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March 19, 2021

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Mr. Patrick Wruck, Commission Secretary

Dear Mr. Wruck:

Re: FortisBC Energy Inc. (FEI)

Application for Updated Demand Side Management (DSM) Expenditures for the period covering from 2021 to 2022

Pursuant to section 44.2 of the *Utilities Commission Act*, FEI hereby applies to the British Columbia Utilities Commission for acceptance of the attached updated DSM Expenditures covering the period from 2021 to 2022

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Registered parties in the FEI 2019-2022 DSM Expenditures Plan proceeding

FORTISBC ENERGY INC.

Application for Updated Demand Side Management Expenditures for 2021 and 2022

Volume 1 - Application

March 19, 2021

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1. INTRODUCTION

1.1 *OVERVIEW*

In this Application, FortisBC Energy Inc. (FEI) is seeking acceptance pursuant to section 44.2 of the Utilities Commission Act (UCA) of changes to the 2021 and 2022 accepted Demand Side Management (DSM) budgets for the Commercial, Industrial and Innovative Technologies Program Areas and additional expenditures of $2.290 million in 2022, which will allow FEI to pursue new opportunities in the Industrial and Innovative Technologies Program Areas.

FEI is in the final two years of its 2019-2022 Demand Side Management Plan (2019-22 DSM Plan or Plan), which was accepted by the British Columbia Utilities Commission (BCUC) on January 17, 2019 by Order G-10-19 (Decision). Based on FEI's experience in executing the Plan to date and more current information as further described in this Application, markets have changed and new opportunities have arisen in FEI's Industrial and Innovative Technology Program Areas that were not foreseen at the time FEI developed the Plan. As a result, FEI is forecasting more DSM spending in these program areas and requires additional DSM funding to respond to these opportunities. In addition, market factors have contributed to lower forecast DSM spending in the Commercial Program Area and there is an opportunity to reallocate Commercial expenditures to the Industrial and Innovative Technology Program Areas to offset the additional DSM funding required in these areas. Specifically, FEI is requesting BCUC acceptance to decrease funding in the Commercial Program Area and increase funding in the Industrial and Innovative Technology Program Areas, as shown in Table 1-1 below.

The following Table 1-1 sets out the 2021 and 2022 approved DSM Plan expenditures, the revised forecasts, proposed new DSM Plan budgets, and resulting variances for the Commercial, Industrial and Innovative Technology Program Areas, and also shows the total incremental funding required to address FEI's new DSM forecasts in 2022. In 2021, FEI is requesting a decrease to the Commercial Program Area approved budget only in an amount necessary to offset the increases to the Industrial and Innovative Technologies Program Areas. In 2022, FEI is requesting incremental expenditures to the total portfolio expenditures to reflect the increased budgets for Industrial and Innovative Technologies that is not offset by the Commercial Program Area decrease in expenditures.

Table 1-1: 2021-2022 DSM Plan Versus Updated Expenditures

Program Area	Total Utility Expenditures ($000s)*							
	2021				2022			
	DSM Plan (A)	Revised Forecast (B)	Proposed New Budget (C)	Variance (C - A)	DSM Plan (A)	Revised Forecast (B)	Proposed New Budget (C)	Variance (C - A)
Commercial	27,437	19,600	**20,735**	-6,702	31,074	19,800	**19,800**	-11,273
Industrial	3,644	7,913	**7,913**	4,269	3,708	8,462	**8,462**	4,754
Innovative Technologies	2,631	5,064	**5,064**	2,433	3,062	11,871	**11,871**	8,809
Existing		*3,605*				*3,423*		
Deep Retrofits Residential (New)		*1,072*				*2,272*		
Deep Retrofits Commercial (New)		*387*				*6,176*		
Incremental Funding				**0****				**2,290**

** Includes estimated inflation*

*** No overall incremental funding required in 2021*

1.2 *APPROVALS SOUGHT*

FEI is requesting acceptance, pursuant to section 44.2 of the UCA, of a DSM expenditure schedule, as follows:

a. In 2021, revised DSM expenditure budgets of $20.735 million for the Commercial Program Area, $7.913 million for the Industrial Program Area, $5.064 million for the Innovative Technologies Program Area; and

b. In 2022, revised DSM expenditure budgets of $19.800 million for the Commercial Program Area, $8.462 million for the Industrial Program Area, $11.871 million for the Innovative Technologies Program Area, which results in an overall portfolio incremental funding increase of $2.290 million.

A draft order sought is included as Appendix A to this Application.

1.3 *ORGANIZATION OF APPLICATION*

In the following sections FEI provides a summary of its consultation with the Energy Efficiency and Conservation Advisory Group (EECAG) (Section 2), a discussion of how FEI's updated DSM Plan continues to satisfy the legal framework for DSM expenditures in British Columbia (Section 3), an overview of updated 2021 and 2022 DSM expenditure forecasts for all program areas (Section 4), and a detailed description of the Commercial (Section 5), Industrial (Section 6), and Innovative Technologies (Section 7) Program Areas and the developments that have led to FEI's request to revise its DSM Plan for the years 2021 and 2022.

2. ENERGY EFFICIENCY AND CONSERVATION ADVISORY GROUP (EECAG) CONSULTATION

Input from the EECAG was an important consideration for FEI in updating its DSM expenditure forecasts for 2021 and 2022. Discussions with EECAG about the proposed changes to the 2019-22 DSM Plan set out in this Application occurred as part of two online sessions, the first on November 3, 2020 and the second on December 8, 2020. The December 8 session was added to ensure that EECAG members had sufficient time to ask questions and provide input. Notes and presentation materials from the EECAG input sessions are included with this Application as Appendix B.

In preparing for this Application and for discussions with EECAG members, FEI presented updated expenditure and energy savings forecasts for all Program Areas. Some questions from EECAG members explored these forecasts and the extent to which the changes proposed in this Application were impacting the other Program Areas. FEI provided explanations for variances between the latest forecasts and the 2019-22 DSM Plan. FEI also confirmed its intention to file for approval of additional funding in the Industrial and Innovative Technologies Program Areas for 2021 and 2022, transfer funds from the Commercial Program Area, and explained that the changes in Commercial Program Area expenditure expectations are driven by existing market conditions. Finally, a general comment was raised about the efficacy of continued investments in natural gas equipment given the Province's (and global) need to reduce carbon emissions. FEI presented its commitment to reduce customer emissions by 30 percent through 2030 and beyond to help the Province reach its carbon reduction targets and that continued investment in gas equipment and infrastructure is an important part of this vision and goal. FEI's commitment to a 30 percent reduction of customer carbon emissions by 2030 was supported by some EECAG members with encouragement for FEI to consider longer term targets also discussed.

With respect to the Industrial Program Area, EECAG discussion included the position that the relative contribution from the Industrial Program Area to overall DSM funding, energy savings and the overall portfolio TRC is an important consideration and that more information in this regard would be helpful in assessing the proposal. FEI explained the challenges and barriers to industrial participation which have been overcome, creating the opportunity to increase the share of DSM expenditures for Industrial. A number of comments were made by EECAG members in support of the proposed funding changes for the Industrial Program Area and there were no other comments of concern or opposition.

With respect to the Innovative Technologies Program Area, the EECAG discussion included interest in the proposed gas fired heat pump and deep retrofit pilots for which FEI is requesting increased funding. Questions were raised about the efficiency and benefits of gas fired heat pumps compared to electric heat pumps. FEI explained that recent reports showed the technology to be quite promising in terms of efficiency and gas savings and that a pilot project is needed at this stage in order to learn more about the technologies' potential to be part of a diversified and

decarbonized energy future for BC. One EECAG member expressed support for exploring the technology and the use of other gas equipment in a situation where continued demand for gas would be needed to support a switch to renewable gas technologies and supplies. There was also concern expressed that, while more study is needed, increased program expenditures for deep retrofits and heat pumps could impact lower income customers and renters through rates, and that efforts need to be maintained to ensure fair access to benefits of DSM for these groups. A number of EECAG members supported the inclusion of the gas fired heat pump technology pilot in order to learn more about the technology and the potential it offers. FEI received no comments opposing the pilot or raising additional concerns other than those described above. Ideas were brought forward that FEI will consider in designing the pilot study.

Finally, there was strong interest in and support for the deep energy retrofit pilot. There was fairly broad agreement that deep energy retrofits will be an important part of a decarbonized energy future and that there is much to study in order to achieve successful programming in the future. Discussion points included study design, technical clarifications and questions, and marketplace considerations that will help to inform pilot design work. A number of EECAG members expressed support for the higher expenditure proposal. FEI received no comments opposing the pilot or raising concerns other than those discussed above. Please note that since the EECAG consultation, new information with respect to time estimates and budgets was received. This has pushed the construction dates to subsequent years resulting in an overall reduction of forecast deep energy retrofit commercial budgets for both 2021 and 2022. Those updated values are reflected in this Application.

3. LEGAL FRAMEWORK

FEI's 2019-22 DSM Plan was filed and accepted pursuant to section 44.2(1)(a) of the UCA. The proposed changes to the final two years of the 2019-2022 DSM Plan, as set out below, update the approved 2019-22 DSM Plan to reflect market conditions that were not anticipated at the time of development. The updated 2019-22 DSM Plan for the years 2021 and 2022 continues to meet the criteria for BCUC acceptance set out in section 44.2(5) of the Act as set out below.

- Consistency with British Columbia Energy Objectives

  The proposed changes to the final years of the 2019-22 DSM Plan continue to support the applicable energy objectives as set out in Table 3-1 of the 2019-22 DSM Plan. In particular, FEI's proposed changes to the Innovative Technology Program Area further supports BC Energy Objective (d) to use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources;

- Consistency with Long Term Gas Resource Plan

  FEI's 2017 Long Term Gas Resource Plan (LTGRP) projects that, as part of a long term plan for implementing DSM activities, FEI will continue to perform residential, commercial, industrial, low income, innovative technologies, conservation education and outreach as well as enabling DSM activities. The updates to the 2019-22 DSM Plan remain consistent with the 2017 LTGRP.

- Adequacy pursuant to the DSM Regulation

  The updates to the 2019-22 DSM Plan do not impact the adequacy of the Plan pursuant to section 3 of the DSM Regulation. As shown in Table 4-3 below, the DSM Plan remains cost-effective.

- Interests of Persons Who May Receive Service

  The proposed updates to DSM expenditures in 2021 and 2022 are in the interests of customers and potential customers as they reflect the current opportunities in the marketplace to encourage energy efficiency and conservation and reduce GHG emissions. These proposed updates are beneficial to the economy and are cost-effective.

