to lower-emitting modes and investing in infrastructure

Federal, provincial, and territorial governments will work together to enhance investments in public-transit upgrades and expansions.

Federal, provincial, and territorial governments will invest in building more efficient trade and transportation corridors including investments in transportation hubs and ports.

Federal, provincial, and territorial governments will consider opportunities with the private sector to support refueling stations for alternative fuels for light- and heavy-duty vehicles, including natural gas, electricity, and hydrogen.

4. Using cleaner fuels

The federal government, working with provincial and territorial governments, industry, and other stakeholders, will develop a clean fuel standard to reduce emissions from fuels used in transportation, buildings and industry.

This will take into account the unique circumstances of Indigenous Peoples and northern and remote communities.



3.4 Industry

Canada's industries are the backbone of the economy, but they are also a major source of GHG emissions. In 2014, industrial sectors accounted for about 37 percent of Canada's emissions, the majority of which came from the oil and gas sector. Industrial emissions are projected to grow between now and 2030 as demand grows for Canadian-produced goods, at home and abroad.

A low-carbon industrial sector will rely heavily on clean electricity and lower-carbon fuels, will make more efficient use of energy, and will seize opportunities unlocked by innovative technologies. The province of Alberta has legislated an absolute cap of 100 Mt a year on emissions from the oil sands sector. There are a number of near-term opportunities to reduce industrial emissions while maintaining the competitive position of Canadian firms.

The approach to the industrial sector will include three main areas of action: (1) regulations to reduce methane and hydrofluorocarbon (HFC) emissions; (2) improving industrial energy efficiency; and (3) investing in new technologies to reduce emissions. Together, these actions will help set the path for long-term clean growth and the transition to a low-carbon economy.

Methane and HFCs are potent GHGs, dozens to thousands of times more powerful than carbon dioxide. The oil and gas sector is the largest contributor to methane emissions in Canada. Building on provincial actions and targets, the federal government has committed to reduce methane emissions by 40-45 percent by 2025. Canada joined almost 200 other countries in signing the [Kigali Amendment to the Montreal Protocol](#), which will push the global phase out of HFC

emissions. Taking action on HFCs can prevent up to 0.5 °C of global warming due to the potency of these gases, while continuing to protect the ozone layer.

There is significant potential to improve energy efficiency in Canada's industrial sectors. Energy management systems such as ISO 50001, the Superior Energy Performance program (SEP), and the ENERGY STAR for Industry program are useful tools that help businesses track, analyze, and improve their energy efficiency.

Using today's low-emission technologies and switching to clean electricity and lower-carbon fuels are near-term actions industry can take to reduce emissions. Over the longer-term, more dramatic emission reductions will be possible by using new technologies to transform how some industries operate. Investing in promising new technologies is an important area for action. Innovation will help Canadian businesses access global markets and attract foreign investment.

LOWER-CARBON INDUSTRIAL ACTIVITY IN CANADA:

Quebec's aluminum smelters have reduced their emissions by 30 percent since 1990. The modernized world-class aluminum smelter in Kitimat, BC will boost production and reduce emissions by nearly 50 percent. As a result of these investments, Canada's aluminum industry is now the most carbon-efficient producer of aluminum in the world.



OIL SANDS INNOVATION:

COSIA (Canada's Oil Sands Innovation Alliance) is an alliance of 13 oil sands producers, representing 90 percent of production from the Canadian oil sands, who are working together to develop technologies that help reduce the environmental impact of the oil sands, including reducing GHG emissions. Member companies have shared 936 distinct environmental technologies, costing \$1.33 billion, since coming together in 2012.

Taking these actions will benefit businesses. Strengthening energy performance is one of the most cost-effective ways for industry to reduce energy use, it generally has quick payback periods, and it will continually generate financial savings. Measures that help cut costs or develop new technologies can improve competitiveness and create jobs and export opportunities for the clean technology sector.

NEW ACTIONS

1. Reducing methane and HFC emissions

The federal government will work with provinces and territories to achieve the objective of reducing methane emissions from the oil and gas sector, including offshore activities, by 40-45 percent by 2025, including through equivalency agreements.

The federal government has introduced proposed regulations to phase down use of HFCs to support Canada's commitment to the Montreal Protocol amendment.

2. Improving industrial energy efficiency

Federal, provincial, and territorial governments will work together to help industries save energy and money, including by supporting them in adopting energy management systems.

3. Investing in technology

Federal, provincial, and territorial governments working with industry will continue to invest in research and development and to promote deployment of new technologies that help reduce emissions.

Federal, provincial, and territorial governments will also work with industry to identify demonstration projects for promising pre-commercial clean energy technologies required to reduce emissions from energy production and use in the Canadian economy, including in the oil and gas sector.



3.5 Forestry, agriculture, and waste

Emissions from agriculture (livestock and crop production) and extraction of forestry resources accounted for about 10 percent of Canada's emissions in 2014, and they are not projected to significantly change by 2030. Municipal waste accounts for a small portion (about 3 percent) of Canada's total GHGs, and these emissions are projected to decline, largely due to increases in landfill gas capture.

Agricultural soils and forests also absorb and store carbon. The emissions or removals from carbon sinks can fluctuate with natural disturbances (e.g. forest fires), but there are still a number of actions that can increase carbon storage and reduce emissions.

Forests, wetlands, and agricultural lands across Canada will play an important natural role in a low-carbon economy by absorbing and storing atmospheric carbon. Actions taken by jurisdictions and woodlot owners to accelerate reforestation, to continuously improve sustainable management practices, and to plant new forests where they do not currently exist will enhance stored carbon. Clean technology, such as lower-carbon bioenergy, and bioproducts that use feedstock from agriculture and forestry waste and dedicated crops to replace higher-carbon fuels can also reduce emissions. Continued innovation and clean technology in agriculture will build on past GHG reduction successes of decreasing emissions per unit of production. The municipal waste sector will also be a key source of cleaner fuels such as renewable natural gas from landfills.

The approach to these sectors will include (1) enhancing carbon storage in forests and agricultural lands; (2) supporting the increased use of wood for construction; (3) generating fuel from bioenergy and bioproducts; and, (4) advancing innovation.

Forests, wetlands, and agricultural lands can be enhanced as “carbon sinks” through actions such as planting more trees, improving forest carbon management practices, minimizing losses from fires and invasive species, restoring forests that have been affected by natural disturbances, and increasing adoption of land management practices like increasing perennial and permanent cover crops and zero-till farming. Protecting and restoring natural areas, including wetlands, can also benefit biodiversity and maintain or enhance carbon storage.

Increasing the use of wood for construction can reduce emissions as the carbon stored in that wood gets locked in for a long period of time. Increasing domestic demand for Canadian wood products will also support the vibrant forest industries across Canada, which have a long history of innovating to develop new products and more efficient and sustainable forest practices.



The **Cheakamus Community Forest** carbon offset project is located adjacent to the Resort Municipality of Whistler, within the traditional territories of the Squamish and Lil'wat Nations. The project retains more carbon in the forest by using ecosystem-based management practices that include increasing protected areas and using lower-impact harvesting techniques.

The forestry, agriculture, and waste sectors also provide biomass for bioproducts that can be used in place of fossil fuels in other sectors. For example, waste products from forestry, agriculture, and landfills can be converted into energy sources such as renewable natural gas. Dedicated crops can be grown as feedstocks for products like bioplastics. Expanding renewable fuel industries represents an opportunity to create new jobs and economic growth across Canada.

BIOMASS-FIRED DISTRICT HEATING:

Prince Edward Island is home to Canada's longest running, biomass-fired district heating system. Operating since the 1980's, the system has expanded to serve over 125 buildings in the downtown core of Charlottetown, including the University of Prince Edward Island and the Queen Elizabeth Hospital, and cleanly burns 66 000 tons of waste materials annually.

Innovative solutions, including clean technologies, are required to reduce emissions from agriculture. Promising new technologies are being developed to reduce emissions from livestock and crop production, including from the use of precision farming and “smart” fertilizers, which time the release to match plant needs, and from feed innovations that reduce methane production in cattle. Actions pertaining to the agriculture sector will be developed collaboratively through Canada's Next Agriculture Policy Framework.

These actions in the forestry, agriculture, and waste sectors, and supporting clean technology businesses, can help to create jobs and build more sustainable communities.

NEW ACTIONS

1. Increasing stored carbon

Federal, provincial, and territorial governments will work together to protect and enhance carbon sinks, including in forests, wetlands, and agricultural lands (e.g. through land-use and conservation measures).

2. Increasing the use of wood for construction

Federal, provincial, and territorial governments will collaborate to encourage the increased use of wood products in construction, including through updated building codes.

3. Generating bioenergy and bioproducts

Federal, provincial, and territorial governments will work together to identify opportunities to produce renewable fuels and bioproducts, for example, generating renewable fuel from waste.

4. Advancing innovation

Federal, provincial, and territorial governments will work together to enhance innovation to advance GHG efficient management practices in forestry and agriculture.



3.6 Government leadership

Governments are directly responsible for a relatively small share of Canada's emissions (about 0.6 percent), but they have an opportunity to lead by example. A number of provinces are already demonstrating leadership, including through carbon neutral policies.



CARBON NEUTRAL GOVERNMENT:

British Columbia's public sector has successfully achieved carbon neutrality each year since 2010. Over the past 6 years, schools, post-secondary institutions, government offices, Crown corporations, and hospitals have reduced a total of 4.3 million tonnes of emissions through improvements to their operations and investments of \$51.4 million in offset projects. British Columbia was the first—and continues to be the only—carbon neutral jurisdiction on the continent.

In a low-carbon, clean growth economy, federal, provincial, and territorial governments will be leaders in sustainable, low-emission practices that support the goals of clean growth and address climate change.

Municipalities are also essential partners. How cities develop and operate has an important impact on energy use and therefore GHG emissions.

LEADERSHIP BY CITIES:

The City of Whitehorse's Sustainability Plan outlines 12 community-wide goals in areas such as transportation, buildings, waste, GHG reductions, and resilient, accessible food systems, with associated targets for 2020, 2030, and 2050. For example, Whitehorse has set a target that new buildings will be 30 percent more efficient than the National Energy Code of Canada for Buildings, the National Building Codes, or achievable comparable EnerGuide ratings, while city-owned buildings will be 50 percent more efficient than the National Energy Code.

The public sector can play an important role by setting ambitious emissions reduction targets and by demonstrating the effectiveness of policies to reduce emissions (e.g. from vehicle fleets and buildings).

The approach to government leadership will include (1) setting ambitious targets; (2) cutting emissions from government buildings and fleets; and (3) scaling up clean procurement.

Governments control a significant share of assets like fleets and buildings. By setting targets and implementing policies to make buildings more efficient and to reduce emissions from vehicle fleets, the public sector can help to demonstrate the business case for ambitious action. Governments are also major purchasers and providers of goods and services, and they can help to build demand for low-carbon goods and services through procurement policies. They can also provide a testing ground for new and emerging technologies, creating new opportunities for Canadian firms developing clean technology products, services, and processes.

NEW ACTIONS

1. Setting ambitious targets

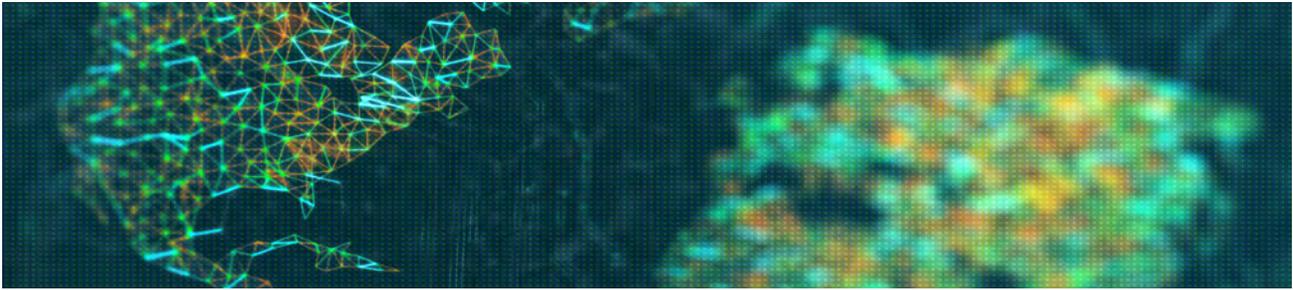
Federal, provincial, and territorial governments will demonstrate leadership through commitments to ambitious targets to reduce emissions from government operations. The federal government is committed to reduce its own GHG emissions to 40 percent below 2005 levels, by 2030 or sooner.

2. Cutting emissions from government buildings and fleets

Federal, provincial, and territorial government will scale up efforts to transition to highly efficient buildings and zero-emission vehicle fleets. The federal government has set a goal of using 100 percent clean power by 2025.

3. Scaling up clean procurement

Federal, provincial, and territorial governments will work together to modernize procurement practices, adopt clean energy and technologies, and prioritize opportunities to help Canadian businesses grow, demonstrate new technologies, and create jobs.



3.7 International leadership

Governments will work with their international partners, including developing countries, to help reduce emissions around the world. The federal government is investing \$2.65 billion in climate finance to help developing countries transition to low-carbon economies and build climate resilience.

The priority is to first focus on reduction in emissions within Canada, but part of Canada's approach to climate change could also involve acquiring allowances for emissions reductions in other parts of the world, as a complement to domestic emissions reduction efforts. As recognized under the Paris Agreement (article 6), countries may choose to use emissions reductions that take place outside of their own borders, known as “internationally transferred mitigation outcomes”, to meet their targets. Emissions reductions that take place outside of Canada may have lower costs and contribute to investment in sustainable development abroad. Quebec and California already participate in international emissions trading under their linked cap-and-trade system, which Ontario will soon join.

The approach to international leadership will include (1) delivering on Canada's international climate finance commitments; (2) acquiring internationally transferred mitigation outcomes; and (3) engaging in trade and climate policy.

Federal, provincial, and territorial governments will also explore mechanisms and opportunities for provinces and territories to collaborate in international fora, joint missions, and discussions on climate change and energy.

The federal government will continue to engage with and support Indigenous Peoples' action on international climate change issues, including

through the United Nations Framework Convention on Climate Change, to formulate a platform for Indigenous Peoples, as agreed to in the Paris decision.

NEW ACTIONS

1. Delivering on Canada's international climate-finance commitments

The federal government will deliver on its historic commitment of \$2.65 billion by 2020 to help the poorest and most vulnerable countries mitigate and adapt to the adverse effects of climate change.

2. Acquiring internationally transferred mitigation outcomes

The federal government, in cooperation with provincial and territorial governments and relevant partners, will continue to explore which types of tools related to the acquisition of internationally transferred mitigation outcomes may be beneficial to Canada and will advance a robust approach to the implementation of article 6 of the Paris Agreement. A first priority is ensuring any cross-border transfer of mitigation outcomes is based on rigorous accounting rules, informed by experts, which result in real reductions.

The federal government will work with Ontario, Quebec, and other interested provinces and territories, as well as with international partners, to ensure that allowances acquired through international-emissions trading are counted towards Canada's international target.

3. Engaging in trade and climate policy

The federal government, in cooperation with provincial and territorial governments, will work with its international partners to ensure that trade rules support climate policy.



ADAPTATION AND CLIMATE RESILIENCE

Overview

The impacts of climate change are already being felt across Canada. These changes are being magnified in Canada's Arctic, where average temperature has increased at a rate of nearly three times the global average. They pose significant risks to communities, health and well-being, the economy, and the natural environment, especially in Canada's northern and coastal regions and for Indigenous Peoples. Indigenous Peoples are among the most vulnerable to climate change due to their remote locations and reliance on wild foods. The changes already being experienced are both dramatic and permanent, with significant social, cultural, ecological, and economic implications.

Taking action to adapt to current and future climate impacts will help protect Canadians from climate change risks, build resilience, reduce costs, and ensure that society thrives in a changing climate.

INUIT AND CLIMATE IMPACTS:

Inuit and Inuit Nunangat, the homeland of Inuit in Canada, are experiencing significant climate change impacts, as highlighted in Inuit Tapiriit Kanatami's recent report on Inuit Priorities for Canada's Climate Strategy. More than 70 per cent of Canada's coastline is located in the Arctic and it is defined by ice. Average sea ice thickness is decreasing and sea ice cover is now dominated by younger, thinner ice. Some models are projecting that summer sea ice cover could be almost completely lost before 2050. These changes are already impacting access to wild foods and contributing to hazards and risks on ice.

Developing adaptation expertise and technology can further contribute to clean growth by creating jobs and spurring innovation. Adaptation is a long-term challenge, and it requires ongoing commitment to action, leadership across all governments, strong governance to assess and sustain progress, adequate funding, and meaningful engagement with, and continued leadership by, Indigenous Peoples. Federal investments (see Annex I) will support key adaptation measures.

Federal, provincial, and territorial governments have identified new actions to build resilience to climate change across Canada in the following areas:

1. Translating scientific information and Traditional Knowledge into action
2. Building climate resilience through infrastructure
3. Protecting and improving human health and well-being
4. Supporting particularly vulnerable regions
5. Reducing climate-related hazards and disaster risks



4.1 Translating scientific information and Traditional Knowledge into action

Canadians need authoritative science and information to understand current and expected changes. This includes changing conditions (e.g., rainfall, temperature, and sea ice) and the impacts of climate change across Canada. Long-term monitoring and local observations are also key. Data, tools, and information need to be widely accessible, equitable, and relevant to different types of decision-makers in different settings.

Translating knowledge into action takes leadership, skilled people, and resources. [The Government of Canada's Adaptation Platform](#) supports collaboration among governments, industry, and professional organizations on adaptation priorities. Building regional expertise and capacity for adaptation will improve risk management; support land-use planning; help safeguard investments; and strengthen emergency planning, response, and recovery. Decision-making by all governments will be guided by consideration of scientific and Traditional Knowledge.



INFORMATION AND TOOLS FOR ADAPTATION DECISIONS:

Decision-makers in five Quebec coastal municipalities collaborated with researchers, notably from the Université du Québec à Rimouski and from Ouranos, a regional climate and adaptation consortium, to explore solutions to repeated damage of coastal infrastructure. Projections of future erosion, studies of sea ice and coastal vulnerability due to climate change, and cost-benefit analyses provided the foundation for the municipalities to make decisions on an adaptation solution.

The approach to information, knowledge, and capacity building will include (1) providing authoritative climate information and (2) building regional adaptation capacity and expertise.

Ensuring Canadians across all regions and sectors have the capacity to make informed decisions and to act on them provides the foundation for

advancing adaptation in Canada. Indigenous-led community-based initiatives that combine science and Traditional Knowledge can help guide decision making. Including this information in regional and national impacts and adaptation assessments can further advance understanding of climate change across the country.

NEW ACTIONS

1. Providing authoritative climate information

The federal government will establish a Canadian centre for climate services, to improve access to authoritative, foundational climate science and information. This centre will work with provincial and territorial governments, Indigenous Peoples and other partners to support adaptation decision making across the country.

2. Building regional adaptation capacity and expertise

Governments will work with regional partners, including with Indigenous Peoples through community-based initiatives, to build regional capacity, develop adaptation expertise, respectfully incorporate Traditional Knowledge, and mobilize action. Canada's Adaptation Platform and regional consortia and centres support the sharing of expertise and information among governments, Indigenous Peoples and communities, businesses, and professional organizations and support action on joint priorities.



4.2 Building climate resilience through infrastructure

Climate change is already impacting infrastructure, particularly in vulnerable northern and coastal regions, as well as Indigenous Peoples. Climate-related infrastructure failures can threaten health and safety, interrupt essential services, disrupt economic activity, and incur high costs for recovery and replacement.

The approach to building climate resilience through infrastructure will include (1) investing in infrastructure that strengthens resilience and (2) developing climate-resilient codes and standards.

Traditional built infrastructure (e.g. roads, dykes, seawalls, bridges, and measures to address permafrost thaw) can address specific vulnerabilities. Additionally, living natural infrastructure (e.g. constructed/managed wetlands and urban forests) can build the resilience of communities and ecosystems and deliver additional benefits, such as carbon storage and health benefits.

Considering climate change in long-lived infrastructure investments, including retrofits and upgrades, and investing in traditional and natural adaptation solutions can build resilience, reduce disaster risks, and save costs over the long term.



ADAPTATION INFRASTRUCTURE:

The Red River Floodway was originally constructed in 1968 at a total cost of \$63 million. It was recently expanded in 2014, at a cost of \$627 million. Since 1968, the Floodway has prevented over \$40 billion (in 2011 dollars) in flood-related damages for the City of Winnipeg.

NEW ACTIONS

1. Investing in infrastructure to build climate resilience

Federal, provincial, and territorial governments will partner to invest in infrastructure projects that strengthen climate resilience.

2. Developing climate-resilient codes and standards

Federal, provincial, and territorial governments will work collaboratively to integrate climate resilience into building design guides and codes. The development of revised national building codes for residential, institutional, commercial, and industrial facilities and guidance for the design and rehabilitation of climate-resilient public infrastructure by 2020 will be supported by federal investments.



4.3 Protecting and improving human health and well-being

Climate change is increasingly affecting the health and well-being of Canadians (e.g. extreme heat, air pollution, allergens, diseases carried by ticks and insects, and food security). Indigenous Peoples and northern and remote communities in particular are experiencing unique and growing risks to health and vitality.

The approach to protecting and improving human health and well-being will include (1) taking action to address climate change related health risks and (2) supporting healthy Indigenous communities.

Adaptation actions with an inclusive view of well-being (e.g. social and cultural determinants of health and mental health) will keep Canadians healthy and reduce pressures on the health system.

NEW ACTIONS

1. Addressing climate change-related health risks

Governments will collaborate to prevent illness resulting from extreme heat events and to reduce the risks associated with climate-driven infectious diseases, such as Lyme disease. Federal adaptation investments will support actions including surveillance and monitoring, risk assessments, modelling, laboratory diagnostics, as well as health-professional education and public awareness activities. Efforts will also continue to advance the science and understanding of health risks and best practices to adapt.

2. Supporting healthy Indigenous communities

The federal government will increase support for First Nations and Inuit communities to undertake climate-change and health adaptation projects that protect public health.

The federal government will also work with the Métis Nation on addressing the health effects of climate change.



FOOD SECURITY AND SUSTAINABILITY – PLANNING FOR CLIMATE CHANGE IMPACTS IN ARVIAT, NUNAVUT:

With the goal of promoting and providing access to healthy foods, a community-based project in Arviat, Nunavut involved researchers and community youth to monitor and collect data on optimal growing conditions in the community greenhouse and to build capacity for its ongoing operation.



4.4 Supporting particularly vulnerable regions

The Indigenous Peoples of Canada, along with coastal and northern regions are particularly vulnerable and disproportionately affected by the impacts of climate change. Unlike rebuilding after an extreme event like a flood or a fire, once permafrost has thawed, coastlines have eroded, or socio-cultural sites and assets have disappeared, they are lost forever.

The approach to supporting vulnerable regions will include (1) investing in resilient infrastructure to protect vulnerable regions; (2) building climate resilience in the North; (3) supporting community-based monitoring in Indigenous communities; and (4) supporting adaptation in coastal areas.

Action taken to support adaptation in vulnerable regions can help communities, traditional ways of life, and economic sectors endure and thrive in a changing climate. The knowledge, expertise, technologies, and lessons from adaptation actions in vulnerable northern and coastal regions can benefit other vulnerable regions and sectors.

COLLABORATING TO ADDRESS CLIMATE IMPACTS IN THE NORTH: Nunavut, the Northwest Territories, and Yukon hosted the Pan-Territorial Permafrost Workshop in 2013, which brought together front-line decision makers and permafrost researchers from each territory to share knowledge, form connections, and look at possibilities for adaptation in the future.

NEW ACTIONS

1. Investing in resilient infrastructure to protect vulnerable regions

Federal, provincial, and territorial governments will work together to ensure infrastructure investments help build resilience with Indigenous Peoples as well as in vulnerable coastal and northern regions.

2. Building climate resilience in the North

Federal, territorial, and northern governments and Indigenous Peoples will continue working together to develop and implement a Northern Adaptation Strategy to strengthen northern capacity for climate change adaptation. Federal investments to build resilience in the North and northern Indigenous Peoples will support this work.

3. Supporting community-based monitoring by Indigenous Peoples

The federal government will provide support for Indigenous communities to monitor climate change in their communities and to connect Traditional

Knowledge and science to build a better understanding of impacts and inform adaptation actions.

4. Supporting adaptation in coastal regions

Federal, provincial, and territorial governments will support adaptation efforts in vulnerable coastal and marine areas and Arctic ecosystems. Activities will include science, research, and monitoring to identify climate change impacts and vulnerabilities; the development of adaptation tools for coastal regions; and the improvement of ocean forecasting. This knowledge will help inform adaptation decisions related to fisheries and oceans management and coastal infrastructure. Federal adaptation investments will help advance this work.

SUPPORTING VULNERABLE COASTAL COMMUNITIES:

Through the Atlantic Climate Adaptation Solutions Project, **Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick** partner together and with Indigenous communities, regional non-profits, and industry to develop practical tools and resources to help vulnerable coastal communities consider climate change in planning, engineering practices, and water and resource management. Examples include land-use planning tools, best practices, and risk assessments.



4.5 Reducing climate-related hazards and disaster risks

Climate change is impacting the intensity and frequency of events such as floods, wildfires, drought, extreme heat, high winds, and winter road failures. Recognizing this reality, Federal-Provincial-Territorial Ministers Responsible for Emergency Management are updating emergency management in Canada including work to mitigate disasters, review the Disaster Financial Assistance Arrangements, develop build-back better strategies, and collaborate on public alerting. Additionally, the Canadian Council of Forest Ministers is working on the establishment of the Canadian Wildland Fire Strategy, with climate change highlighted as a key challenge.

The approach to reducing climate-related hazards and disaster risks will include (1) investing in infrastructure to reduce disaster risks; (2) advancing efforts to protect against floods; and (3) supporting adaptation for Indigenous Peoples.

Disaster risk-reduction efforts and adaptation measures can reduce the negative impacts of these events, some of which have a disproportionate impact on Indigenous Peoples.

NEW ACTIONS

1. Investing in infrastructure to reduce disaster risks

Federal, provincial, and territorial governments will partner to invest in traditional and natural infrastructure that reduces disaster risks and protects Canadian communities from climate-related hazards such as flooding and wildfires.

2. Advancing efforts to protect against floods

Federal, provincial, and territorial governments will work together through the National Disaster Mitigation Program to develop and modernize flood maps and assess and address flood risks.

3. Supporting adaptation in Indigenous Communities

Governments will work in partnership with Indigenous communities to address climate change impacts, including repeated and severe climate impacts related to flooding, forest fires, and failures of winter roads. The federal government will provide support to Indigenous communities for adaptation.



FLOOD AND DROUGHT PROTECTIONS THROUGH WETLANDS RESTORATION:

Alberta's Watershed Resiliency and Restoration Program provided a grant to Ducks Unlimited to restore approximately 558 hectares of wetlands in the South Saskatchewan River basin for the purposes of water storage for flood and drought protection. Using historical imagery and LiDAR data to identify drained wetlands, project leads then work with and compensate landowners to restore wetlands on private land.