4. UPDATED 2021 AND 2022 DSM EXPENDITURES AND SAVINGS

FEI engaged ICF Canada to provide an update to the final two years of FEI's 2019-22 DSM Plan. ICF's DSM Plan 2021-2022 Update Report is provided as Appendix C and a summary of the new forecasts is provided in Table 4-1 below.

Table 4-1: 2021 & 2022 Program Area Expenditures – Plan vs Revised Forecast

Program Area	Total Utility Expenditures ($000s)*					
	2021			2022		
	DSM Plan	Revised Forecast	Variance	DSM Plan	Revised Forecast	Variance
Residential	28,476	30,108	106%	31,383	30,501	97%
Commercial	27,437	19,600	71%	31,074	19,800	64%
Industrial	3,644	7,913	217%	3,708	8,462	228%
Low Income	6,984	7,125	102%	7,217	7,469	103%
Conservation Education and Outreach	8,578	8,077	94%	9,433	9,229	98%
Innovative Technologies	2,631	5,064	192%	3,062	11,871	388%
Enabling Activities	9,231	9,112	99%	8,921	8,371	94%
Portfolio Level Activities	1,822	1,822	100%	1,979	1,979	100%
ALL PROGRAMS	**88,803**	**88,822**	**100%**	**96,775**	**97,682**	**101%**

**Includes estimated inflation*

FEI is requesting changes to the Commercial, Industrial, and Innovative Technologies Program Areas only in this Application. As discussed in section 5 below, the decreased forecast for the Commercial Program Area primarily reflects lower than expected program uptake of certain measures and anticipated lingering impacts from the COVID-19 pandemic. As discussed in sections 6 and 7 below, the increased forecasts for the Industrial and Innovative Technologies program areas reflect new opportunities that have emerged, including new programs.

The new forecasts in the other program areas reflect updated forecasts based on program experiences to date and current anticipated market uptake, and the variances from the DSM Plan are minor. Therefore, FEI expects to address any variances above Plan in these areas at the end of each year by transferring from any program areas below Plan. As FEI expects to address the variances through inter-program transfers within the 25 percent threshold of the Funding Transfer Rules, FEI is not seeking acceptance of new expenditures for these other program areas.

FEI notes, however, that there was higher than expected interest in the residential time-limited double rebates campaign that ran from October to December 2020 as part of the Company's COVID-19 customer support initiatives. At this time, FEI is not able to determine the full extent of the impact to the expenditure levels for the Residential Program Area in 2021; however, the Company will bring forward a separate application for increased funding if required.

Based on the updated forecast expenditures, FEI's updated projected savings for 2021 and 2022 are set out in Table 4-2.

Table 4-2: 2021 & 2022 Program Area Energy Savings – Plan vs Projection

Program Area	Incremental Annual Gas Savings, Net (GJ)					
	2021			2022		
	DSM Plan	Revised Forecast	Variance	DSM Plan	Revised Forecast	Variance
Residential	300,891	257,763	86%	328,860	270,879	82%
Commercial	418,482	388,041	93%	478,288	381,421	80%
Industrial	316,955	458,769	145%	316,955	466,317	147%
Low Income	77,141	69,422	90%	77,707	73,495	95%
Conservation Education and Outreach	Savings Not Estimated			Savings Not Estimated		
Innovative Technologies	Savings Not Estimated			Savings Not Estimated		
Enabling Activities	Savings Not Estimated			Savings Not Estimated		
Portfolio Level Activities	Savings Not Estimated			Savings Not Estimated		
ALL PROGRAMS	**1,113,469**	**1,173,995**	**105%**	**1,201,809**	**1,192,112**	**99%**

Table 4-3 shows that, with the requested funding increases for Industrial and Innovative Technologies, the Portfolio is projected to remain cost effective.

Table 4-3: 2021 & 2022 Portfolio Level Cost Effectiveness Based on Revised Expenditure Projections

Portfolio	2021 Projected		2022 Projected	
	TRC	MTRC	TRC	MTRC
All Programs / Expenditures	1.2	1.8	1.1	1.7

5. COMMERCIAL PROGRAM AREA

5.1 BACKGROUND

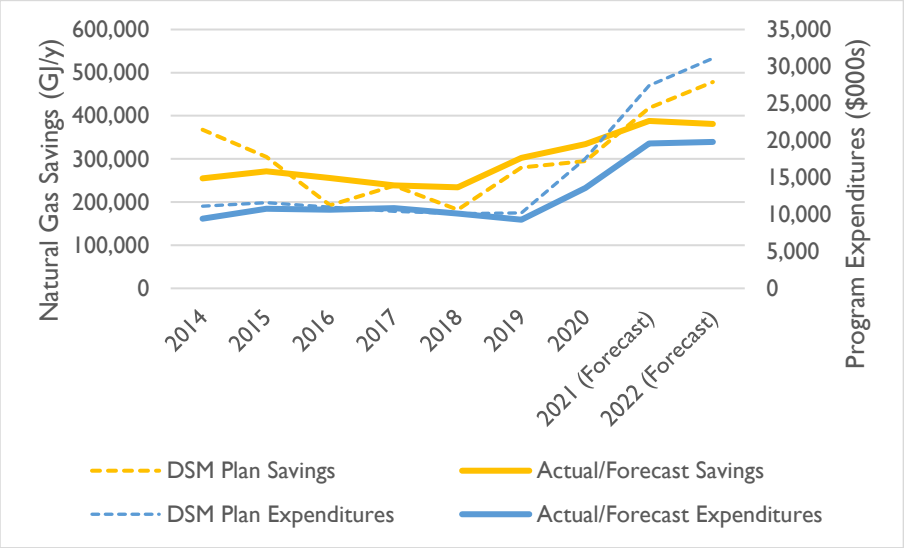
Energy conservation measures in the Commercial Program Area have been grouped into the following program areas, which encompass measures that are broadly similar both in terms of what they offer customers and how they are delivered to the market:

1. **Performance Program – Existing Buildings**: This program includes measures that allow **customers** to identify, assess and implement custom designed energy efficiency retrofit projects.
2. **Performance Program – New Buildings**: This program includes incentives to encourage customers to design and construct high-performance commercial buildings.
3. **Prescriptive Program**: This program includes prescriptive incentives to encourage the implementation of energy efficiency natural gas equipment for specific industrial processes.
4. **Rental Apartment Efficiency Program**: This is a comprehensive program offering energy assessments, implementation support and direct install efficiency measures at purpose-built rental buildings.

5.2 RECENT DEVELOPMENTS

From 2014 through 2020 the Commercial Program Area achieved or nearly achieved planned expenditures and savings and continues to experience year over year growth. Figure 5-1 below shows actual and forecast savings and expenditures for the period 2014 through 2022 for the Commercial Program Area compared to approved Plan amounts for the same time period. Figure 5-1 demonstrates that Commercial Program Area expenditures and savings are expected to continue to increase in 2021 and 2022 compared to actual expenditures through 2014 to 2020, even though FEI is currently forecasting that expenditures and savings will fall below the approved 2019-22 Plan levels.

Figure 5-1: FEI Commercial DSM Program Expenditures and Savings



The main factors driving the lower than originally forecast commercial expenditures and savings in 2021 and 2022 are as follows:

- FEI has experienced lower than expected participation in the Prescriptive Program furnace replacement and kitchen incentive offers due to lower market demand. This trend is expected to continue in 2021 and 2022;
- FEI did not launch a commercial roof insulation offer in the Prescriptive Program due to lower than anticipated cost-effectiveness of the measure. FEI is looking to incorporate this measure into a future Deep Energy Retrofit program where building envelope upgrades can be looked at comprehensively and potentially achieve improved economies of scale;
- FEI is forecasting lower than expected participation in the Performance Program – New Buildings offer due to lower than anticipated building starts completing in 2021 and 2022 using natural gas as the primary fuel for space heating and/or ventilation; and
- FEI has experienced lower than expected participation in the Rental Apartment Efficiency Program due to restricted on-site activities at some buildings due to COVID-19 and lower than anticipated demand from small property management companies. This trend is expected to continue in 2021 and 2022.

Since 2018, FEI expenditures on commercial program incentives have increased from approximately $8.2 million in 2018 to approximately $11.2 million in 2020. The current forecast for commercial customer incentive expenditures in 2022 is approximately $19.8 million in 2022, a 241 percent increase over 2018. FEI has been and will continue to assess the commercial energy

efficiency marketplace and identify opportunities to improve commercial programming and increase commercial program participation and energy savings.

5.3 *COMMERCIAL PROGRAM AREA FUNDING*

Table 5-1 presents the forecast expenditures from 2021 to 2022 by program, including both incentive and non-incentive expenditures. Non-incentive expenditures include expenses related to labour, measurement and verification, evaluation, and related administrative expenses.

Table 5-1: 2021-2022 Commercial Program Area Expenditures by Program

	Utility Expenditures $(000s)*						
	DSM Plan			Revised Forecast			Variance
	Incentive	Non-Incentive	Total	Incentive	Non-Incentive	Total	
Program	**2021**						
Prescriptive Program	12,045	3,046	15,091	7,100	800	7,900	52%
Performance Program - Existing Buildings	2,170	566	2,736	6,200	500	6,700	245%
Performance Program - New Buildings	6,127	1,436	7,563	3,000	300	3,300	44%
Rental Apartment Efficiency Program	1,015	256	1,270	600	300	900	71%
Non-Program Specific Expenses	0	813	813	0	800	800	98%
ALL PROGRAMS	**21,356**	**6,117**	**27,473**	**16,900**	**2,700**	**19,600**	**71%**
Program	**2022**						
Prescriptive Program	14,431	3,653	18,084	6,500	700	7,200	40%
Performance Program - Existing Buildings	2,373	582	2,955	5,700	600	6,300	213%
Performance Program - New Buildings	6,395	1,461	7,856	4,000	500	4,500	57%
Rental Apartment Efficiency Program	1,021	252	1,273	650	350	1,000	79%
Non-Program Specific Expenses	0	906	906	0	800	800	88%
ALL PROGRAMS	**24,220**	**6,854**	**31,074**	**16,850**	**2,950**	**19,800**	**64%**

*Including estimate of inflation

Additional information on projected energy savings and cost effectiveness for the Commercial Program Area is included in Appendix C.