CLEAN TECHNOLOGY, INNOVATION, AND JOBS

Overview

Global demand for clean technologies is significant and increasing. Fostering and encouraging investment in clean technology solutions can facilitate economic growth, long-term job creation, and environmental responsibility and sustainability. Taking action on climate change will help to capture new and emerging economic opportunities, including for Indigenous Peoples and northern and remote communities. The window of opportunity exists for Canada to create the conditions for new clean technology investment and exports and seize growing global markets for clean technology goods, services, and processes.

To effectively compete in the global marketplace and capitalize on current and future economic opportunities, Canada needs a step change in clean technology development, commercialization, and adoption across all industrial sectors. Clarity of purpose, investment, and strong coordination that leverages pan-Canadian regional and provincial/territorial strengths are essential to seizing the economic growth and job-creation opportunities of clean technology. International research, development, and demonstration collaboration is also essential. Governments, Indigenous Peoples, industry, and other stakeholders all have a role to play and must be engaged.



5.1 Building early-stage innovation

To become a leader in the development and deployment of clean technologies, Canada needs a strong flow of innovative ideas.

Government investments in clean technology research, development, and demonstration will create the largest benefit where coordinated and focused in areas that will most effectively help Canada to meet its climate change goals, create economic opportunities, and expand global-market opportunities. Efforts to coordinate and focus investment must go beyond governments and involve the collaboration of industry, stakeholders, academia, and Indigenous Peoples in the innovation process. Canada must leverage its domestic strengths, which vary by region. Developing international partnerships will create new economic opportunities, build areas of shared expertise, and foster stronger bilateral relations.

Sustainable Development Technology

Canada (SDTC) provides funding support to companies across Canada to develop, demonstrate, and deploy innovative new clean technologies. SDTC has also launched joint funding opportunities in collaboration with Emissions Reduction Alberta and Alberta Innovates and partners with the Ontario Centres of Excellence to enhance Ontario's Greenhouse Gas Innovation Initiative. SDTC estimates its projects have reduced annual emissions by 6.3 Mt of CO₂e, generated \$1.4 billion in annual revenue and, in 2015, supported more than 9200 direct and indirect jobs.



Through its participation in [Mission Innovation](#), the federal government has committed to double its investments in clean energy research and technology development over five years, while encouraging greater levels of private sector investment in transformative clean energy technologies. On November 14, 2016, Canada and 21 other Mission Innovation partners launched seven Innovation Challenges aimed at catalyzing global research efforts in areas that could provide significant benefits in reducing GHG emissions, increasing energy security, and creating new opportunities for clean economic growth.

NEW ACTIONS

1. Supporting early-stage technology development

Governments will support new approaches to early-stage technology development, including breakthrough technologies, to advance research in areas that have the potential to substantially reduce GHG emissions and other pollutants. Innovative partnerships with the private sector will make an important contribution to this effort.

2. Mission-oriented research and development

Governments will encourage new “mission-oriented” research approaches to focus RD&D facilities, programs, and supports on clean technology and environmental performance issues.



5.2 Accelerating commercialization and growth

Given Canada's small domestic market, Canadian firms must look to highly competitive international markets to achieve scale. Succeeding in the globally competitive clean technology marketplace requires globally competitive talent, access to the capital and resources needed to demonstrate the commercial viability of products, and strong international networks that facilitate the cross-border flow of clean technology goods and services.

Canadian clean technology producers and researchers are currently confronted by a myriad of programs and services, at the federal, provincial, and territorial level. Streamlining and integrating access to support programs and services is a priority for businesses and essential to building commercial capacity in this area.

Compared with other technology areas, clean technologies face unique challenges and often take longer to get to market, making access to “patient capital” important to successful commercialization. While federal and provincial governments already have a range of supports in place, key needs exist in terms of accessing venture capital as well as working capital and support for first, large-scale commercial projects or deployments.

20/20 Catalysts Program is a mentorship program that matches Indigenous and non-Indigenous project mentors with Indigenous mentees to promote knowledge sharing that will enable Indigenous communities to drive change towards clean technology business and economic development.

Further development of clean technologies could create new opportunities in Canada's resource sectors, increase the productivity and competitiveness of Canadian businesses, and create new employment opportunities, while also improving environmental performance. Canada will need to be able to access the skills and expertise of talented workers from around the world to enable Canadian businesses to succeed in the global marketplace. It will also be important to ensure a commitment to skills and training to provide Canadian workers with a just and fair transition to opportunities in Canada's clean growth economy.

Indigenous Peoples are leaders of change in the transition to a low-carbon economy. Indigenous governments, organizations, and businesses can play a key role in developing pathways for the adoption and adaptation of clean technology solutions for Indigenous Peoples.

Building stronger businesses and commercial capacity in all of Canada's regions is essential to taking advantage of new market opportunities. Support for new technology start-ups, through incubators and accelerators, is important to this effort. A strong, focused Canadian clean technology export strategy is needed to position Canada in growing and emerging global markets.

MaRS Cleantech works closely with entrepreneurs and investors to create solutions in energy, water, agri-tech, advanced materials and manufacturing, and smart cities. Industry looks to MaRS Cleantech to assist with company growth and to remove complex technology-adoption barriers. MaRS supports high-impact businesses by connecting innovators with potential partners, customers, investors, talent, and capital. MaRS strives to build globally competitive companies and to drive clean technology innovation.

VENTURE CAPITAL:

BDC Capital is launching a new \$135 million venture capital fund to support Canadian energy and clean technology start-up businesses with global potential. The Industrial, Clean and Energy Technology (ICE) Venture Fund II will invest in 15 to 20 new high-impact Canadian start-up firms that demonstrate efficiency and strong scalability and will support the transition to a low-carbon economy. Fund II is a follow-on to BDC Capital's highly successful ICE Venture Fund I, which was launched in 2011 with investments of \$287 million now under management.

NEW ACTIONS

1. Access to government programs

Federal, provincial, and territorial governments will work together to create a coordinated “no-wrong door” approach to supporting Canadian clean technology businesses, ensuring full and effective access to the suite of government programs and services available to support their commercial success.

2. Increasing support to advance and commercialize innovative technologies

Governments will collaborate to enable access to capital for clean technology businesses to bring their products and services to market, including at the commercial-scale demonstration and deployment stages. This will include support for clean technology businesses in the natural resource sectors to improve both competitiveness and environmental performance.

3. Strengthening support for skills development and business leadership

Governments will work together to strengthen skills development and business-leadership capacity in support of the transition to a low-carbon economy.

4. Expedite immigration of highly qualified personnel

Governments will work together to enable expedited processing of visas and work permits for global talent, in particular for high-growth Canadian businesses such as those in the clean technology sector. This will attract top international talent and expand Canada's clean growth capacity.

5. Promoting exports of clean technology goods and services

Federal, provincial, and territorial governments will work collaboratively to strengthen clean technology export potential. This will include targeted export missions and the development of better market intelligence, addressing barriers to markets, support for export financing and marketing, and leveraging Canada's Trade Commissioner services.

6. Standards-setting

Governments will work together to exert a strong leadership role in international standards-setting processes for new clean technologies and to ensure that Canada's clean-technology capacity shapes future international standards.



5.3 Fostering adoption

The adoption of clean technology can create economic opportunities and improve environmental outcomes. Canada's performance on clean technology adoption by industry has significant room for improvement. Even amongst Canadian businesses that regularly adopt advanced technologies, clean technologies are the least likely to be adopted.

SmartICE (Sea-ice Monitoring And Real-Time Information for Coastal Environments) is a partnership with community, academic, government, and industry participation. It is developing an integrated system to provide near-real-time information about coastal sea-ice travel and shipping, improving safety and the ability to adapt to changing climate conditions. The pilot program is preparing to expand across the Arctic through a northern social enterprise.

Pricing carbon pollution will send a market signal that can drive innovation among Canadian businesses and, in return, will make them more competitive, including by opening up access to new markets and reducing costs of deploying clean technologies.

There is significant potential for Canadian governments to “lead by example” as early adopters of clean technology serving an essential role as a first or “reference customer” for Canadian clean technology goods, services, and processes. Having a “first sale” in Canada would boost businesses'

chances of securing sales abroad. Beyond direct federal, provincial, and territorial government operations, other bodies, such as municipalities and publicly regulated utilities, could become significant markets for and adopters of clean technology.

Done effectively, the adoption of clean technology could be a mechanism for improving environmental circumstances and creating economic opportunity for Indigenous Peoples and northern and remote communities. Effective engagement and partnership with Indigenous Peoples is essential to this effort.

Encouraging dialogue between regulators and industry could improve certainty in clean technology development and allow for more effective and responsible regulation.

NEW ACTIONS

1. Leading by example

Federal, provincial, and territorial governments will develop action plans for greening government operations and encourage utilities and municipalities and other public sector entities to adopt clean technologies to lead by example.

2. Supporting Indigenous Peoples and northern and remote communities to adopt and adapt clean technologies

Federal, provincial, and territorial governments will support Indigenous Peoples and northern and remote communities in adopting and adapting clean technologies, and ensuring business models support community ownership and operation of clean technology solutions.

3. Consumer and industry adoption

Federal, provincial, and territorial governments will work together to promote and encourage effective working relationships between regulators and industry, providing for early dialogue and effective guidance, which can assist in bringing new clean technologies to market quickly and responsibly.

Governments will also support visible and effective certification programs to ensure consumer and business confidence and support green procurement.



5.4 Strengthening collaboration and metrics for success

An effective approach to clean technology development, commercialization, and adoption in Canada requires coherent, collaborative, and focused approaches. This is true within individual governments and between Canadian jurisdictions. A collaborative approach between governments should take into account regional strategies and jurisdictional responsibilities.

Regular and ongoing discussions between federal, provincial, and territorial governments regarding clean technology and clean growth would help eliminate duplication of efforts and identify gaps in support for clean technology development. Engaging Indigenous Peoples, industry, and stakeholders as a routine component of this process would be important.

There is inadequate data on Canada's clean technology capacity and potential. Building better data, and clear metrics for tracing the impact of government activities, would properly focus these activities and ensure that they achieve intended, meaningful results.

NEW ACTIONS

1. Enhance alignment between federal, provincial, and territorial actions

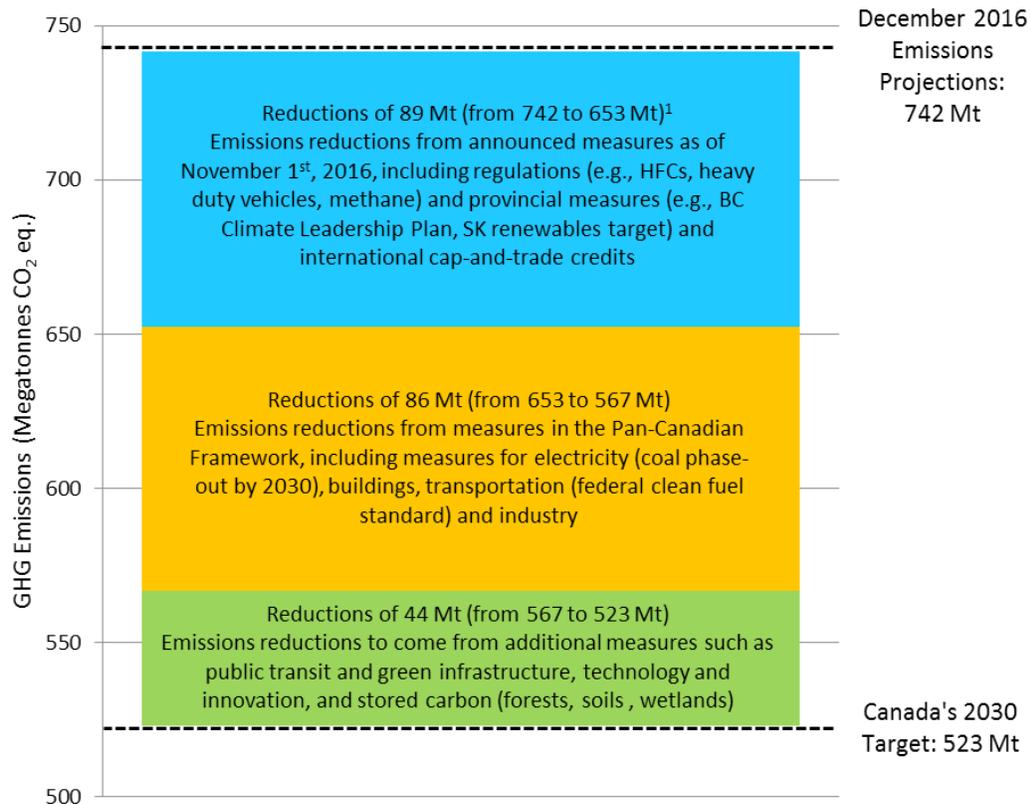
Governments will work together to improve policy and program coordination and sharing of data and best practices, which can sustain intergovernmental momentum and action on clean technology and clean growth. Continued partnership and engagement of Indigenous Peoples, industry, and stakeholders is essential to this effort.

Governments will work together to target and better align clean technology RD&D investments and activities in Canada, including opportunities for co-funding clean technology projects.

2. Establishing a clean technology data strategy

The federal government, working with the provinces and territories, will support the collection and regular publication of comprehensive data on clean technology in Canada to inform future government decision making, to improve knowledge in the private sector and stakeholder community, and to foster innovation.

PATHWAY TO MEETING CANADA'S 2030 TARGET



Note: Reductions from carbon pricing are built into the different elements depending on whether they are implemented, announced, or included in the Pan-Canadian Framework. The path forward on pricing will be determined by the review to be completed by early 2022.

¹ Estimates assume purchase of carbon credits from California by regulated entities under Quebec and Ontario's cap-and-trade system that are or will be linked through the Western Climate Initiative.



REPORTING AND OVERSIGHT

Overview

To help achieve the goals and actions laid out in this Pan-Canadian Framework, the programs and policies put in place will be monitored, results will be measured including impacts on GHG emissions, and actions and performance will be reported on publicly in a way that is transparent and accountable to Canadians. This public reporting will be complemented by ongoing public outreach, including with youth, inviting their contributions to Canada's action on clean growth and climate change. The effectiveness of actions will also be assessed with a view to ensuring continual improvement so as to increase ambition over time, in accordance with the Paris Agreement.

NEW ACTIONS

Measurement and reporting on emissions – Federal, provincial, and territorial governments will continue to collaborate on efforts to track and report GHG emissions in a consistent way across the country, to track progress on the Pan-Canadian Framework, and to support international reporting obligations. This

will involve further technical work on measurement to improve emissions inventories and projections, and aligning these where possible. Federal, provincial, and territorial governments will work together through the Canadian Council of Ministers of the Environment (CCME) to examine options for the reporting of emissions and inventories to ensure consistency across provinces and territories, to support Canada's reporting to the UNFCCC, and for a pan-Canadian offset protocol framework and verified carbon credits that can be traded domestically and internationally.

Reporting on implementation – Federal, provincial, and territorial governments will work together to support the coordinated implementation of the Pan-Canadian Framework, engaging with relevant ministerial tables including ministers of environment, energy and mines, transportation, forestry, agriculture, innovation, infrastructure, emergency management, and finance, and with meaningful involvement of Indigenous Peoples. This will include a process to take regular stock of

progress achieved, to report to Canadians and, to inform Canada's future national commitments in accordance with the Paris Agreement.

Analysis and advice – Federal, provincial, and territorial governments will engage with external experts to provide informed advice to First Ministers and decision makers; assess the effectiveness of measures, including through the use of modeling; and identify best practices. This will help ensure that actions identified in the Pan-Canadian Framework are open to external, independent review, and are transparent and informed by science and evidence.

Review - Federal, provincial, and territorial governments will work together to establish the approach to the review of carbon pricing, including expert assessment of stringency and effectiveness that compares carbon pricing systems across Canada, which will be completed by early 2022 to provide certainty on the path forward. An interim report will be completed in 2020 which will be reviewed and assessed by First Ministers. As an early deliverable, the review will assess approaches and best practices to address the competitiveness of emissions-intensive trade-exposed sectors.

Federal, provincial, and territorial governments will continue to engage and partner with Indigenous Peoples as actions are implemented and progress is tracked.

LOOKING AHEAD

This Plan provides a foundation for working together to grow the economy, reduce emissions, and strengthen resilience. Ongoing, collaborative action is needed to generate transformational change and to ensure that all Canadians benefit from the transition to a low-carbon economy. First Ministers are tasking their officials to develop an agenda for federal, provincial, and territorial Ministers to implement this Plan. Annual reports to First Ministers will enable governments to take stock of progress and give direction to sustain and enhance efforts.



ANNEX I: FEDERAL INVESTMENTS AND MEASURES TO SUPPORT THE TRANSITION TO A LOW-CARBON ECONOMY

FEDERAL INVESTMENTS

The federal government will help catalyze the transition to a clean growth economy through significant new investments to complement provincial and territorial actions and investments, including investments in infrastructure, the Low-Carbon Economy Fund, and clean technology funding.

- Budget 2016 outlined a number of new federal investments that will support a transition to a low-carbon economy. Some of these investments include
 - » \$62.5 million to support the deployment of infrastructure for alternative transportation fuels, including charging infrastructure for electric vehicles and natural gas and hydrogen refueling stations as well as demonstration of next generation recharging technologies;
 - » \$50 million over two years to invest in technologies that will reduce GHG emissions from the oil and gas sector;
 - » \$82.5 million over two years to support research, development, and demonstration of clean energy technologies with the greatest potential to reduce GHG emissions;
 - » \$100 million per year from the Regional Development Agencies to support clean technology, representing a doubling of their existing annual aggregate support;
 - » \$50 million over four years to Sustainable Development Technology Canada (SDTC) for the SD Tech Fund. These resources will enable SDTC to announce new clean technology projects in 2016 that support the development and demonstration of new technologies that address climate change, air quality, clean water, and clean soil;

THE FEDERAL GOVERNMENT HAS COLLABORATED WITH THE FEDERATION OF CANADIAN MUNICIPALITIES ON THE GREEN MUNICIPAL FUND (GMF) SINCE 2000.

- Budget 2016 provided an additional \$125 million over two years including for projects that reduce GHG emissions.
 - Recently announced projects under the GMF include a \$31.5 million investment for 20 new sustainable municipal projects, such as Canada's first net-zero municipal library and Halifax's ground-breaking Solar City project.
- » \$40 million over five years to integrate climate resilience into building design guides and codes. The funding will support revised national building codes by 2020 for residential, institutional, commercial, and industrial facilities;
 - » \$129.5 million to implement programming focused on building the science base to inform decision making, protecting the health and well-being of Canadians, building resilience in the North and Indigenous communities, and enhancing competitiveness in key economic sectors; and
 - » \$10.7 million over two years to implement renewable energy projects in off-grid Indigenous and northern communities that rely on diesel and other fossil fuels to generate heat and power.

- Building on the infrastructure investments outlined in Budget 2016, the federal government has announced an additional \$81 billion over 11 years for investments in public transit, social infrastructure, transportation that supports trade, Canada's rural and northern communities, smart cities, and green infrastructure.
- Green infrastructure funding will support projects that reduce GHG emissions, enable greater climate change adaptation and resilience, and ensure that more communities can provide clean air and safe drinking water for their citizens. Specific projects could include interprovincial transmission lines that reduce reliance on coal, the development of new low-carbon/renewable power projects, and the expansion of smart grids to make more efficient use of existing power supplies.
- The federal government is proposing the creation of the Canada Infrastructure Bank that will work with provinces, territories, and municipalities to further the reach of government funding directed to infrastructure. The Canada Infrastructure Bank will be responsible for investing at least \$35 billion on a cash basis from the federal government into large infrastructure projects that contribute to economic growth through direct investments, loans, loan guarantees, and equity investments.
- Funding under the \$2 billion Low Carbon Economy Fund will begin in 2017. This Fund will support new provincial and territorial actions to reduce emissions between now and 2030. Projects will focus on concrete measures that generate new, incremental reductions, while considering cost-effectiveness.
- The Government has also committed more than \$1 billion, over four years, to support clean technology including in the forestry, fisheries, mining, energy and agriculture sectors.

FEDERAL CARBON PRICING BENCHMARK

The federal government outlined a benchmark for carbon pricing that reflects the principles proposed by the Working Group on Carbon Pricing Mechanisms and the Vancouver Declaration. Its goal is to ensure that carbon pricing applies to a broad set of emission sources throughout Canada with increasing stringency over time to reduce GHG emissions at lowest cost to business and consumers and to support innovation and clean growth.

The benchmark includes the following elements:

1. Timely introduction.

All jurisdictions will have carbon pricing by 2018.

2. Common scope.

Pricing will be based on GHG emissions and applied to a common and broad set of sources to ensure effectiveness and minimize interprovincial competitiveness impacts. At a minimum, carbon pricing should apply to substantively the same sources as British Columbia's carbon tax.

3. Two systems.

Jurisdictions can implement (i) an explicit price-based system (a carbon tax like British Columbia's or a carbon levy and performance-based emissions system like in Alberta) or (ii) a cap-and-trade system (e.g. Ontario and Quebec).

4. Legislated increases in stringency, based on modelling, to contribute to our national target and provide market certainty.

For jurisdictions with an explicit price-based system, the carbon price should start at a minimum of \$10 per tonne in 2018 and rise by \$10 per year to \$50 per tonne in 2022.

Provinces with cap-and-trade need (i) a 2030 emissions-reduction target equal to or greater than Canada's 30 percent reduction target and (ii) declining (more stringent) annual caps to at least 2022 that correspond, at a minimum, to the projected emissions reductions resulting from the carbon price that year in price-based systems.

5. Revenues remain in the jurisdiction of origin.

Each jurisdiction can use carbon-pricing revenues according to their needs, including to address impacts on vulnerable populations and sectors and to support climate change and clean growth goals.

6. Federal backstop.

The federal government will introduce an explicit price-based carbon pricing system that will apply in jurisdictions that do not meet the benchmark. The federal system will be consistent with the principles and will return revenues to the jurisdiction of origin.

7. Five-year review.

The overall approach will be reviewed by early 2022 to confirm the path forward, including continued increases in stringency. The review will account for progress and for the actions of other countries in response to carbon pricing, as well as recognition of permits or credits imported from other countries.

8. Reporting.

Jurisdictions should provide regular, transparent, and verifiable reports on the outcomes and impacts of carbon pricing policies.

The federal government will work with the territories to address their unique circumstances, including high costs of living, challenges with food security, and emerging economies.

OTHER RECENT FEDERAL MEASURES

The federal government has also recently announced new federal measures, including

- During the North American Leaders Summit in June 2016, the federal government made joint commitments with the United States and Mexico to
 - » phase out fossil fuel subsidies by 2025. The commitment was reaffirmed by G-20 countries in September 2016.
 - » reduce methane emissions from the oil and gas sector by 40 to 45 percent below 2012 levels by 2025.
- On October 15, 2016, Canada signed onto the [Kigali Amendment to the Montreal Protocol](#) and committed to propose new regulations to significantly reduce HFC consumption and prohibit the manufacture and import into Canada of certain products containing HFCs. These proposed regulations were published on November 26, 2016. This is additional to measures already introduced to increase the recovery, recycling, and destruction of HFCs in refrigeration and air conditioning equipment and to established regulatory provisions for an HFC reporting system.
- On November 17, 2016, Canada released its Mid-Century Long-Term Low-Greenhouse Gas Development Strategy. The mid-century strategy describes various pathways for innovative and creative solutions. Canada's mid-century strategy is not a blueprint for action nor is it policy prescriptive. It is based on modelling of different scenarios and looks beyond 2030 to start a conversation on the ways we can reduce emissions for a cleaner, more sustainable future by 2050. As a result, it will be a living document.
- On November 21, 2016, the federal government announced that it would be amending its existing coal-fired electricity regulations to accelerate the phase out of traditional coal-fired electricity by 2030. The federal government also announced that, to support the transition away from coal towards cleaner sources of generation, performance standards for natural gas-fired electricity are also being developed.
- On November 25, 2016, the federal government announced that it will consult with provinces and territories, Indigenous Peoples, industries, and non-governmental organizations to develop a clean fuel standard. It is expected that once developed, a clean fuel standard would promote the use of clean technology and lower carbon fuels, and promote alternatives such as electricity, biogas, and hydrogen.



ANNEX II: PROVINCIAL AND TERRITORIAL KEY ACTIONS AND COLLABORATION OPPORTUNITIES WITH THE GOVERNMENT OF CANADA

INTRODUCTION

The Paris Agreement and the Vancouver Declaration have set an ambitious course for low carbon growth and climate action in Canada. The Pan-Canadian Framework on Clean Growth and Climate Change will build on the leadership shown and actions taken by the provinces and territories as well as new policies announced by the federal government.

This annex outlines provincial and territorial accomplishments in reducing greenhouse gas emissions and accelerating clean growth, and presents steps that each jurisdiction has taken or is taking to implement carbon pricing.

The annex also outlines areas where the federal government and each provincial and territorial government will work together to implement the Pan-Canadian Framework in order to spur growth and jobs for Canadians, reduce our emissions and adapt to climate change.

Each province and territory is unique and is responding to the urgency of climate change and the opportunity offered by clean growth in its own way. Effective action will require close collaboration between governments. Each provincial and territorial government has identified multiple areas for potential partnerships with the federal government, adapted to their own priorities, circumstances and strengths. Governments are committed to working together on these priorities to support the implementation of the Pan-Canadian Framework. Governments will also engage the contributions of Indigenous Peoples in advancing shared goals.

This work will be supported by significant new federal investments to drive the transition to a clean growth economy, as outlined in Budget 2016 and the 2016 Fall Economic Statement, including public transit and Green Infrastructure, the Canada Infrastructure Bank, the Low-Carbon Economy Fund, and funding for clean technology and innovation. Federal investments are intended to supplement and accelerate investments by provinces and territories, and will follow applicable program criteria.

BRITISH COLUMBIA

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in British Columbia include:

British Columbia's Climate Leadership Plan

B.C. has proven that it is possible to reduce emissions while growing the economy and creating jobs and it's important that this balance be maintained. With this in mind, B.C. released its Climate Leadership Plan in the summer of 2016.

Building on the comprehensive foundation established in 2008, the plan lays out a series of targeted, sector-specific actions that will reduce emissions by 25 million tonnes (Mt) of carbon dioxide equivalent (CO₂e) and create 66,000 jobs. The plan will be further strengthened in the months and years ahead, as B.C. continues to work with First Nations, the federal government, communities, industry and others. B.C. is committed to reducing GHG emissions by 80% below 2007 levels by 2050. To read B.C.'s Climate Leadership Plan, visit: <http://climate.gov.bc.ca/>

Revenue-Neutral Carbon Tax

B.C. has the highest broad-based carbon tax in North America. The carbon tax sets a transparent and predictable price on carbon while returning all revenue to B.C. individuals and businesses. The price signal creates a real incentive to reduce emissions across the economy and is the backbone of B.C.'s approach to climate action.

Forestry

B.C.'s forests offer potential for storing carbon, so the Province is taking further action to rehabilitate up to 300,000 hectares of Mountain

Pine Beetle and wildfire impacted forests over the first five years of the program; recover more wood fibre; and avoid emissions from burning slash.