6. INDUSTRIAL PROGRAM AREA

6.1 *BACKGROUND*

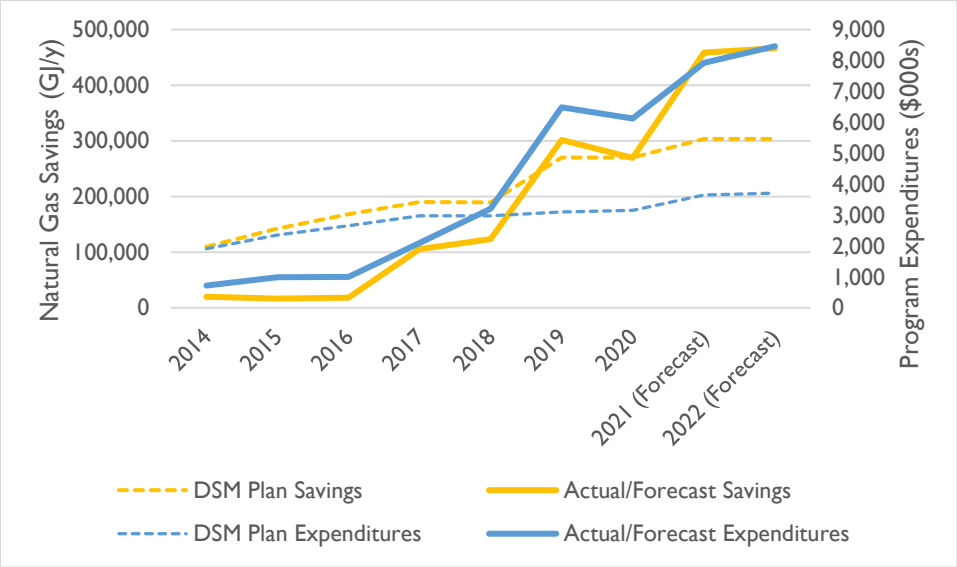
The Industrial Program Area offers three programs to support energy efficiency projects for customers that use natural gas as part of their industrial processes (processes that transform materials into a saleable product):

1. **Performance Program**: This program includes measures that allow customers to identify, assess and implement custom designed energy efficiency projects.
2. **Prescriptive Program**: This program includes prescriptive incentives to encourage the implementation of energy efficient natural gas equipment for specific industrial processes.
3. **Strategic Energy Management Program**: This is a comprehensive program offering for large natural gas industrial customers to provide energy modeling, energy efficiency coaching and strategic planning support to promote both operational savings projects and larger capital retrofits.

The Industrial Program Area launched in 2010 with a relatively modest budget of $1.766 million. From 2014 through 2017 the Industrial Program Area experienced lower than forecast participation. In 2017, FEI revised the structure of the Performance Program and significantly expanded the Prescriptive Program offerings. The Industrial Program Area began seeing a notable increase in program participation beginning in 2018. FEI reflected the increased program participation in 2018 in the development of the 2019-22 DSM Plan Industrial Program Area forecasts.

Figure 6-1 below compares the actual and forecast Industrial savings and expenditures for 2014 through 2022 against the approved DSM Plan savings and expenditures. Figure 6-1 shows the low participation in the years 2014 through 2017, the increased participation in years 2018 through 2020 where actual amounts begin to grow to exceed approved DSM Plan amounts, and 2021 and 2022 where this trend is forecast to continue.

Figure 6-1: FEI Industrial DSM Program Expenditures and Savings



In developing the 2019-22 DSM Plan, FEI forecast a modest increase, year-over-year, from the 2018 industrial expenditures. In addition, FEI forecast a moderate increase in Industrial Program Area savings associated with the launch of the Strategic Energy Management Program.

Industrial programs in 2019, in particular the Prescriptive and Performance Programs, saw unanticipated increases in program participation from previous years. FEI consulted with EECAG members and filed a request for acceptance from the BCUC to transfer funds from the Residential and Commercial Program Areas to the Industrial Program Area that were in excess of 25 percent of total 2019 Industrial approved expenditures in order to meet this customer demand. FEI received approval to transfer funds into the Industrial Program Area from the BCUC pursuant to Order G-273-19 (as shown in the Approved line in Table 6-1 below).

In 2020, FEI's industrial programs experienced similar demand as in 2019. FEI again consulted with EECAG members and filed a request for acceptance from the BCUC to transfer funds from other Program Areas to the Industrial Program Area that were in excess of 25 percent of total 2020 Industrial approved expenditures in order to meet this customer demand. FEI received approval from the BCUC pursuant to Order G-286-20 (as shown in the Approved line in Table 6-1 below).

The following table sets out the Industrial Program Area 2019-22 DSM Plan expenditures and savings for the first two years of the 2019-22 DSM Plan, both as originally approved and after the approved increases, compared to actual performance for those years.

Table 6-1: 2019-2020 Industrial Program Area Expenditures

		2019	2020
		Industrial Program Area	
Expenditures ($000s)	DSM Plan	3,103	3,133
	Approved	6,543	6,278
	Actual	6,481	6,124
	% Variance from DSM Plan	209%	195%
	% Variance from Approved	99%	98%
Incremental Annual Gas Savings (GJ/y)	DSM Plan	269,863	269,863
	Actual	301,668	269,354
	% Variance from DSM Plan	112%	100%

Additional information about the Industrial Program Area is included in Appendix C.

6.2 *RECENT DEVELOPMENTS*

As stated above, the Industrial program participation is forecast to continue to increase in 2021 and 2022 and requires an increase in the budget for those years. The request to increase Industrial expenditures for 2021 and 2022 is primarily due to the following developments since the 2019-22 DSM Plan was filed and accepted:

- The market uptake of industrial incentives in the Industrial Prescriptive Program (primarily steam boilers, unit heaters, thermal screens, and insulation) is expected to continue on an activity level similar to what was experienced in 2019 and 2020. Key contractors and industry partners have promoted FEI's prescriptive rebate offers to their customers more than was originally forecast in the 2019-22 DSM Plan.
- In the Industrial Performance Program, the most notable activities expected to drive higher expenditures than was originally forecast in the 2019-22 DSM Plan for 2021 and 2022 include:
    - A greater than expected number of projects completing construction and energy savings verification in 2021 and 2022 (incentives committed in 2019 and 2020) and then receiving the performance based rebate portion;
    - Continued growth in repeat customers who participated in the past and engaged in the program for further upgrades or upgrades in other plants they operate. Repeat customers were not anticipated in the 2019-22 DSM Plan;
    - Increased engagement with the BC energy consultant community to market our industrial DSM programs to key influencers; and
    - General interest in the industrial sector to increase efficiency and reduce greenhouse gas (GHG) emissions.
- Strategic Energy Management program participants have been applying for additional Industrial Prescriptive and Performance Program incentives beyond original expectations. This trend was consistent through 2019 and 2020, and is expected to continue.

6.3 *INDUSTRIAL PROGRAM AREA FUNDING*

Table 6-2a and 6-2b present the forecast expenditures and savings for 2021 and 2022 by program, including both incentive and non-incentive expenditures. Non-incentive expenditures include expenses related to labour, measurement and verification, evaluation, and related administrative expenses.

Table 6-2a: 2021-2022 Industrial Program Area Expenditures by Program

	Utility Expenditures $(000s)*						
	DSM Plan			Revised Forecast			% Variance
	Incentive	Non-Incentive	Total	Incentive	Non-Incentive	Total	
Program	**2021**						
Performance Program	1,812	390	2,203	4,297	351	4,648	211%
Prescriptive Program	473	112	585	2,503	110	2,613	447%
Strategic Energy Management Program	456	213	669	329	145	474	71%
Non-Program Specific Expenses	0	187	187	0	190	190	102%
ALL PROGRAMS	**2,742**	**902**	**3,644**	**7,129**	**796**	**7,925**	**217%**
Program	**2022**						
Performance Program	1,804	389	2,211	4,294	369	4,663	211%
Prescriptive Program	505	120	608	3,004	116	3,120	513%
Strategic Energy Management Program	453	211	673	345	152	497	74%
Non-Program Specific Expenses	0	227	212	0	179	179	85%
ALL PROGRAMS	**2,762**	**946**	**3,708**	**7,643**	**816**	**8,459**	**228%**

*Including estimate of inflation

Table 6-2b: 2021-2022 Industrial Program Area Annual Gas Savings by Program

	Incremental Annual Gas Savings, Net (GJ)		
Program	DSM Plan	Revised Forecast	% Variance
Program	**2021**		
Performance Program	115,957	282,656	244%
Prescriptive Program	91,513	120,112	131%
Strategic Energy Management Program	96,000	56,000	58%
Non-Program Specific Expenses	0	0	
ALL PROGRAMS	**303,470**	**458,768**	**151%**
Program	**2022**		
Performance Program	115,957	266,029	229%
Prescriptive Program	91,513	144,288	158%
Strategic Energy Management Program	96,000	56,000	58%
Non-Program Specific Expenses	0	0	
ALL PROGRAMS	**303,470**	**466,317**	**154%**

7. INNOVATIVE TECHNOLOGIES PROGRAM AREA

7.1 *BACKGROUND*

The Innovative Technologies Program Area evaluates both pre-commercial and commercially available technologies and conducts pilot studies to validate manufacturers' claims related to equipment and system performance. The program area also assesses actual savings and customer acceptance of these newer technologies or systems of technologies. Technologies that successfully emerge from the Innovative Technologies Program Area are considered for inclusion within the applicable sector programs that form the larger C&EM portfolio. Examples of technologies that have become program offers include condensing tankless and storage water heaters, combined space and water heating systems, high efficiency fireplaces, condensing make up air units, smart learning thermostats, and recirculation demand controls among others.

Table 7-1 below compares the original 2019-22 DSM Plan amounts to FEI's proposed expenditure amounts, including for new programs, for 2021 and 2022.

Table 7-1: 2021-2022 Innovative Technologies Program Area Expenditures by Activity Area

Activity Area	Utility Expenditures ($000s)*							
	2021				2022			
	DSM Plan	Revised	Variance		DSM Plan	Revised	Variance	
Technology Screening	657	838	181	128%	662	851	189	129%
Pilot Project Expenditures	1,851	2,582	731	139%	2,276	2,447	171	108%
Deep Retrofits - Residential (New)	NA	1,072	1,072	NA	NA	2,272	2,272	NA
Deep Retrofits - Commercial (New)	NA	387	387	NA	NA	6,176	6,176	NA
Non-Program Specific Expenses	123	185	62	150%	124	125	1	101%
TOTAL Innovative Technologies	***2,631***	***3,605***	***974***	***137%***	***3,062***	***3,423***	***361***	***112%***
TOTAL Deep Retrofits		***1,459***	***1,459***			***8,448***	***8,448***	
TOTAL	**2,631**	**5,064**	**2,433**	**192%**	**3,062**	**11,871**	**8,809**	**388%**

**Includes estimated inflation*

The following sections summarize recent market developments in this area and detail the proposed new programs and changes to existing programs to take advantage of new opportunities that were not foreseen at the time FBC developed the 2019-22 DSM Plan.

7.2 *RECENT DEVELOPMENTS*

The request to increase Innovative Technologies expenditures for 2021 and 2022 is primarily due to the following developments since the 2019-22 DSM Plan was filed and accepted:

- The drive for development and commercialization of innovative natural gas appliances that can significantly reduce GHGs, such as gas heat pumps, has been greater than anticipated due to federal, provincial and local government policies and industry drivers across North America.

- There has been an increased interest beyond what was originally anticipated from local governments and other stakeholders in pursuing deep retrofits that include a combination of window, envelope and mechanical upgrades to dramatically reduce GHG emissions within the existing building stock.

The following sections provide more detail on these developments, including the energy savings potential, key drivers supporting the request and detailed budgets.

7.2.1 Technology Screening, Pilot Project Expenditures and Non-Program Specific Expenditures

The increase in funding for these areas is primarily driven by Gas Fired Heat Pump (GHP) technology. GHPs have the potential to significantly reduce energy use and GHG emissions for both space and water heating applications across residential and commercial markets. The technology is also suitable for both retrofit and new construction applications across a variety of building types. According to research conducted by Posterity Group (an energy efficiency engineering consultant organization), the energy savings potential of gas heat pumps across FEI's service territory is approximately 500,000 GJ per year attributed to equipment with efficiencies ranging from a 1.07 to 1.4 coefficient of performance (COP). FEI pilot trial data has also shown that gas heat pumps can maintain efficiencies greater than 100 percent throughout the year, even in cold temperatures. These efficiencies are particularly promising given the aspirational goals of the Pan-Canadian Framework on Clean Growth and Climate Change that require that all space and water heating technologies perform with efficiencies greater than 100 percent by 2035[1]. Although electric resistance heating is 100 percent energy efficient, natural gas fired appliances with this performance level are either not commercially available today or have a low adoption rate.

Over the last year, there has been strong momentum across North America to support the commercialization of gas heat pumps, resulting in a greater opportunity for FEI to support advancement of this technology more quickly for use in British Columbia than was previously anticipated. FEI is participating in both the North American Gas Heat Pump Collaborative (a group of 13 utilities across the US and Canada) and Natural Resources Canada's Water & Space Heating Market Transformation Expert Working Group (a collection of manufacturers, utilities and industry subject matter experts supporting the Pan-Canadian Framework's aspirational goals). Both of these groups share the objective to accelerate the commercialization and market acceptance of GHPs and contribute to support state, federal, provincial and local government GHG reduction plans.

This has led to several original equipment manufacturers (OEMs) prioritizing the development and expansion of gas heat pumps across the North American market, requiring field demonstrations, funding for lab testing as well as working groups identifying market transformation activities that were not identified at the time of developing the 2019-22 DSM Plan.

[1] https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Market-Transformation-Strategies_en.pdf.

The Decision accepted $2.6 million and $3 million in expenditures for 2021 and 2022 for the Innovative Technology Program area in the areas of Market Transformation, Pilot Project Expenditures and Non-Program Specific Expenditures. FEI is requesting an additional $974 thousand in 2021 and $361 thousand in 2022 to support both technology screening and pilot project expenditures related to the market transformation of GHPs as outlined in Table 7-1.

7.2.2 Deep Retrofits (Residential and Commercial)

A deep energy retrofit or 'deep retrofit' of a home or building is a retrofit in which the envelope and mechanical systems are improved such that there is a reduction in overall energy and GHG performance by at least 30 percent or more. Across FEI's service territory there is a significant base of buildings that are at least 25 years old and were built before the adoption of the National Energy Code for Buildings. These buildings are considered to be ideal candidates for deep retrofits. According to research conducted by Posterity Group, half of gas-heated, pre-1995 buildings in both single-family and multi-unit residential segments may be suitable candidates for a deep retrofit. This includes approximately 274 thousand dwellings, representing 26 petajoules of annual gas consumption. The energy savings potential of deep retrofits across FEI's service territory is 890,000 GJ per year.

Since development of the 2019-22 DSM Plan, deep retrofits have been identified as a key GHG reduction opportunity by provincial, federal and local governments. A deep retrofit approach encourages a comprehensive "home-as-a-system" or "building-as-a-system" approach, potentially leading to more comprehensive energy and GHG savings. From a program perspective, a Deep Energy Retrofit approach may allow FEI to achieve deeper engagement and higher levels of cost-effective savings.

FEI has identified several potential benefits of a deep retrofit approach;

- To demonstrate the viability of such an approach as a means of de-risking future projects, especially in the municipal space;
- A means to move away from "one-off" rebate transactions with participants and toward a more comprehensive, flexible and ultimately sustainable approach;
- An opportunity to build experience and capacity ahead of developing FEI's next DSM expenditure plan, where deep retrofit programs could play a significant role; and
- As a means to address customer interest in more comprehensive projects.

FEI is requesting increased funding to support pilot-scale deep retrofits across residential and commercial rate customers to identify whether it is feasible and cost-effective to move a broader initiative forward. The pilot program will determine the practicality of a deep retrofit approach in BC.

8. CONCLUSION

FEI submits that its requested changes to the final two years of the 2019-22 DSM Plan are required given the changes in the current DSM environment. FEI has demonstrated that the changes to its 2021 and 2022 DSM expenditure levels are in response to market demand and still result in a cost-effective DSM Portfolio. Finally, FEI has discussed these proposed changes with EECAG, considered their feedback in preparing this Application and believes there is general support from EECAG members. For these reasons FEI submits that its propose DSM expenditure schedule is in the public interest and should be accepted by the BCUC.

Appendix A
DRAFT ORDER

bcuc
British Columbia
Utilities Commission

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ORDER NUMBER
G-xx-xx

IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

FortisBC Energy Inc.
2019-2022 Demand Side Management Expenditures Plan –
Request for Acceptance of Industrial Expenditures Budget Transfer for 2020

BEFORE:
[Panel Chair]
Commissioner
Commissioner

on Date

ORDER

WHEREAS:

A. On January 17, 2019, the British Columbia Utilities Commission (BCUC) issued its decision by way of Order G-10-19 in the FortisBC Energy Inc. (FEI) Application for Acceptance of 2019-2022 Demand Side Management (DSM) Expenditures Plan (2019-22 DSM Plan) proceeding, approving, among other things, FEI's request that funding transfers follow the same process as was established in the FEI 2012 and 2013 Revenue Requirements and Natural Gas Rates Decision;

B. On March 19, 2021, FEI filed an application to update DSM forecasts and request changes to the approved expenditure budgets for the Commercial, Industrial and Innovative Technologies Program Areas for the final two years of the 2019-22 DSM Plan (the Application).

C. The Application requests acceptance of revised DSM expenditure budgets for 2021 of $20.735 million for the Commercial Program Area, $7.913 million for the Industrial Program Area, $5.064 million for the Innovative Technologies Program Area and revised 2022 DSM expenditure budgets of $19.800 million for the Commercial Program Area, $8.462 million for the Industrial Program Area, $11.871 million for the Innovative Technologies Program Area, which results in an overall portfolio incremental funding increase of $2.290 million.

D. The BCUC has reviewed the Application and finds that approval is warranted.

NOW THEREFORE, pursuant to section 44.2 of the *Utilities Commission Act*, the BCUC orders as follows:

1. The revised 2021 expenditure budgets for the Commercial Program Area of $20.735 million, Industrial Program Area of $7.913 million and the Innovative Technologies Program Area of $5.064 million are accepted.

2. The revised 2022 expenditure budgets for the Commercial Program Area of $19.800 million, Industrial Program Area of $8.462 million and the Innovative Technologies Program Area of $11.871, resulting in an overall portfolio incremental funding increase of $2.290 million are accepted.

DATED at the City of Vancouver, in the Province of British Columbia, this (XX) day of (Month Year).

BY ORDER

(X. X. last name)
Commissioner

Appendix B

ENERGY EFFICIENCY AND CONSERVATION ADVISORY GROUP CONSULTATION MEETING NOTES AND PRESENTATION

FORTIS BC™

Confidential: Please do not share this information beyond EECAG members at this time as it may contain sensitive market information.

FortisBC Energy Efficiency & Conservation Advisory Group (EECAG)

November 3, 2020 Session Notes

Session Objectives:
1. Seek EECAG input on proposed 2021 and 2022 portfolio funding and increases for the Industrial and Innovative Technologies program areas.

2. Provide EECAG with an overview of FortisBC's Clean Growth Pathway and Guidehouse Energy Pathways report to help better understand the various lower carbon pathways that make sense for BC's 2050 climate targets.

Agenda

9:00 am	Welcome, Introductions & Agenda Overview
9:30 am	Energy Pathways Report Presentation (Tyler Bryant)
10:30 am	Break
10:45 am	2021 and 2022 Portfolio Funding: ● Industrial DSM Program Area Funding Increase (James Allen) ● Innovative Technologies DSM Program Area Funding Increase (Jim Kobialko)
11:55 am	Next steps

EECAG Attendees

- Jeff Fisher, Urban Development Institute
- Conor Reynolds, Metro Vancouver
- Tom Hackney, BC Sustainable Energy Association
- Ian Cullis, BC Non-Profit Housing Association
- Phil Stallard, BC Utilities Commission
- Nicola Simon, BC Utilities Commission
- Peter Love, York University/Love Energy Consultants Inc.
- Carmen Proctor, Nelson Hydro/City of Nelson
- Leigha Worth, BC Public Interest Advocacy Centre
- Katherine Muncaster, BC Ministry of Energy, Mines & Petroleum Resources
- Fabian Navarro, BC Housing
- Tom-Pierre Frappé-Sénéclauze, Pembina Institute
- David Craig, Commercial Energy Consumers
- Madi Kennedy, Pembina Institute (Guest)

EECAG Discussions and Additional Follow-up Information from FortisBC Where Applicable

The Power Point slides presented for each topic are attached to these notes. These notes are not intended to recap the presentations, rather capture the questions and comments raised by EECAG members and the responses from FortisBC staff.

Topic: Opening Remarks from Danielle

Following the welcome and presentation of the session objectives and agenda, by the independent facilitator, Danielle Wensink welcomed/thanked EECAG Members and provided an update on the preparation/submission of the 2020 Industrial Program Area funding transfer request to the BC Utilities Commission (BCUC). It was noted the period for comments from interested parties into that process was ending on November 4th and that if Members had further questions or wished to provide comments and were unsure of the process, they could call Ken Ross.