Clean LNG

B.C. has an abundance of natural gas, which is a lower carbon fuel that will play a critical role in transitioning the world economy off of high carbon fuels such as coal. B.C. is developing the resource responsibly, and provincial legislation will make the emerging LNG sector the cleanest in the world. B.C. is also electrifying upstream development of natural gas and will require a 45% reduction in methane emissions by 2025.

100% Clean Electricity

Thanks to significant historical investments, B.C.'s electricity is already 98% clean or renewable and British Columbians have the third-lowest residential rates in North America. Going forward under the Climate Leadership Plan, 100% of the supply of electricity acquired by BC Hydro for the integrated grid must be from clean or renewable sources. The \$8.3 billion Site C Clean Energy Project is a major part of B.C.'s clean energy future and will create enough electricity to power 450,000 homes.

Clean Transportation

B.C. is taking real action to reduce emissions from the transportation sector and help British Columbians make greener choices—initiatives include Zero Emissions Vehicles rebates and funding for more charging stations (which have helped BC become the Canadian leader in clean energy vehicle sales per capita); a scrap-it program; low carbon and renewable fuel standards; and historic investments in transit. B.C.'s actions in the transportation sector have

already reduced annual emissions by an estimated 2.5 Mt and combined with the new actions, will reduce annual emissions by up to a further 3.4 Mt by 2050.

Adaptation

In 2010, the Province created a comprehensive strategy to address the changes we will see as a result of climate change. It is based on three key strategies: build a strong foundation of knowledge and tools; make adaptation a part of government business; and assess risks and implement priority adaptation actions in key climate sensitive sectors. The Province is now working with the federal government and other Canadian jurisdictions to further improve the management of the risks associated with a changing climate.

These actions provide a strong contribution to a comprehensive pan-Canadian framework.

ACTION ON PRICING CARBON POLLUTION

B.C.'s revenue-neutral carbon tax has been in place since 2008. It is set at \$30/tonne and covers approximately 75% of the province's economy. All revenues generated will be returned to tax payers. B.C. will assess the interim study in 2020 and determine a path forward to meet climate change objectives.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

British Columbia and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Growing our forests; reducing our emissions

Forests present a unique opportunity to address climate change because trees absorb CO₂ when they grow. British Columbia, the Government of Canada and First Nations will work together to reduce GHG emissions through forestry activities, including reforestation, enhanced silviculture techniques, and the salvaging of unmerchantable trees for processing into dimensional lumber and bioenergy. The initiative is expected to reduce emissions by 12 Mt in 2050 and create 20,000 jobs.

Preparing for and adapting to climate change

British Columbia and the Government of Canada will support projects across the province to make infrastructure more resilient to a changing climate, and to help communities adapt to a changing climate. Flood mitigation will be an area of focus.

Reduce Emissions from Natural Gas Activities

British Columbia and the Government of Canada will work together to bring clean grid electricity to natural gas operations in northeast B.C. They will co-fund the construction of new transmission lines and other public electrification infrastructure that could serve up to 760 megawatts of upstream natural gas processing load and avoid up to 4 Mt of emissions per year.

Electricity Grid Interconnection

British Columbia and the Governments of Canada and Alberta will work together to restore the capability of the existing high-voltage electricity grid interconnection with Alberta. This project will improve access to clean electricity in Alberta and will result in lower GHG emissions and air

pollution, and improved grid reliability in both provinces.

Clean Technology Innovation

British Columbia and the Government of Canada will work together to spur the development and commercialization of new technologies that will reduce emissions and create jobs for Canadians.

ALBERTA

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in Alberta include:

Climate Leadership Plan

The Climate Leadership Plan is a made-in-Alberta climate change strategy, specifically designed for Alberta's unique economy. While details of the final strategy are still being developed, the Alberta government has moved forward on a number of key areas.

Clean Electricity

Alberta will phase-out GHGs from coal-fired power plants and achieve 30% renewable energy by 2030.

Alberta will add 5,000 megawatts of renewable energy capacity by 2030 through the Renewable Electricity Program. To meet this target, investment in Alberta's electricity system will be solicited through a competitive and transparent bidding process, while ensuring projects come online in a way that does not impact grid reliability and is delivered at the lowest possible cost to consumers.

A new provincial agency, Energy Efficiency Alberta, has been created to promote and support energy efficiency and community energy systems for homes, businesses and communities.

Capping Oil Sands Emissions

A legislated maximum emissions limit of 100 Mt in any year, with provisions for cogeneration and new upgrading capacity, will help drive technological progress.

Reducing Methane Emissions

Alberta will reduce methane gas emissions from oil and gas operations by 45% by 2025.

Innovation and Technology

Alberta is investing in innovation and technology to reduce GHGs, encourage a more diversified economy and energy industry, and create new jobs, while improving opportunities to get the province's energy products to new markets. Alberta has created a task force that will make recommendations on a Climate Change Innovation and Technology Framework.

These actions provide a strong contribution to a comprehensive pan-Canadian framework.

ACTION ON PRICING CARBON POLLUTION

A carbon levy to be included in the price of all fuels that emit greenhouse gases when combusted, including transportation and heating fuels such as diesel, gasoline, natural gas and propane. The levy will be applied at a rate of \$20/tonne on January 1, 2017 and will increase to \$30/tonne one year later.

The Climate Leadership Plan is designed for Alberta's economy. The economic impact of carbon pricing is expected to be small, and every dollar will be reinvested back into the local economy. Reinvesting carbon revenue in our economy will diversify our energy industry by investing in large scale renewable energy, bioenergy initiatives, and transformative innovation and technology. Over the next 5 years:

\$6.2 billion will help diversify our energy industry and create new jobs:

- \$3.4 billion for large scale renewable energy, bioenergy and technology

- \$2.2 billion for green infrastructure like transit
 - \$645 million for Energy Efficiency Alberta
- \$3.4 billion will help households, businesses and communities adjust to the carbon levy:
- \$2.3 billion for carbon rebates to help low- and middle-income families
 - \$865 million to pay for a cut in the small business tax rate from 3% to 2%
 - \$195 million to assist coal communities, Indigenous communities and others with adjustment

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

Alberta and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Clean Electricity

Alberta and the federal government will work together to advance renewable energy, coal to natural gas conversion, and potential hydroelectric projects, including pump storage projects. Alberta is committed to developing incentives for renewable generation in a manner that is compatible with Alberta's unique electricity market.

B.C. – Alberta Intertie

Alberta is working with British Columbia and the federal government to explore new and enhanced

interties. The Alberta Electric System Operator is currently working with BC Hydro and industry on a key project, the restoration of the B.C.-Alberta 950 MW intertie to its full path rating (expected completion is in 2020). This restoration would allow imports of 1200 MW on the BC-AB intertie.

Innovation and Technology

Alberta is focused on the opportunity to leverage environmental policies and programs into new manufacturing, innovation, and clean technology businesses. Current opportunities include superclusters, advanced sensor technology for environmental applications including methane monitoring and reductions, and municipal waste diversion. Innovative solutions will result in meaningful GHG reductions across Canada and the export of solutions to promote a lower carbon world.

Disaster Mitigation / Infrastructure

Alberta is undertaking targeted work to address the hazards to which Albertans are vulnerable, including flood, wildfire, heat, drought, landslides, and wind.

While hazards and disaster risks have always been a concern, climate change is driving the need to adapt to more intense and frequent events. Federal support for wildfire mitigation infrastructure will reduce the risk of wildland fires. In addition, flood risk requires immediate mitigation infrastructure such as dykes and dams. Federal partnership on these initiatives will support risk management.

ONTARIO

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in Ontario include:

Permanent Closure of Coal-fired Electricity Generating Stations

On April 15, 2014, Ontario became the first jurisdiction in North America to fully eliminate coal as a source of electricity generation. This action is the single largest GHG reduction initiative in North America. On November 23, 2015, Ontario passed the *Ending Coal for Cleaner Air Act*, permanently banning coal-fired electricity generation in the province.

Ontario's Climate Change Strategy and Action Plan

On November 24, 2015, Ontario released its Climate Change Strategy setting the framework for the province to meet its long-term 2050 GHG emissions reduction target. The Strategy highlights five key objectives for transformation:

1. A prosperous low-carbon economy with world-leading innovation, science and technology
2. Government collaboration and leadership
3. A resource-efficient, high-productivity society
4. Reducing GHG emissions across sectors
5. Adapting and thriving in a changing climate

On June 8, 2016, Ontario released its Climate Change Action Plan to implement the strategy over the next five years and put Ontario on the path to achieve its longer term objectives. Policies and programs identified in the Action Plan include:

- Transforming how ultra-low and carbon-free energy technologies are deployed in our

homes and workplaces, and how we move people and goods

- Halting rising building-related emissions, with a focus on helping homeowners and small businesses move to low- and zero-carbon energy
- Making available funding for industries and manufacturers proposing to transform their operations and move off carbon-based fuels and peak electricity
- Aligning Ontario's R&D and innovation funding to place a greater emphasis on climate change science and technologies, with a view to making the discoveries that could lead to breakthroughs in zero-carbon technology

Ontario has made measurable progress in reducing GHGs. According to Environment and Climate Change Canada's 2016 National Inventory Report, from 2005 to 2014, Ontario's emissions decreased by 41 Mt (-19%), over the same period, Canada-wide emissions fell by 15 Mt (-2%).

These actions provide a strong contribution to a comprehensive pan-Canadian framework.

ACTION ON PRICING CARBON POLLUTION

On May 18, 2016, Ontario passed its landmark *Climate Change Mitigation and Low-carbon Economy Act*, which creates a long term framework for climate action. The Act creates a robust framework for cap and trade program, ensures transparency and accountability on how any proceeds collected under the program are used and enshrines emission reduction targets in legislation.

Ontario's approach, including its cap and trade program and associated emissions reduction

targets, will exceed the standards of the federal carbon pricing benchmark. Ontario's targets are:

- 15% below 1990 levels by 2020;
- 37% below 1990 levels by 2030; and
- 80% below 1990 levels by 2050.

Ontario is a founding member of the Western Climate Initiative (WCI), a not-for-profit organization established in 2008 to help member states and provinces execute their cap and trade programs. In 2017, Ontario will link its cap and trade system with those of WCI members Quebec and California to create the largest cap and trade system in North America.

Ontario will set a cap on total emissions from the covered sectors in 2017 based on the forecast emissions for large final emitters, electricity generation and transportation and heating fuels. Allowances will then be created in an amount equal to the cap and either sold or provided free-of-charge to Ontario emitters.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

Ontario and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Invest in Zero Emission Transportation and Infrastructure

Ontario is committed to increase uptake of zero emission passenger and commercial vehicles, both by providing purchasing incentives and by expanding the EV charging network across Ontario. In its 2016 budget, the federal government committed to support the deployment of alternative transportation fuel infrastructure, including electric charging stations. Ontario and the Government of Canada will work together to support the deployment of EV vehicles through enabling infrastructure.

Invest in Other Zero Emission Transportation

Ontario seeks a partnership with the Government of Canada to support enabling infrastructure that will increase the availability and use of lower carbon fuels, including LNG, increase the use of low carbon trucks and buses and increase the availability of LNG fueling infrastructure. Ontario is dedicating significant resources for these additional transportation initiatives. Expected emissions reductions in the transportation sector overall are 2.45 Mt in 2020.

Assist with Building Retrofits, Energy Audits and Technology Deployment

Ontario seeks a partnership with the Government of Canada as the province develops programs for fuel switching and energy efficiency, such as retrofits for existing residential buildings (including targeted initiatives for low-income households), and clean technologies for industries and small and medium enterprises. Partnership would increase investment in this area, allowing acceleration and scaling up of progress.

Ontario Climate Modelling Services Consortium

Ontario seeks a partnership with the Government of Canada to build regional capacity and support adaptation actions. Ontario plans to establish an Ontario Climate Modelling Services Consortium, which would act as a one window source of data to help the public and private sectors make evidence-based decisions.

The Consortium would operate at arm's length from government. Ontario would seek partnerships with other governments, non-governmental organizations and the private sector to ensure the organization's effectiveness and long term success. The Consortium would also be expected to develop service fee revenue

streams to contribute to the organization's fiscal sustainability.

Electricity Transmission

Ontario, in collaboration with the Government of Canada, will work with its regional partners to advance opportunities to expand and upgrade electricity transmission infrastructure to support clean hydroelectric power to displace the production of electricity from fossil fuels.

Ontario will also collaborate with the Government of Canada to accelerate access to clean electricity in remote Indigenous communities. This will lessen dependence on expensive diesel fuel and reduce greenhouse gas emissions and air pollution.

QUÉBEC

KEY ACTIONS TO DATE

Some of the key measures taken to date by Québec, which has the lowest greenhouse gas emissions per capita between the provinces in Canada, include:

2013-2020 Action Plan on Climate Change (PACC 2013-2020)

PACC 2013-2020 will reduce GHG emissions by 20% below the 1990 level by 2020. Among its other measures, the action plan offers financial help to the different stakeholders of Québec society so they can reduce their energy consumption, improve their practices, innovate and adjust. The work surrounding the development of the actions of Québec after the 2020 period is underway, in particular to reduce GHG emissions of the province by 37.5 % below the 1990 level by 2030.

2016-2030 Energy Policy

The Energy Policy will favour a transition to a low carbon footprint economy, chiefly by improving energy efficiency by 15%, by reducing petroleum consumption by 40%, and by increasing the production of renewable energies by 25%. Québec is one of the world's main producers of renewable energy, which represents 99.8% of its total electricity production.