Additional Update: The Commission approved FortisBC's application to transfer funding into the Industrial Program Area above 25% of the 2019-2022 DSM Plan amount on November 6, 2020.

Topic: Guidehouse (Navigant) Energy Pathways Report

Question/comment: Why is BC Hydro's Site C seen as the bench mark for peak electricity capacity cost.

Response: Navigant felt large hydroelectric would be lowest cost peak resource. It was not the intention to say this would be the pathway, but it was a conservative approach to costing the pathway. Other variable resource options were examined but it was found that their implementation would widen the cost difference between the Pathways studied. Also this is just for the peak supply analysis. Numerous other resources were modelled being built to meet annual energy need. These could not on their own solve the peak supply issue.

Question/comment: Can you discuss why the proportion of renewable gas is so much smaller in the electric pathway?

Response: Both pathways have all policies of CleanBC in them (i.e. 15% RNG) but in the electrification pathway that is the maximum RNG modelled as the modelling for this pathway relies on electrification. Adding more RNG reduces the need for peak electricity supply resources.

Question/comment: It is interesting that carbon capture and storage (CCS) was included in the study. What context of CCS has been modelled? You might further consider how this technology could be employed by large energy users. There is a 'District 2030 Group' in the Greater Toronto Area looking at similar pathways although so far have not developed their study to the same extent.

Response: CCS was modelled as an upstream solution to reduce complexity, but it is an important technology that FortisBC is looking at to understand better the role it can play.

Question/comment: Can you speak more to the assumed technology advancements in the diversified pathway--hydrogen, CCS, Natural Gas Heat Pumps (NGHP), Renewable Natural Gas (RNG) from wood and the cost assumptions?

Response: There is more work to be done on various technologies in both pathways in order to achieve the targets. Both pathways involve technology innovation. Navigant looked at various hydrogen studies (including the BC Carbon study and Europe). The technology of generating hydrogen is proven but there are still a lot of unknowns around injecting it into the natural gas distribution system. We were quite conservative with this in the study. RNG from wood is proven, we have a project underway. NGHP technology works but has not been widely commercialized yet. FortisBC has innovation funding that has

been approved by the BCUC and FortisBC will use the funding to investigate these types of technologies more fully and where possible, help move some of them forward in BC.

Question/comment: Generally agree with the framework. Looking at a 100% target suggests that we will need more RNG. Challenge the second bullet (slide 16) – we don't really know what these technologies will cost – the difference is likely within the uncertainty band. Encourage a price sensitivity analysis. Can you talk more to this production and distribution of RNG – what does this future look like?

Response: Accurately predicting costs over the longer term future is a challenge for any long range planning exercise. We have to use the best tools and information we have and extend them forward to show the feasibility of the pathways. Sensitivities were conducted as shown in the 'Navigant (Guidehouse) slide titled Sensitivities on Key Cost Assumptions Could Narrow the Cost Differential By Up To $38 Billion Or Widen By Up To $31 Billion'.

Question/Comment: Why are we not more aggressive with RNG Resource Development?

Response: FortisBC is working hard on RNG and will be very assertive in expanding the supply portfolio. FortisBC has a hard cap today and wants to use it for its best use. FortisBC also wants to talk to stakeholders about revisiting the cap.

Question/Comment: It is important to understand who pays the costs and who realizes the benefits in each of the pathways, and whether or not the benefits end up in BC or elsewhere. Agree that we have to be careful about the costs assumptions – Appreciate that it is not either/or, rather it is both/and… Are there different ways to direct the use of RNG to sectors or geographic areas and electrify other sectors or regions – was this taken into account? Also, that framing assumes we are trying to minimize costs. I think we need to challenge that assumption. Sometimes the most stimulated economy is not one where you try to minimize costs.

Response: Agree that the costs and distribution of the costs and benefits are important. Some suggest that RNG will be best used in buildings but we don't see it that way. It's misguided to say the building sector is easy to electrify – especially for retrofits where the cost and practical feasibility has not been considered. Coming back to costs, the study of future pathways needs to have some type of tether to what we know and have now. The information from the study is needed to inform a prudent approach to developing the policy regime. As we move forward and gain more knowledge we will revisit and revise.

Question/Comment: Does the study assume that electrification is in new construction?

Response: Yes

Question/Comment: This is really import work and good quality. An important aspect of this beyond the costs are the resiliency benefits – which have a lot of value. Do you have a variable that you have studied that considers the degree to which we can get more energy conservation through building design and retrofitting? Would love to collaborate and share some info we have on retrofitting.

Question/Comment:: Agree - it is a huge concern to residential ratepayers that FEI look to the future.

Question/Comment:: Agree - we need to ensure that the system is resilient and that building design needs to minimize consumption.

Response: We are undertaking some additional analysis to get more info on [gas] heat pumps and deep energy retrofits to get a better sense of where we can get energy savings/emission reductions from these technologies/activities.

The independent facilitator, in order to move the session on to the next topic, asked that further discussion on this topic be held and suggested a follow up session in order to continue the discussion of the Pathways report. FortisBC confirmed that it would conduct a follow up session on this topic.

Topic: 2021-2022 DSM Portfolio Forecast Overview

Question/Comment: Why is FortisBC not expecting the Residential Program Area to perform according to the current Plan in 2022?

Response: The New Home program in particular is not performing as expected when the current DSM Plan was developed. The current DSM Plan was also fairly aggressive so we have backed it off a little. Expectations for the Residential Program Area is still quite close to the current Plan.

Topic: 2021-2022 FEI Proposed Industrial Funding Allocation

Question/Comment: Why are energy savings for apartments lower than expected and what is FortisBC doing to counter-act?

Response: The biggest reason for the lower than planned savings in the Rental Apartment Program is COVID19. Of course there is less appetite among customers to let contractors into their home and of course for FortisBC it is all about keeping customers and staff safe. FortisBC instituted safety measures including not entering residences and businesses and being careful to avoid multiple contacts in a building especially in specific building types (care homes, etc.). Since these restrictions covered such a big portion of the year, savings are down substantially. More recently we have a re-integration strategy under strict safety protocols to enter where it is deemed safe, but for now we have to watch conditions and restrictions carefully.

Question/Comment: Going back to the Pathways presentation, it showed a decrease in the amount of gas to the building sector that is needed to meet targets. Why invest in natural gas equipment for new buildings?

Response: At this time customers have the choice. We do not use DSM funding to encourage fuel selection. For DSM programs we look at what the energy demand is and we look for opportunities to ensure that if they are choosing natural gas that it is the most efficient. Based on the Conservation Potential Review, there are potential energy savings in this market and there is still a demand for natural gas systems in buildings. The Pathways report shows there are pathways other than just electrification to reduce GHG emissions.

Question/Comment: What is the conservation potential in the industrial versus the residential and commercial sectors? I expect that the TRC is quite high but I am not seeing that information. Also, it is likely the case that a large portion of the funding for DSM is derived from industrial customers. Knowing these details would help in making a decision and if these assumptions are correct, the information would help support the application.

Response: Yes, both the TRC and the conservation potential in the industrial sector are quite high compared to the rest of the Portfolio. This are good points and we will make this information more prominent in the application we file with the BCUC.

Additional Response: FortisBC confirms that the current 2020 year-end forecast for the Industrial program portfolio has a TRC of 1.4. The 2017 BC Conservation Potential Review indicates that there are additional savings available to Industrial customers beyond what is being achieved under the currently approved Industrial expenditures.

Question/Comment: I generally support the proposal.

Question/Comment: I also think it looks promising to increase the industrial area activity. I have a question about getting this approved by the BCUC.

Response: Thank you for that feedback, let's hold questions about process until the Next Steps discussion later in the session?

Question/Comment: Please let me know when the follow up session is as I am very interested in diving into some of these issues more deeply.

Additional Information: Time lapsed on the session before we could come back to this question. FortisBC will revisit the next steps and regulatory process in another session being planned on the topic of proposed changes to the DSM Plan for 2021-2022.

Topic: 2021-2022 Innovative Technologies & Deep Retrofits

Question/Comment: Can you provide more information on the situations where gas fired heat pump deployment can be considered? To what extent can gas heat pumps compete with electric heat pumps? The efficiency of heat pumps at the low end is not that impressive, why focus on this?

Response: Manufacturers are working on gas heat pump technology in response to the needs of the market place. The pathways report presented earlier shows the need for diversified energy solutions for customers. Manufacturer claims of energy efficiency are very promising. We need to better understand how well they operate and what the energy savings can be in BC. This is best done through a pilot study.

Question/Comment: Do you have any projections on when gas fired heat pumps will be available for residential.

Response: Manufactures are working on scaling the technology – current plans that FortisBC is aware of suggest they could receive certification for residential use in 2022.

Question/Comment: If deep retrofits can achieve up to 30% energy savings and represent 26 PJ of potential <reference to technical potential>, why is <market> the potential only 0.89 PJ? Do deep retrofits achieve a TRC or MTRC greater than 1? Are the commercial deep retrofits for apartments and condos or for businesses?

Response: Regarding the savings potential, the consultant assessed the achievable potential given currently known barriers. These retrofits, involving building envelope and windows for example, are not cost effective under current regulations for DSM in BC. Cost reductions over time may help to overcome

this and FortisBC will consider the potential to treat the cost effectiveness for these measures at the portfolio level. A pilot study is needed to better understand the costs and benefits.

Question/Comment: When measuring energy and GHG savings, is your baseline the existing tech in the home (e.g. 80% furnace) or current minimum energy performance standards (eg 95% AFUE furnace) or some blend based on early replacement?

Response: FortisBC looks at what the current code base line is for appliances when calculating energy savings. For deep retrofits there may be a case for the existing system to be the base case. These are issues the pilot study will assess.

Question/Comment: Deep energy retrofits are an important piece of the EE puzzle. Think about the opportunity for a long term programmatic offering since it is easy to dismiss individual projects. It is difficult for pilot projects to assess the adoption or uptake potential. Is FortisBC planning to put 2 different options forward to the BCUC or are you looking for feedback to land on one option.

Response: FortisBC currently anticipates putting one option forward to the BCUC but are very interested in EECAG feedback on which option to put forward. We believe more projects in the pilot will provide better information with which to make decisions.

Question/Comment: Be careful of setting a GHG threshold – while some holistic retrofits have resulted in approximately 30% GHG reductions, results could vary by plus or minus 15%. A GHG reduction threshold could create a barrier.

Question/Comment: With deep retrofits, make sure we are studying both up front costs and long term operating costs to ensure ability to operate buildings in the long term. It is a bit of a concern that Fortis is coming in once technology has been decided on -- baked in once building is in design. BC Hydro and FortisBC need to be in the process early for new buildings.