2013-2020 Governmental Climate Change Adjustment Strategy

The Strategy will mitigate the impact of climate change on the environment, the economy and the communities, and will strengthen the resiliency of Québec society. The government of Québec has, notably, invested in the Ouranos consortium in order to get a better understanding of the impact of climate change on its territory, and to better inform the decision-making process and the development of solutions.

2015-2020 Transport Electrification Plan

Québec targets 100,000 electric vehicles on the road in 2020 and one million in 2030. The zero-emission vehicle (ZEV) standard adopted in October 2016 will encourage automotive manufacturers to improve their offer of ZEV, and the investments in electrification will allow Québec to build up its available renewable energies, its expertise and its world-class know-how.

These measures represent a major contribution at the Pan-Canadian level.

ACTION ON PRICING CARBON POLLUTION

Pioneer in the use of cap-and-trade systems for greenhouse gas emissions allowances, Québec's system has been linked to California's since 2014, and will soon be linked to that of Ontario. It represents the largest carbon market in North America, and is often referred to as an example of performance and rigour. Because it is based on hard caps to reduce GHG emissions, it is a robust and efficient tool to achieve the ambitious mitigation goals Québec has set for itself for 2020 and 2030.

Furthermore, auction revenues from its cap-and-trade system are entirely reinvested in measures that will spur the transition of Québec's economy to a more resilient and low-carbon one. This comprehensive approach, tailored to the needs and specificities of Québec, allows Québec to fulfill its leadership role in the fight against climate change in North America and internationally.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

The governments of Québec and Canada intend to collaborate in the following priority areas in order to fight climate change and allow clean economic growth:

Electric and Public Transport

Support the development of the offer and infrastructure of electric and public transport, by completing various projects such as the Metropolitan Electric Network (MEN), the implementation of bus rapid transit (BRT) systems between Montreal and Laval, the extension of the BRT in Gatineau, and the implementation of a BRT in Québec.

Energy Efficiency and Conversion

Speed up the reduction of GHG emissions in Northern communities, as well as on the Lower North Shore and Magdalen Islands, by replacing diesel with renewable energy sources for the electricity supply of their free-standing network.

Promote the implementation of energy performance and efficiency standards for new buildings, as well as for the renovation of existing buildings. Invest in the industrial sector to improve the energy performance of fixed production processes, by providing innovative technologies and reducing the use of gases with high warming potential such as hydrofluorocarbons, which Québec will continue to prioritize.

Recognition of the International Trade of Emission Rights

Contribute to the implementation of Articles 6 and 13 of the Paris Accord, to which the accounting and disclosure principles of the Western Climate Initiative (WCI) can contribute, as well as within a possible agreement between Canada and the United States regarding the accounting and attribution of “internationally transferred mitigation outcomes” as part of the contributions determined at national level (CDN).

Québec will also share with the government of Canada a detailed methodology, developed in collaboration with California and soon Ontario, in order to tabulate in its international reports the emission reductions achieved by Québec thanks to the carbon market.

Innovation and Adjustment to Climate Change

Promote innovation in green technology and GHG emission reduction, and collaborate on increasing the resiliency of the communities affected by climate change, by assessing the vulnerabilities and risks, adjusting land planning and use, and designing sustainable projects.

Québec will provide its expertise to the initiatives of the government of Canada, focusing in particular on joint financing of prevention and protection infrastructure against certain natural disasters linked to climate change.

NEW BRUNSWICK

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in New Brunswick include:

Transitioning to a Low-Carbon Economy: New Brunswick's Climate Change Action Plan

The Climate Change Action Plan outlines a bold vision for New Brunswick and sets renewed GHG reduction targets: 2030 target of 35% below 1990 levels; and 80% below 2001 levels by 2050. The plan also address other commitments, such as the Canadian Energy Strategy, released by the Council of the Federation in 2015, and contains a Climate Change Adaptation Strategy supported by actions to build resilience into New Brunswick communities, businesses, infrastructures and natural resources.

The Action Plan provides a clear path forward to reduce GHG emissions while promoting economic growth and enhancing current efforts to adapt to the effects of climate change.

Locally-owned Renewable Energy Projects that are Small Scale (LORESS)

In May 2015, the province introduced legislation to allow local entities to develop renewable energy sourced electricity generation in their communities. This will enable universities, non-profit organizations, co-operatives, First Nations and municipalities to contribute to NB Power's renewable energy requirements.

Shifting to renewables in electricity generation

Two fossil fuelled power plants were closed in recent years – one coal and one heavy oil. Also, 300 megawatts of wind energy was installed in the province and biomass fuel use in industry was expanded to displace oil. Solid waste

landfills are capturing biogas and some are generating electricity.

These actions are allowing NB Power to achieve the regulated Renewable Portfolio Standard of 40% of in-province sales from renewable energy sources by 2020. This translates to approximately 75% non-emitting by 2020 including nuclear.

Adaptation

The province has developed a progressive Climate Change Adaptation Program including assembling future climate projections, and supporting climate impact vulnerability assessments in communities and for infrastructure. Adaptation projects also focus on solutions building and advanced planning to help reduce or avoid the costs of impacts such as more severe and frequent flooding, coastal erosion and storm events and disease and pest migration.

Several projects are carried out in collaboration with other Atlantic provinces, notably under the Regional Adaptation Collaborative (RAC), which involves federal support, as well as with the Gulf of Maine Council and US partners.

These actions provide a strong contribution to a comprehensive Pan-Canadian Framework.

ACTION ON PRICING CARBON POLLUTION

The province will implement a made-in-New Brunswick carbon pricing mechanism that addresses the requirements of the federal government for implementing a price on carbon emissions by 2018 and that at the same time recognizes New Brunswick's unique economic and social circumstances. The provincial government will take into consideration the impacts on low-income families, trade-exposed and energy-intensive industries, and consumers

and businesses, when developing the specific mechanisms and implementation details, including how to reinvest proceeds.

Any carbon pricing policy will strive to maintain competitiveness and minimize carbon leakage (i.e., investments moving to other jurisdictions). Proceeds from carbon emissions pricing will be directed to a dedicated climate change fund.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

The Government of New Brunswick and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Enhanced Electricity Generation and Transmission System

New Brunswick will work with the other Atlantic provinces and the Government of Canada to advance opportunities for clean electricity generation, transmission, storage and demand management linkages across the region. This will: improve access to non-emitting electricity; support the phase-out of coal-fired electricity generation; improve grid reliability and energy security; and, consistent with fair market principles, help provinces access export markets for clean, non-emitting electricity.

This will contribute to both the Atlantic Growth Strategy and Canadian Energy Strategy and will build on existing regional coordination efforts, leading to an integrated regional electricity strategy.

Energy Efficiency

The Government of New Brunswick, in partnership with the Government of Canada, will seek to enhance energy efficiency programs by targeting GHG emission reduction opportunities across sectors and fuels.

Examples of possible targeted interventions include programs that help: trucking fleets add aerodynamic and other efficiency measures to existing equipment; small- to medium-size industry improve their compressed air systems, boilers and lighting; commercial and institutional facilities invest in heating, lighting and other retrofits; and families retrofitting their homes to reduce energy costs, with special treatment for low- and fixed-income families.

Industrial Emissions Reductions

The Government of New Brunswick and the Government of Canada will work to support industrial emission reduction initiatives through technology and energy efficiency improvements while maintaining productivity. For example, there are significant opportunities to reduce emissions resulting from industrial production in the Belledune area of New Brunswick.

NOVA SCOTIA

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in Nova Scotia include:

The Environmental Goals and Sustainable Prosperity Act (2007)

In 2007, Nova Scotia passed legislation outlining principles for sustainable economic growth, including a requirement to reduce GHG emissions in the province to 10% below 1990 levels by 2020. The development and implementation of the Nova Scotia Climate Action Plan led to early action on the electricity sector, the largest source of emissions in the province. As a result, Nova Scotia has not only achieved its target six years early, it has also already met the Canadian 2030 target of 30% below 2005 levels, and is on a track to continue reducing emissions.

Nova Scotia's Greenhouse Gas Emissions Regulations

Nova Scotia was the first province in Canada to place a hard cap on GHG emissions from the electricity sector. These regulations, created in 2009 and enhanced in 2013, required the utility to reduce GHG emissions by 25% by 2020, and 55% by 2030. This is a measured and flexible approach which will enable a transition from coal to clean energy in the province.

Nova Scotia's Renewable Energy Regulations

In addition to the hard cap on GHG emissions, Nova Scotia also has a renewable energy standard for the electricity sector. This standard established requirements for 25% of electricity to be sourced from renewable energy by 2015, and 40% by 2020.

Energy Efficiency

Nova Scotia has Canada's first energy efficiency utility, Efficiency Nova Scotia. This independent organization has achieved an annual reduction in electricity demand of over 1% since its creation. It also administers comprehensive energy efficiency programs for low income and First Nations Nova Scotians. These efforts reduce GHG emissions while supporting the growth of the low carbon economy.

Tidal Energy

The Bay of Fundy and Minas Basin are home to the highest tides in the world- every day, more water flows into this bay than the output from all the rivers in the world combined. Nova Scotia has been supporting the development of these tides as a source of clean, predictable and reliable energy for Nova Scotians and as a clean technology export. The Fundy Ocean Research Centre for Energy (FORCE) now has a grid connected 2MW tidal turbine with plans to install more in the coming years.

Waste Management

Nova Scotia is also making efforts to reduce GHG emissions by diverting organic waste from landfills, recycling and creating a circular economy. Progress on waste diversion is reflected in a 30% reduction in greenhouse emissions from the waste sector since 2002.

These actions are just a snapshot of what Nova Scotians are doing to reduce GHG emissions and provide a strong contribution to a comprehensive pan-Canadian framework.

ACTION ON PRICING CARBON POLLUTION

As part of the pan-Canadian benchmark for carbon pricing, Nova Scotia has committed to

implement a cap and trade program in the province that builds on our early action in the electricity sector.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

The Government of Nova Scotia and the Government of Canada intend to collaborate in the following priority domains to address climate change and advance clean growth:

Energy Efficiency

Nova Scotia and the Government of Canada are committed to partnering to enhance the existing provincial energy efficiency programs for homes and businesses with the objective of reducing energy use and saving energy costs. This could include expanded energy efficiency programs, efforts to accelerate the electrification of homes and businesses through heat pumps and smart meters, district energy systems, as well as electric vehicle infrastructure.

Renewable Energy Generation, Transmission and Storage

Nova Scotia, in partnership with the Government of Canada, will work together to advance opportunities for renewable energy generated from sources such as wind, tidal and solar, as well as the enabling transmission and storage infrastructure to ensure growth beyond current technical limits. Research and development capacity will continue to be strengthened.

Planning and Implementing Adaptation Infrastructure

Nova Scotia and the Government of Canada will work together and invest in projects to make infrastructure more resilient to a changing climate, and to help communities increase their capacity to adapt to a changing climate.

Regional Electricity Grid Connections

Nova Scotia will work with the other Atlantic provinces and the Government of Canada to advance opportunities for clean electricity generation, transmission, storage and demand management linkages across the region.

This will: improve access to non-emitting electricity; support the phase-out of coal-fired electricity generation; improve grid reliability and energy security; and, consistent with fair market principles, help provinces access export markets for clean, non-emitting electricity. This will contribute to both the Atlantic Growth Strategy and Canadian Energy Strategy and will build on existing regional coordination efforts, leading to an integrated regional electricity strategy.

PRINCE EDWARD ISLAND

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in Prince Edward Island include:

Climate Change Policy Framework

Prince Edward Island's primary areas of strategic focus for climate change fall into the themes of built environment, transportation, agriculture, conservation and adaptation. Prince Edward Island is in the process of developing new climate change strategies that will result in further actions and initiatives to reduce GHG emissions across the province, increase our resilience to a changing climate, and advance measures to strengthen and grow a prosperous green economy in the province.

Prince Edward Island does not have a legislated provincial emissions reduction target but does contribute to the regional target set by the Conference of the New England Governors and Eastern Canadian Premiers (NEG-ECP). The targets are 10% reductions from 1990 by 2020, 35% - 45% below 1990 levels by 2030, and 75-85% reduction from 2001 levels by 2050. PEI has realized a 9% reduction in GHG emissions since 2005.

PEI Wind Energy

Prince Edward Island is a world leader in producing clean electricity from wind. Prince Edward Island boasts the highest penetration of wind in Canada and 2nd highest in the world next to Denmark. The Government of Prince Edward Island has demonstrated a long-term commitment and investments of \$119 million to wind energy.

The first commercial wind farm in Atlantic Canada was developed by the PEI Energy Corporation at North Cape in 2001. North Cape was expanded in 2003, doubling in size.

In January 2007, the PEI Energy Corporation commissioned its second wind farm at East Point. In 2014, the Island's newest wind farm was commissioned at Hermanville/ Clearspring. As a result, Prince Edward Island now has a total installed wind capacity of 78% of peak load, which supplies almost 25% of the province's total electricity requirements.

Biomass

Prince Edward Island is home to Canada's longest-running, biomass-fired district heating system. Operating since the 1980s, the system has expanded to serve over 125 buildings in the downtown core of Charlottetown, including the University of Prince Edward Island and the Queen Elizabeth Hospital. It has contributed to the establishment of a local waste-wood fuel-supply market. The system burns approximately 66,000 tons of waste materials annually.

Coastal Erosion

Prince Edward Island has partnered with the University of Prince Edward Island (UPEI) Climate Research Lab to study coastal vulnerability, including the award-winning Coastal Impacts Visualization Environment (CLIVE). CLIVE is an innovative 3D platform for visualizing the potential future impacts of coastal erosion and coastal flooding at local community scales, on PEI and elsewhere, using past data and Intergovernmental Panel on Climate Change models.

The province has also invested in UPEI in its development of an expansive, cutting-edge coastal erosion monitoring network. This research includes the use of drone and GIS technology to quantify and assess erosion volume of shoreline disappearance along Prince Edward Island's coastline.

Environmental Awareness in Agriculture

As a key industry for Prince Edward Island, agriculture is of particular consequence for climate change and green growth. In recent years, PEI farmers, watershed groups and the fertilizer industry have been implementing a 4R Nutrient Stewardship program to encourage the efficient use of fertilizer and help reduce related emissions.

Island farmers have been making advances in crop diversification, including testing potato varieties that require less fertilizer and adding nitrogen-fixing pulse crops which improve the environmental sustainability of annual cropping systems. The further use of robotics in dairy farming and food additives in livestock production is being employed to reduce methane emissions.

Prince Edward Island is also the first and only jurisdiction in Canada with a provincially-supported Alternative Land Use Services program. Currently, the program has converted almost 4,000 hectares of marginal land from annual crop production to perennial or permanent cover.

These actions provide a strong contribution to a comprehensive pan-Canadian framework and are helping facilitate the transition to a low-carbon economy.

ACTION ON PRICING CARBON POLLUTION

Prince Edward Island will introduce a made-in-PEI approach to carbon pricing which positively contributes to climate change action while benefitting Prince Edward Islanders and ensures optimal conditions for continued growth of the provincial economy. Prince Edward Island will focus on measures that will meaningfully decrease our GHG emissions and recognize the particular elements of our economy.

Our approach will ensure consistent and competitive alignment with efforts being made

across the country, including mitigation and price initiatives in all provinces, especially those in our region. PEI is committed to an approach that will directly enhance provincial adaptation and mitigation efforts.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

Prince Edward Island and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Energy Efficiency

Prince Edward Island, in partnership with the Government of Canada, will pursue improved energy efficiency for all sectors in the province as outlined in the 2016 PEI Energy Strategy. The Strategy and forthcoming Climate Change Action Plan are key policy tools in reducing GHGs, driving economic growth and creating jobs locally and in the region.

Prince Edward Island is committed to engaging in incremental actions through solutions for the built environment, including businesses and homes, as well as in new building construction. It has been clearly illustrated by research in the region that investing in efficiency is one of the most effective means of delivering jobs and economic growth widely – across sectors and regions – while reducing emissions and providing savings to consumers.

With a predominantly rural population and some of the highest electricity rates in the country, particular consideration will be given to low-income Island families, and sectors that may find the transition to a lower-carbon environment challenging.

Clean Energy

Energy resilience and security and a move to greater electrification are key priorities for the province. Prince Edward Island, in partnership

with the Government of Canada, will work to expand its world-class wind resource, invest in solar, and enable greater integration of renewable energy through storage. Prince Edward Island will work with the other Atlantic Provinces and the Government of Canada to advance opportunities for clean electricity generation, transmission, storage and demand management linkages across the region.

This will: improve access to non-emitting electricity; support the phase-out of coal-fired electricity generation; improve grid reliability and energy security; and, consistent with fair market principles, help provinces access export markets for clean, non-emitting electricity. This will contribute to both the Atlantic Growth Strategy and Canadian Energy Strategy and will build on existing regional coordination efforts leading to an integrated regional electricity strategy.

Adaptation

With its 1100 km of coastline, Prince Edward Island is uniquely vulnerable to climate impacts and is positioned to advance innovative solutions to make infrastructure more resilient to a changing climate.

Prince Edward Island and the Government of Canada will work together to act on findings from disaster risk reduction planning and coastal infrastructure assessment, and to improve decision-making capacity to adapt to climate change through planning, training and monitoring.

Research and Development

Prince Edward Island and the Government of Canada will work together to support research and development on promising practices and innovation in the areas of agriculture, marine industries, and smart grid and micro-grid/storage. Prince Edward Island provides an ideal demonstration site for development in these areas.

This research will advance better understanding of influences on emissions and opportunities for clean growth in key sectors of the Prince Edward Island economy.

Transportation

Prince Edward Island relies on exports for continued economic growth. The Prince Edward Island economy is heavily reliant on ground transportation for the movement of goods to markets across Canada and around the world, and the movement of people across the province. The province has no rail system, large container ports, or robust public transit. As the most rural province in Canada, mitigation in transportation is a difficult challenge.

Prince Edward Island and the Government of Canada will work together on methods to support an eventual move to greater electrification in transportation, including corresponding work with other jurisdictions in Canada. Proposed specific areas of work include installation of public charging infrastructure across the province and in collaboration regionally where possible.

NEWFOUNDLAND & LABRADOR

KEY ACTIONS TO DATE

Newfoundland and Labrador is making significant investments to increase the use of clean and renewable hydroelectric power in the province. The Muskrat Falls hydroelectric development, with capital costs of over \$9 billion, will result in 98% of electricity consumed in the province coming from renewable sources by 2020.

Muskat Falls will facilitate advancing by more than a decade the decommissioning of the largest thermal oil-fired electricity generation facility in the province, reducing greenhouse gas (GHG) emissions by about 1.2 Mt annually (equivalent to more than 10% of the province's total emissions in 2015), and assisting other jurisdictions to meet their GHG reduction targets.

To focus the province's efforts to tackle climate change, Newfoundland and Labrador has adopted GHG emission reduction targets of 10% below 1990 levels by 2020 and 75-85% below 2001 levels by 2050, and has endorsed, on a regional basis, the Conference of New England Governors and Eastern Canadian Premiers' reduction marker range of at least 35-45% below 1990 levels by 2030.

To make progress towards these targets Newfoundland and Labrador released a Climate Change Action Plan in 2011 identifying 75 actions to reduce GHG emissions and adapt to the adverse impacts of climate change. Building on this work, Newfoundland and Labrador passed the *Management of Greenhouse Gas Act* in June 2016, creating a legislative framework for reducing GHGs from large industry, and has completed public consultations to inform new provincial actions on climate change.

These actions provide a strong contribution to a comprehensive Pan-Canadian Framework.

ACTION ON PRICING

CARBON POLLUTION

The Government of Newfoundland and Labrador and the Government of Canada continue to collaborate to ensure that Newfoundland and Labrador's climate change plan, including carbon pricing, is consistent with the goals in the Pan-Canadian Framework to reduce GHG emissions, improves resilience to climate impacts, and accelerates innovation and job creation.

This made-in-Newfoundland and Labrador plan will address the province's particular social, economic, and fiscal realities. This includes sensitivity to the particular circumstances facing Labrador communities, and the need to consider impacts on all remote and isolated communities, vulnerable populations, consumers and trade-exposed industries, as well as the need to take account of the province's reliance on marine transportation and the absence of lower carbon alternatives.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

Newfoundland and Labrador and the Government of Canada intend to explore collaboration in the following priority domains to address climate change and advance clean growth:

Renewable Energy

Newfoundland and Labrador and the Government of Canada intend to jointly explore opportunities to develop renewable energy, including such actions as enhancing hydroelectric capacity, increasing transmission infrastructure, and offsetting diesel use in small-scale off-grid electricity systems.

These efforts will also seek to maximize collaboration with other Atlantic provinces in the

electricity sector, contributing to both the Atlantic Growth Strategy and Canadian Energy Strategy, and will build on existing regional coordination efforts, leading to an integrated regional electricity strategy.

Transportation

Newfoundland and Labrador and the Government of Canada intend to jointly explore opportunities to reduce GHG emissions in all parts of the transportation sector, including electric vehicles and associated infrastructure, on- and off-road freight and industrial transportation, marine vessels, and public transit.

Energy Efficiency

Newfoundland and Labrador and the Government of Canada intend to jointly explore opportunities to develop energy efficiency programming, improve energy codes, and support fuel switching in all sectors reliant on fossil fuels.

Adaptation

Newfoundland and Labrador and the Government of Canada intend to jointly explore opportunities to expand climate monitoring and adaptation product and information development, as well as best management practices.

Green Innovation

Newfoundland and Labrador and the Government of Canada intend to jointly explore opportunities in research and development in green technology, including fostering innovation networks and initiation of pilot projects.

YUKON

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in Yukon include:

Yukon Government Climate Change Action Plan

The Yukon government *Climate Change Action Plan* has four goals: reducing GHG emissions; addressing the impacts of climate change; leading Yukon action on climate change; and enhancing our knowledge and understanding of climate change.

KEY ACTIONS

Work to date in achieving *Climate Change Action Plan* goals includes:

Reducing GHG emissions (mitigation)

- Setting nine sector-specific targets in the areas of transportation, heating buildings, electricity, and industrial operations.
- Completing a study of Yukon's transportation sector, and launching a Ride Share program in partnership with the City of Whitehorse.
- Supporting Yukon homeowners with the Good Energy Residential Incentives Program, which provides incentives to purchase high efficiency wood stoves, boilers and pellet stoves.
- Carrying out detailed energy audits of seven high-consumption Yukon government buildings.
- A Yukon Biomass Strategy to guide the development of a biomass energy sector in the territory.

Addressing the impacts of climate change (adaptation)

- Completing ten adaptation projects in the areas of permafrost impacts to highways, buildings, hydrological responses, and agricultural capacity; flood risk mapping; forestry implications including the encroachment of mountain pine beetle in lodgepole pine forests; and bioclimate shifts.
- With the Pan-Territorial Adaptation Strategy, territorial governments are collaborating on practical adaptation measures for the north. Permafrost thaw has been a key focus.

Leading Yukon action on climate change

- Participating in international and national climate change efforts that impact Yukon, such as the United Nations Framework Convention on Climate Change Conference of the Parties (COP) meetings, including a developmental opportunity for a Yukon youth ambassador.
- Currently supporting the Yukon College to develop a climate change policy course to be offered by Yukon College.

Enhance our knowledge and understanding of climate change

- Supporting development of the Climate Change Indicators and Key Findings report, an important source of independent information that will guide action and research on climate change in Yukon.
- Provide ongoing funding for the Northern Climate Exchange at Yukon College.

These actions provide a strong contribution to a comprehensive pan-Canadian framework.

ACTION ON PRICING CARBON POLLUTION

The Government of Yukon recognizes the role of carbon pricing in the pan-Canadian Framework for Clean Growth and Climate Change.

Given Yukon's particular circumstances, the Government of Canada and the Government of Yukon will work together to assess the implications of carbon pricing in the territory for its economy, communities and people including energy costs, and to develop solutions together.

The Government of Yukon and the Government of Canada will also work together to assess the implications of carbon pricing in Canada on the cost of living in Yukon. This will be an important consideration for future policy development.

As outlined in the federal government's benchmark, 100% of the revenues from carbon pricing will be retained by Yukon. Yukon government will distribute these revenues back to individual Yukoners and businesses through a rebate.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

Yukon and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Advancing Renewable Energy

Yukon government and the Government of Canada will partner in advancing renewable energy projects in Yukon. This will improve the energy infrastructure in Yukon, including developing new renewable energy sources to provide clean energy for current and future electricity needs.

It will also support remote communities in diminishing their reliance on diesel for electricity and will support the expanded use of biomass as a cleaner option for heating in Yukon.

Energy Efficiency

Yukon government, in partnership with the Government of Canada, will support energy efficiency through the retrofitting of existing buildings. Sound investments in retrofits and new energy efficiency projects will be supported by expanding the capacity for collecting, analyzing, and reporting emissions data that will help identify the areas of greatest opportunity for reducing emissions.

Adaptation: Building Resilient Yukon Communities

Canada's Northern jurisdictions and the Government of Canada are working together to develop the Northern Adaptation Strategy. The Government of Canada will partner with Yukon to help build climate-resilient Yukon communities.

Research collaboration will build the knowledge necessary for evidence-based decision-making in community planning. Investments in infrastructure will address known risks such as infrastructure built on thawing permafrost.

Green Innovation and Technology

Yukon government and the Government of Canada will partner on new research and pilot projects that will explore promising areas for climate action in the north, such as seasonal energy storage, cleaner transportation options, and community-level renewable energy generation.

NORTHWEST TERRITORIES

KEY ACTIONS TO DATE

NWT Climate Change Strategic Framework

The Government of the Northwest Territories (GNWT) has committed to develop a climate change strategy that takes northern energy demands and the cost of living into account. It will reflect commitments to reduce greenhouse gas emissions, explore carbon pricing systems and how to develop local alternatives such as hydro, biomass, wind and solar.

NWT Energy Strategy

The GNWT is currently working on a new 10 year Energy Strategy. The Energy Strategy will focus on the affordability, reliability and environmental impacts of energy in the NWT and will promote energy efficiency, renewable and alternative energy in the electricity, heating and transportation sectors.

The GNWT continues to take the following territorial adaptation actions:

- Support adaptation decision-making with knowledge, information collection and sharing
- Build capacity to translate adaptation knowledge into action
- Build climate-resilience through investments in infrastructure
- Invest in land use planning, management plans and building adaptation capacity and expertise
- Support most vulnerable regions, conducting risk assessments and completing hazard mapping
- Reduce climate-related hazards and disaster by developing disaster risk management plans

- Adapt renewable energy options and solutions for cold regions

The GNWT continues to take the following territorial emissions mitigation actions:

- Work with our federal, provincial indigenous partners and others to find solutions to address diesel use in remote off-grid communities including to develop the NWT's hydroelectricity potential to reduce GHG emissions in the electricity sector.
- Implement policies to support the adoption of lower carbon and energy efficient technologies.
- Implement policies to support industry and large emitters in the adoption of lower carbon and energy efficient technologies.
- Continue biomass initiatives and work towards the development of a local forest and wood product industry and develop local wood pellet manufacturing as an alternate local fuel source.
- Addressing energy use and GHG emissions in government buildings and operations.

These actions provide a strong contribution to a comprehensive pan-Canadian framework.