Question/Comment: How does FortisBC think it will go with the BCUC given that there is a current funding limit in place?

Response: FortisBC would need approval from the BCUC to transfer any funds into the Innovative Technologies Program Area. The Company now wants to be able to support more than one commercial pilot project and it appears this will require additional funding above the currently approved amount. So we anticipate seeking approval from the BCUC.

It was recognized that the end of the session had arrived and more discussion on heat pumps and deep retrofits was desired by members of the EECAG.

Next Steps

FortisBC confirmed that it will set up a follow up EECAG session to further discuss both the Guidehouse Pathways Report and presentation, and options for putting forward a request to the BCUC for additional Innovative Technologies Program Area funding to support gas fired heat pump technology and deep energy retrofit pilot studies. These meeting notes will be circulated prior to the next EECAG Session.

Additional Information: FortisBC is planning two follow up sessions to address the topics noted on which further discussion is needed. An EECAG session is planned for December 8th to discuss the Innovative

Technology funding alternatives and planning for a combined session of EEC and both electric and gas Resource Planning Advisory Group members in January to further consider and discuss the Guidehouse (Navigant) Energy Pathways report is under way.

The meeting was adjourned although FortisBC staff remained on the conference call to answer further questions for any EECAG member that wanted to remain on the virtual meeting.

FortisBC Participants

Danielle Wensink
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Beth Ringdahl
Manager, C&EM Programs

Colin Norman
Manager, Portfolio & Marketing Strategies

James Allen
Program Manager, Commercial & Industrial

Jim Kobialko
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Program Manager, Conservation Education & Outreach

Tanya Rumak
Program Manager, Residential

Ken Ross
Manager, Integrated Resource Planning and DSM Reporting

Kalie McGratten
Program Manager, Partnerships

Tyler Bryant
Public Policy Manager

Energy at work

FORTIS BC™

2021-2022 DSM Portfolio Forecast Overview

Colin Norman, Manager, Portfolio & Marketing Strategies

November 3rd, 2020

Energy at work FORTIS BC™

Updates & Proposed Changes

FEI (Gas) Forecast Expenditures vs 2021-2022 Approved Plan

Program Area	Total Utility Expenditures ($000s)*					
	2021			2022		
	DSM Plan	New Forecast	Variance %	DSM Plan	New Forecast	Variance %
Residential	28,476	30,108	106%	31,383	30,501	97%
Commercial	27,437	19,500	71%	31,074	19,650	63%
Industrial	3,644	7,925	217%	3,708	8,459	228%
Low Income	6,984	7,125	102%	7,217	7,469	103%
Conservation Education and Outreach	8,578	8,077	94%	9,433	9,229	98%
Innovative Technologies						
Existing	2,631	3,606	137%	3,062	3,423	112%
Deep Retrofits Commercial (New)		1,663			17,507	
Deep Retrofits Residential (New)		1,072			2,272	
Enabling Activities	9,231	9,231	100%	8,921	8,921	100%
Portfolio Level Activities	1,822	1,822	100%	1,979	1,979	100%
ALL PROGRAMS	**88,803**	**90,129**	**101%**	**96,775**	**109,410**	**113%**

** Includes estimated inflation*

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Energy Savings

FEI (Gas) Forecast Energy Savings vs 2021-2022 Approved Plan

Program Area	Incremental Annual Gas Savings, Net (GJ)					
	2021			2022		
	DSM Plan	New Forecast	Variance	DSM Plan	New Forecast	Variance
Residential	300,891	257,764	86%	328,860	270,879	82%
Commercial	418,482	337,225	81%	478,288	311,726	65%
Industrial	316,955	488,910	154%	316,955	483,246	152%
Low Income	77,141	69,779	90%	77,707	64,389	83%
Conservation Education and Outreach	Savings Not Estimated			Savings Not Estimated		
Innovative Technologies	Savings Not Estimated			Savings Not Estimated		
Enabling Activities	Savings Not Estimated			Savings Not Estimated		
Portfolio Level Activities	Savings Not Estimated			Savings Not Estimated		
ALL PROGRAMS	**1,113,469**	**1,153,678**	**104%**	**1,201,809**	**1,130,240**	**94%**

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2021-2022 FEI Proposed Industrial Funding Allocation

James Allen, P.Eng CEM, Program Manager, Conservation and Energy Management

November 3rd, 2020

Energy at work FORTIS BC™

Agenda

- What's happening in the Industrial Portfolio?
- 2021 and 2022 Industrial Program Area Forecast
- Where is the Growth?
- 2021 and 2022 Commercial Program Area Forecast
- Proposed BCUC Expenditure Request

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What's Happening in the Industrial Portfolio?

Strategic Energy Management (SEM)

- On track for savings and expenditures

Prescriptive Program

- Better than expected participation in thermal curtains, unit heater, steam boiler and pipe/tank insulation rebates
- Launch of Commercial Energy Assessment Program

Performance Program

- Increased program participation in 2019 and 2020 has resulted in more than anticipated Part 2 payouts and associated savings in 2021 and 2020
- Increased program participation in energy studies in capital incentives will continue to drive higher than anticipated expenditures and savings in 2021 and beyond.
- Higher than anticipated referrals from the SEM program

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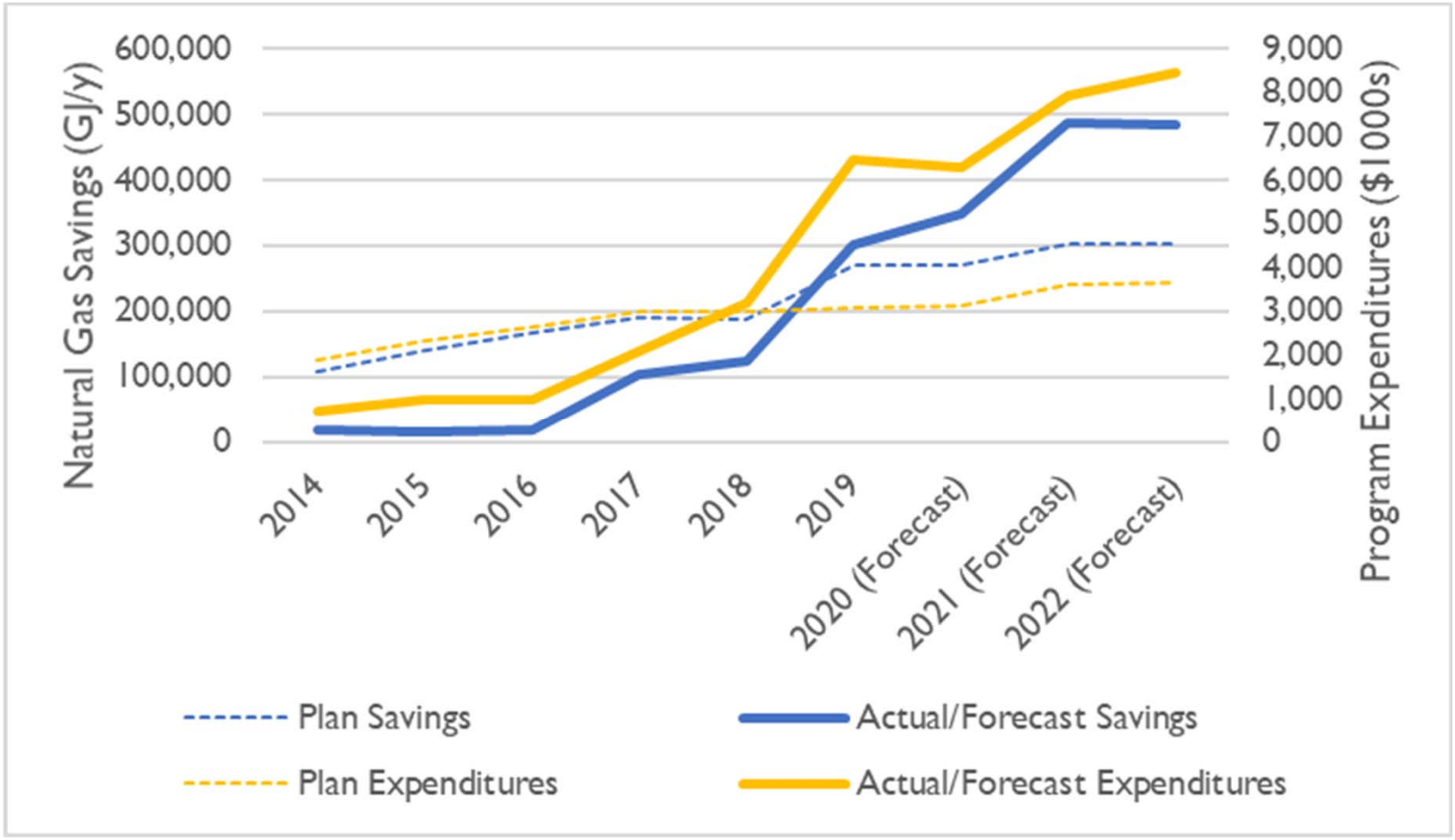
2021-2022 Industrial Program Area Expenditures by Program

	Utility Expenditures ($000s)*						
	DSM Plan			New Forecast			
	Incentive	Non-Incentive	Total	Incentive	Non-Incentive	Total	% Variance
Program			**2021**				
Performance Program	1,812	390	2,202	4,297	351	4,648	211%
Prescriptive Program	473	112	585	2,503	110	2,613	447%
Strategic Energy Management Program	456	213	669	329	145	474	71%
Non-Program Specific Expenses	0	187	187	0	190	190	102%
ALL PROGRAMS	**2,732**	**872**	**3,644**	**7,129**	**796**	**7,925**	**217%**
Program			**2022**				
Performance Program	1,805	389	2,213	4,294	369	4,663	211%
Prescriptive Program	506	120	609	3,004	116	3,120	512%
Strategic Energy Management Program	453	212	674	345	152	497	74%
Non-Program Specific Expenses	0	227	212	0	179	179	84%
ALL PROGRAMS	**2,764**	**947**	**3,708**	**7,643**	**816**	**8,459**	**228%**

**Includes estimated inflation*

Energy at work FORTIS BC™

What's Happening in the Industrial Portfolio?



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Where's the Growth?

Increased participation in product rebates from small industrial and warehousing customers on commercial rates (Rate 2)

- Thermal curtains
- Steam boilers
- Unit and infrared heaters
- Pipe insulation

Thermal Curtains

Unit Heaters

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Where's the Growth?

Increase in custom energy studies and capital incentives from key sectors:

Pulp & Paper

Forestry

Food and Beverage

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What's Happening in the Commercial Portfolio?

Prescriptive Program

- Highest participation ever, but lower participation overall. particularly in commercial furnace and commercial kitchen offers

Rental Apartment Efficiency Program

- Lower than anticipated participation

Performance Program (New Construction)

- Lower than expected participation in new construction program due to market demand
- New low-rise Part 9 New Construction program may help meet some of that demand.

Performance Program (Retrofit)

- Higher than anticipated participation in program due to limited-time COVID relief offers and outreach efforts

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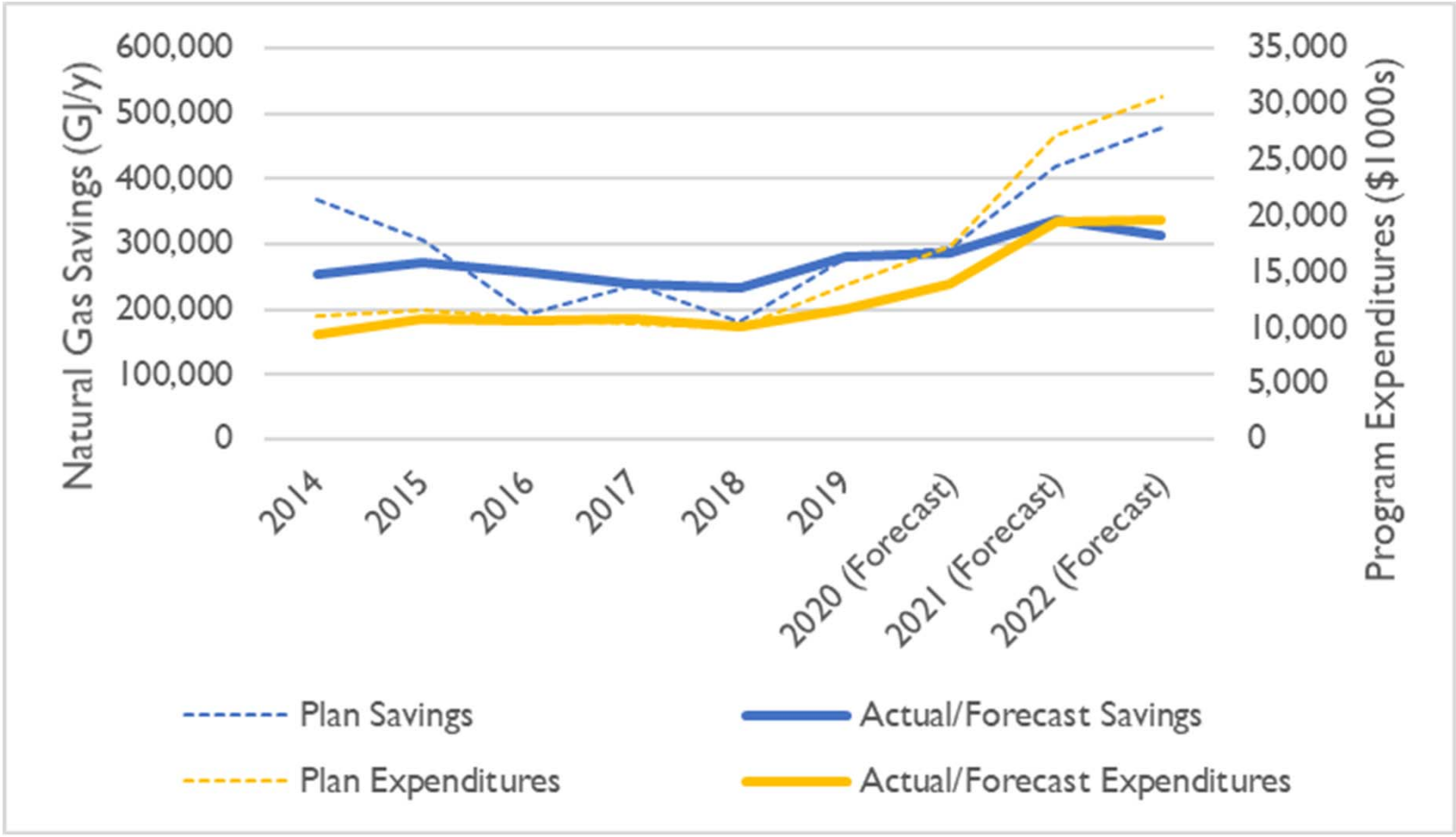
What's Happening in the Commercial Portfolio?



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Proposed BCUC Expenditure Request

- Industrial program area is forecasted to achieve 217% and 228% of plan expenditures for 2021 and 2022, respectively, if expenditures are not held.
- **FortisBC proposes to increase the Industrial program area budget by $4.3 million and $4.8 in 2021 and 2022, respectively.**

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Thank you

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For further information, please contact:

James Allen, james.allen@fortisbc.com

Find FortisBC at:

Fortisbc.com

604-576-7000

2021-2022 Innovative Technologies & Deep Retrofits

Jim Kobialko, Program Manager, Innovative Technologies & Projects

November 3rd, 2020

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2021 – 2022 DSM Budget Submission

Innovative Technologies

- Increase funding from $2.6M in 2021 to $3.6M (137%)
- Increase funding from $3M in 2022 to $3.4M (112%)
  - *Support the commercialization of **gas heat pump** technologies for both residential & commercial markets*

Deep Retrofits

- Increase funding to support both Residential and Commercial Deep Retrofits (*Budget Consultation)
  - *Support local governments with hitting their GHG reduction targets through NG **deep retrofits***

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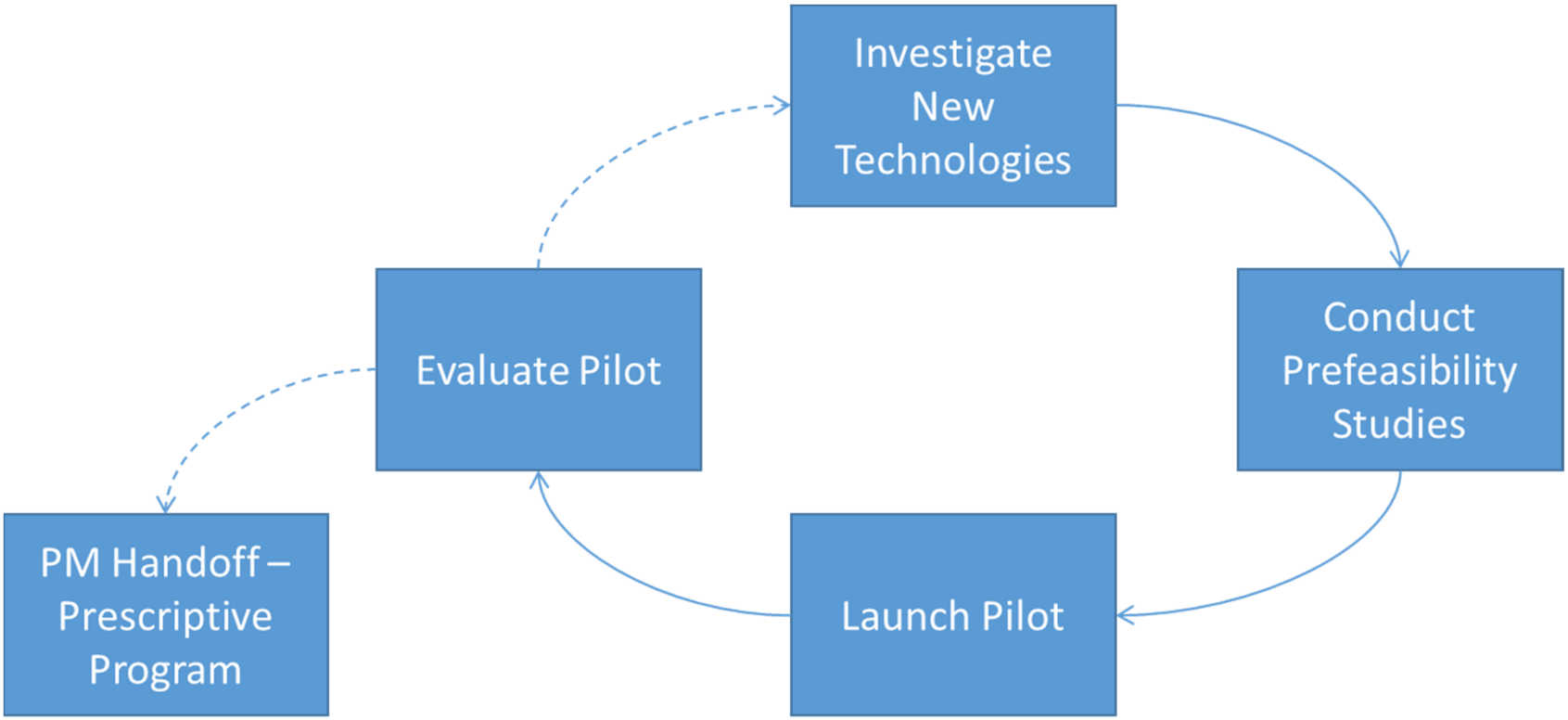
Innovative Technologies Framework