ACTION ON PRICING CARBON POLLUTION

Through the Climate Change Strategic Framework, the GNWT is exploring potential impacts and opportunities that may arise from pursuing different carbon pricing systems in the territory.

The GNWT recognizes the role of carbon pricing in the pan-Canadian Framework for Clean Growth and Climate Change. Given the NWT's particular circumstances, the Government of Canada and the GNWT will work together to assess the

implications of carbon pricing in the territory for its economy, communities and people including energy costs, and to develop solutions together.

The GNWT and the Government of Canada will also work together to assess the implications of carbon pricing in Canada on the cost of living in the NWT. This will be an important consideration for future policy development.

As outlined in the federal government's benchmark, 100% of the revenues from carbon pricing will be retained by the NWT.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

The NWT will work with the Government of Canada, in collaboration with regional partners, to advance opportunities for clean electricity generation, transmission, storage and demand management linkages across the region.

This will: improve access to non-emitting electricity; support the phase-out of coal-fired electricity generation; improve grid reliability and energy security; and, subject to fair market principles, help the region access export markets for clean, non-emitting electricity.

The NWT and the Government of Canada intend to collaborate in the following priority areas to address climate change and advance clean growth:

Taltson Hydro Expansion and Transmission Links

The proposed Taltson hydro expansion is a small scale run of river hydro project that could be developed with little environmental impact next to the existing power plant, on an already developed river, and combined with a transmission link to provide a green energy corridor to our southern neighbours.

The expansion of the Taltson hydro facility would help reduce Canada's GHG emissions by 360,000 tonnes annually for 50-plus years.

The 60 MW expansion of the Taltson hydro facility could be built in partnership with NWT Indigenous governments, creating economic opportunities for Indigenous-owned businesses across the North. The NWT and Government of Canada will undertake technical and feasibility studies as a first step, including the NWT launching the environment assessment process.

Renewable Solutions for Off-Grid Diesel Communities

The Government of Canada and the GNWT will explore opportunities for reducing reliance on diesel in off-grid communities. For example, the Inuvik Wind Project could produce between 2 and 4 megawatts of wind energy for the Town of Inuvik. The project would reduce GHG emissions by 4,300 tonnes per year and eliminate the need for 1.3 million litres of diesel annually in the largest diesel community in the NWT, and help reduce the cost of living for residents.

For other off-grid diesel powered communities of the NWT, a suite of renewable solutions such as solar and wind in combination with energy storage systems and variable generators could reduce diesel use and emissions by 25 percent, an annual GHG elimination of nearly 3000 tonnes.

All-Weather Road Infrastructure for Adapting to Climate Impacts

The safety and reliability of winter roads is being impacted by climate change. Construction of the Mackenzie Valley Highway from Wrigley to Norman Wells would provide safe, secure, and reliable access into the Sahtu region, helping decrease the high cost of living in communities and support the development of resources in the region.

The Great Bear River is a priority as the seasonal ice crossing is increasingly vulnerable to impacts of climate change. Climate change is also

limiting access to existing diamond mining operations in the Slave Geological Province.

Construction of an all-weather Slave Geological Province Access Corridor would reduce costs for industry exploration and development in a region that holds world-class deposits of natural resources and continues to be a major contributor to the Canadian and NWT economy.

NUNAVUT

KEY ACTIONS TO DATE

Some of the key actions taken to date or under development in Nunavut include:

Energy efficiency upgrades

The Nunavut Energy Retrofit Program was piloted in Iqaluit in 2007, and addressed all of the government of Nunavut's Iqaluit Government of Nunavut-owned buildings. The one-time project investment of \$12.8 million has led to annual savings in excess of \$1.6 million and 1,594 tonnes of GHG reductions.

In combination with the conversion of three of our facilities to residual heat, our GHG reduction is approximately 4,100 tonnes, which is roughly 20% of those buildings' total emissions.

Development of a Climate Change and Adaptation strategy

Upagiaqtavut was developed in 2011 and serves as a guiding document for the impacts of climate change in Nunavut

(http://climatechangenunavut.ca/sites/default/files/3154-315_climate_english_reduced_size_1_0.pdf).

Climate change databank

The Government of Nunavut is developing and uses information technology to centralize and increase the access to climate change information, such as permafrost data and landscape hazards maps. The information is used to improve infrastructure planning and help mitigate the effects of climate change across Nunavut.

Climate Change Secretariat

The Government of Nunavut is establishing a Climate Change Secretariat (CCS), which will be the central point within the government to

address both climate change adaptation and mitigation issues.

ACTION ON PRICING CARBON POLLUTION

The Government of Nunavut recognizes the role of carbon pricing in the pan-Canadian Framework for Clean Growth and Climate Change. Given Nunavut's particular circumstances, the Government of Canada and the Government of Nunavut will work together to assess the implications of carbon pricing in the territory for its economy, communities and people including energy costs, and to develop solutions together.

The Government of Nunavut and the Government of Canada will also work together to assess the implications of carbon pricing in Canada on the cost of living in Nunavut. This will be an important consideration for future policy development.

As outlined in the federal government's benchmark, 100% of the revenues from carbon pricing will be retained by Nunavut.

COLLABORATION PARTNERSHIP OPPORTUNITIES FOR CLEAN GROWTH AND CLIMATE CHANGE

Nunavut and the Government of Canada intend to collaborate in the following domains of priority to address climate change and advance clean growth:

Nunavut and the Government of Canada will assess the economic and technical feasibility of electrification through hybrid power generation in Nunavut's communities. Hybrid power generation would significantly reduce emissions while at the same time ensure that Nunavut's isolated communities have reliable power.

Nunavut and the Government of Canada will work together to develop a retrofit program to increase the energy efficiency of public and private

housing. Investment in safe and energy efficient housing is a key component of building strong resilient communities in the Arctic.

Attachment 2.1

Measures	Per-Participant Annual GHG Reduction (tonnes)	Aggregate GHG Reduction (tonnes)	Aggregate Incentives/GHG Reduction (per tonne)
Commercial			
Capital Upgrades - Retrofit	190.9	92,365	\$ 55.94
Combination Oven	3.8	1,500	\$ 155.46
Commercial Energy Assessments	5.2	440	\$ 467.79
Condensing Boiler	20.5	217,622	\$ 59.88
Condensing Boilers	14.5	13,762	\$ 61.16
Condensing make up air unit	4.1	25,775	\$ 34.66
Condensing Storage Water Heater	4.8	14,379	\$ 63.00
Condensing tankless water heater	4.4	20,488	\$ 26.36
Condensing Unit Heaters	0.8	4,727	\$ 110.36
Condensing Volume boiler	9.4	17,325	\$ 49.40
Convection Oven	2.7	5,538	\$ 134.00
Conveyor Oven	11.9	3,708	\$ 35.80
Deep Fryer	7.2	19,648	\$ 45.29
Early engagement	0.0	0	N/A
Energy Assessments	10.3	2,959	\$ 279.12
Existing Program participants	366.8	28,292	\$ 29.33
Furnace replacement (Mid)	0.3	12,577	\$ 295.60
Furnace replacement (Std)	0.4	17,356	\$ 214.20
Gas Underfired Broilers	6.6	12,586	\$ 31.32
Griddle	3.4	3,903	\$ 94.32
HVAC Controls - Kitchen DCV	15.1	10,665	\$ 74.41
Implementation Support Full	0.0	0	N/A
Implementation Support Partial	0.0	0	N/A
Large Vat Deep Fryer	10.1	3,149	\$ 51.27
Low flow spray valves	0.8	1,097	\$ 38.73
Mid Efficiency Boiler	46.1	26,339	\$ 22.42
Non Step Code - Engineered	49.9	41,520	\$ 105.19
Non Step Code - Whole Building	132.4	9,020	\$ 238.85
Rack Oven	16.9	2,281	\$ 46.19
Recirculation Controls	8.0	31,345	\$ 49.50
Recommissioning - O&M	53.4	8,332	\$ 78.67
Recommissioning - Studies	0.0	0	N/A
Roof Insulation	4.3	27,652	\$ 311.51
Steam Cooker	11.4	2,454	\$ 15.80
Step Code - Whole Building	207.0	45,362	\$ 102.50
Step Code capacity building - Charettes	0.0	0	N/A
Studies - Retrofit	0.0	0	N/A
Vortex DeAerators	17.0	19,004	\$ 41.79
Water Heaters	9.3	1,476	\$ 34.39
Industrial			
1" insulation ≥ 1" HPS pipe	105.1	8,129	\$ 4.51
1" insulation ≥ 1" HW pipe	26.9	2,081	\$ 17.63
1" insulation ≥ 1" LPS pipe	60.6	4,682	\$ 7.83
1" insulation 0.5-1" HPS pipe	54.2	4,195	\$ 8.74
1" insulation 0.5-1" HW pipe	13.9	1,073	\$ 34.18
1" insulation 0.5-1" LPS pipe	31.1	2,406	\$ 15.24
Air Curtains - Large Door	56.4	3,604	\$ 4.20
Air Curtains - Medium Door	9.5	607	\$ 22.51
Air Curtains - Small Door	2.4	152	\$ 65.74
Cohort, Medium Customers	103.2	12,273	\$ 67.31
Direct Contact Water Heater	9.6	1,438	\$ 27.88
Feasibility Study	0.0	0	N/A
Individual, Large Customer	1,032.0	68,598	\$ 10.77
Other Prescriptive Measures	169.7	18,229	\$ 18.17
Plant Wide Audit	0.0	0	N/A
Process Boiler (Hot Water and Steam)	47.1	19,556	\$ 29.98
Steam Traps Replacement	59.5	10,830	\$ 15.77
Steam Traps Survey	0.0	0	N/A
Tank Insulation 1" High Temp	1,327.3	34,210	\$ 1.75
Tank Insulation 1" Low Temp	749.8	19,323	\$ 3.10
Tank Insulation 2" High Temp	1,282.9	33,065	\$ 3.61
Technology Implementation	738.7	154,696	\$ 28.46
Low Income			
Energy Conservation Assistance	0.2	18,563	\$ 340.34
Energy Savings Kit	0.1	53,039	\$ 22.63
Furnace Replacement Top Up (Mid efficiency)	0.3	2,979	\$ 574.77
Furnace Replacement Top Up (standard efficiency)	0.4	6,210	\$ 416.50
NonProfit Custom Studies and Implementation Support	0.0	0	N/A
Non-Profit Retrofit (bundled) Rebates	42.9	39,891	\$ 88.43
REnEW	0.0	0	N/A
Res Water Heat Top Up (0.67 EF storage tank)	0.2	1,937	\$ 169.94
Res Water Heat Top Up (Condensing storage tank)	0.3	331	\$ 764.73
Res Water Heat Top Up (Condensing tankless)	0.4	1,768	\$ 522.11
Space Heat Top Up	6.5	8,959	\$ 95.25
Water Heating Top Up	1.8	881	\$ 283.14
Residential			
0.67 EF storage tank water heater	0.2	17,199	\$ 227.80
0.67 Water Heater	0.2	851	\$ 227.80
1.5 GPM Bathroom Aerator	0.0	9,913	\$ 18.40
1.5 GPM Handheld	0.1	2,456	\$ 45.04
1.5 GPM Kitchen Aerator	0.0	9,671	\$ 21.24
1.5 GPM Showerhead	0.1	13,751	\$ 30.73
1.5GPM Bathroom Aerators (Gas)	0.0	242	\$ 3.12
1.5GPM Handheld Showerhead (Gas)	0.1	98	\$ 22.47
1.5GPM Kitchen Aerators (Gas)	0.0	242	\$ 5.96
1.5GPM Showerheads (Gas)	0.1	393	\$ 8.18
Appliance maintenance	0.0	0	N/A
Attic insulation	0.4	50,259	\$ 104.92
Boiler	0.4	9,785	\$ 113.25
Bonus Offers	0.0	0	N/A
Communicating thermostat	0.7	75,625	\$ 56.22
Condensing storage tank water heater	0.7	10,024	\$ 691.75
Condensing tankless water heater	1.0	43,990	\$ 495.35
CrawlSpace and basement insulation	0.3	4,586	\$ 133.17
Direct vent wall furnace	0.5	4,127	\$ 204.23
Drain water heat recovery	0.4	4,895	\$ 185.52
EnerChoice fireplace (MURBs)	1.0	60,262	\$ 183.84
EnerChoice Fireplace (New Home)	0.3	8,976	\$ 204.27
EnerChoice fireplace (Retrofit)	0.4	67,395	\$ 107.13
ENERGY STAR Dryers	0.0	65	\$ 305.61
EnergyStar dryer	0.0	121	\$ 305.61
EnergyStar washer (\$25)	0.1	4,015	\$ 180.35
Furnace (Mid-efficiency)	0.3	31,844	\$ 197.06
Furnace (Standard efficiency)	0.4	68,271	\$ 142.80
HVAC zone controls	0.6	4,151	\$ 321.95
Other insulation	0.3	1,643	\$ 99.77
STEP 2 (Single Family Dwelling)	0.3	5,044	\$ 290.41
STEP 2 (Townhome/Rowhome)	0.5	2,537	\$ 188.10
STEP 3 (Single Family Dwelling)	0.6	27,284	\$ 289.21
STEP 3 (Townhome/Rowhome)	0.7	14,699	\$ 248.86
STEP 4 (Single Family Dwelling)	1.1	6,474	\$ 292.50
STEP 4 (Townhome/Rowhome)	0.9	2,439	\$ 368.40
Type 1 combination system	1.9	15,096	\$ 283.53
Type 2 combination system	2.1	16,764	\$ 255.32
Type 3 combination system	0.7	4,670	\$ 721.17
Wall insulation	1.5	18,184	\$ 35.15