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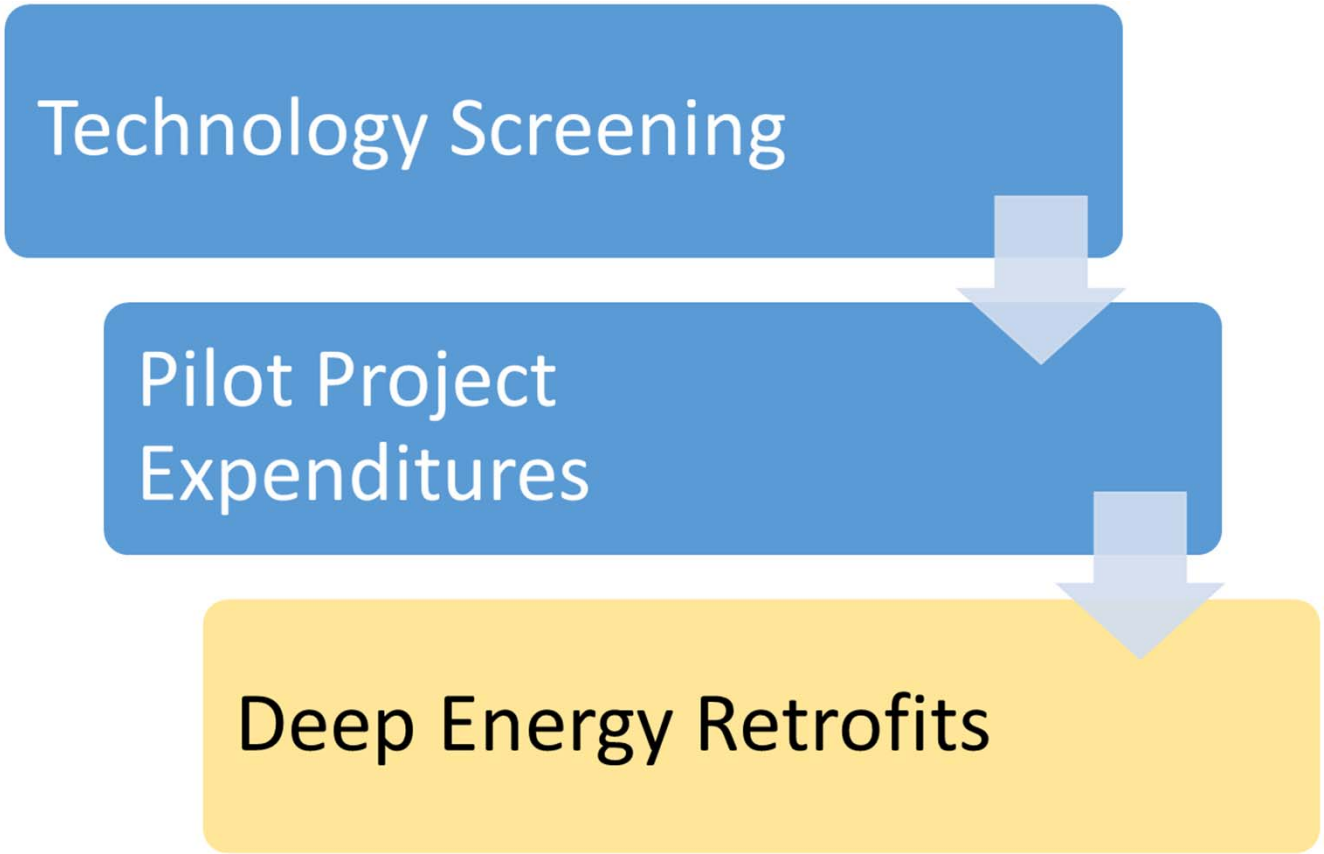
Innovative Technologies Activity Areas



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Innovative Technologies Expenditure Options

Activity Area	Utility Expenditures ($000s)			
	Option 1		Option 2	
	2021	2022	2021	2022
Technology Screening	838	851	838	851
Pilot Project Expenditures	2,582	2,447	2,582	2,447
Deep Retrofits - Residential	1,072	2,272	1,072	2,272
Deep Retrofits - Commercial	1,663	17,507	993	6,647
Non-Program Specific Expenses	185	125	185	125
TOTAL	**6,340**	**23,202**	**5,670**	**12,342**

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Gas Heat Pumps

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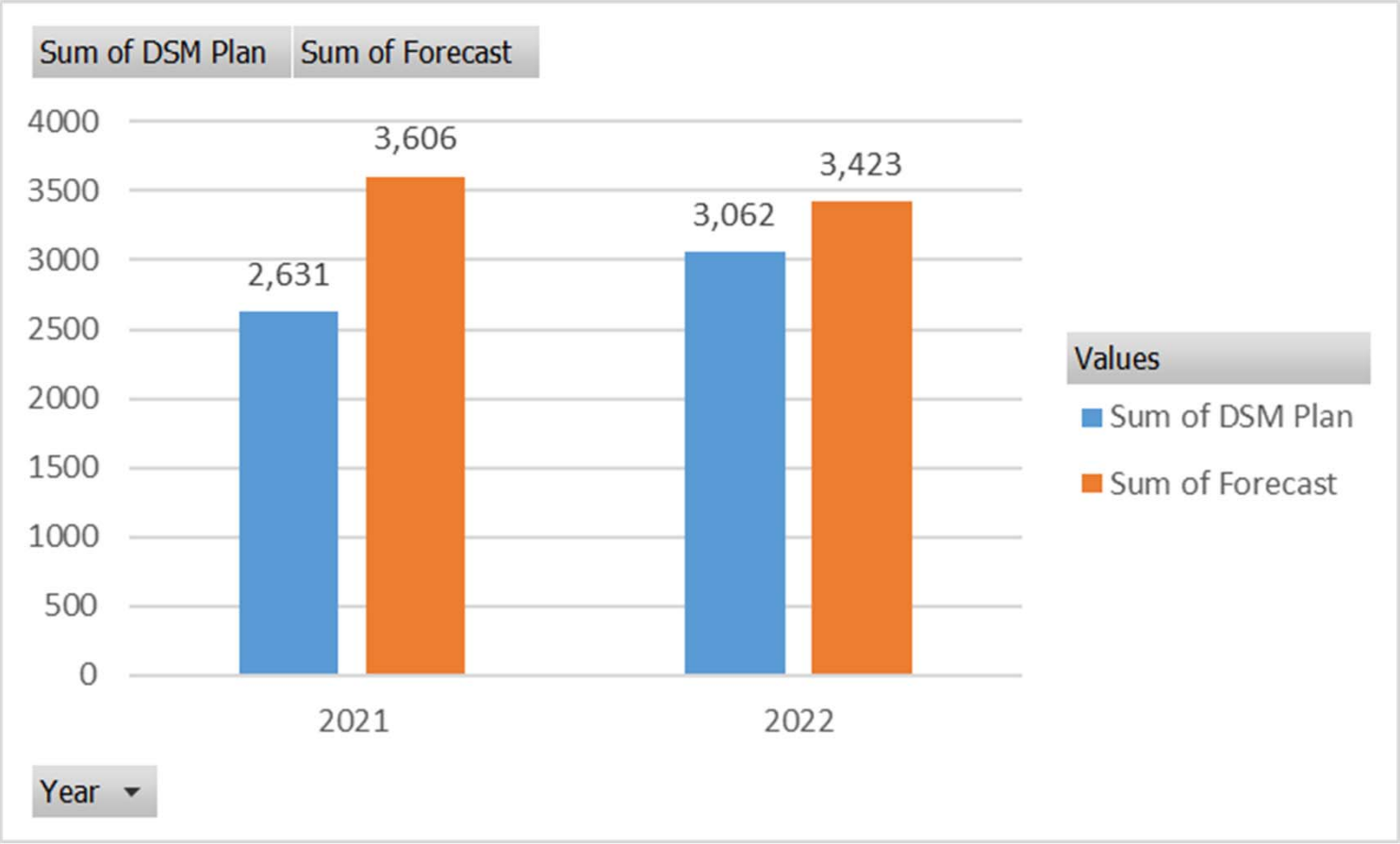
Innovative Technologies (Pilot/Studies Only) Budget Recommendation ($000's)



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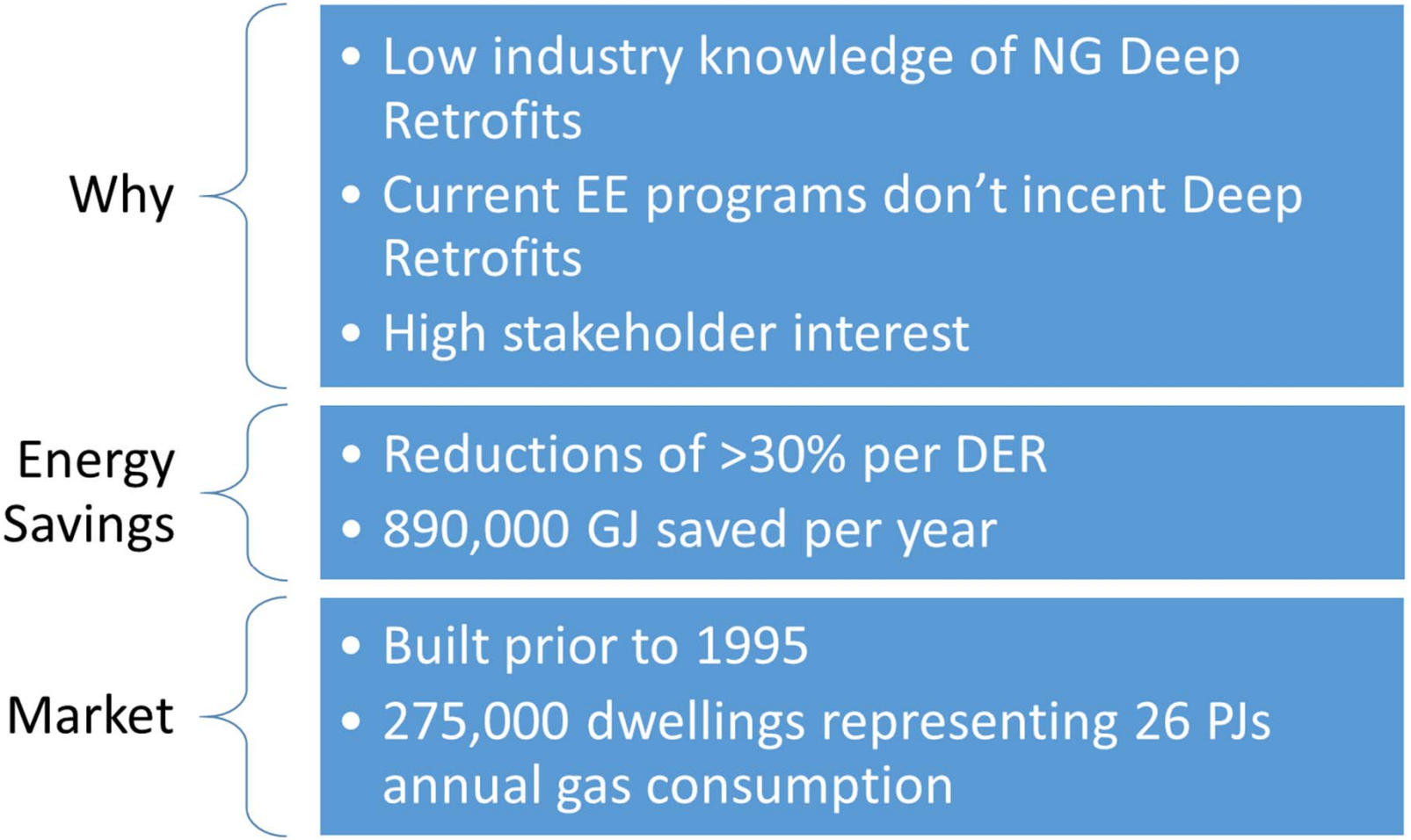
Deep Energy Retrofits



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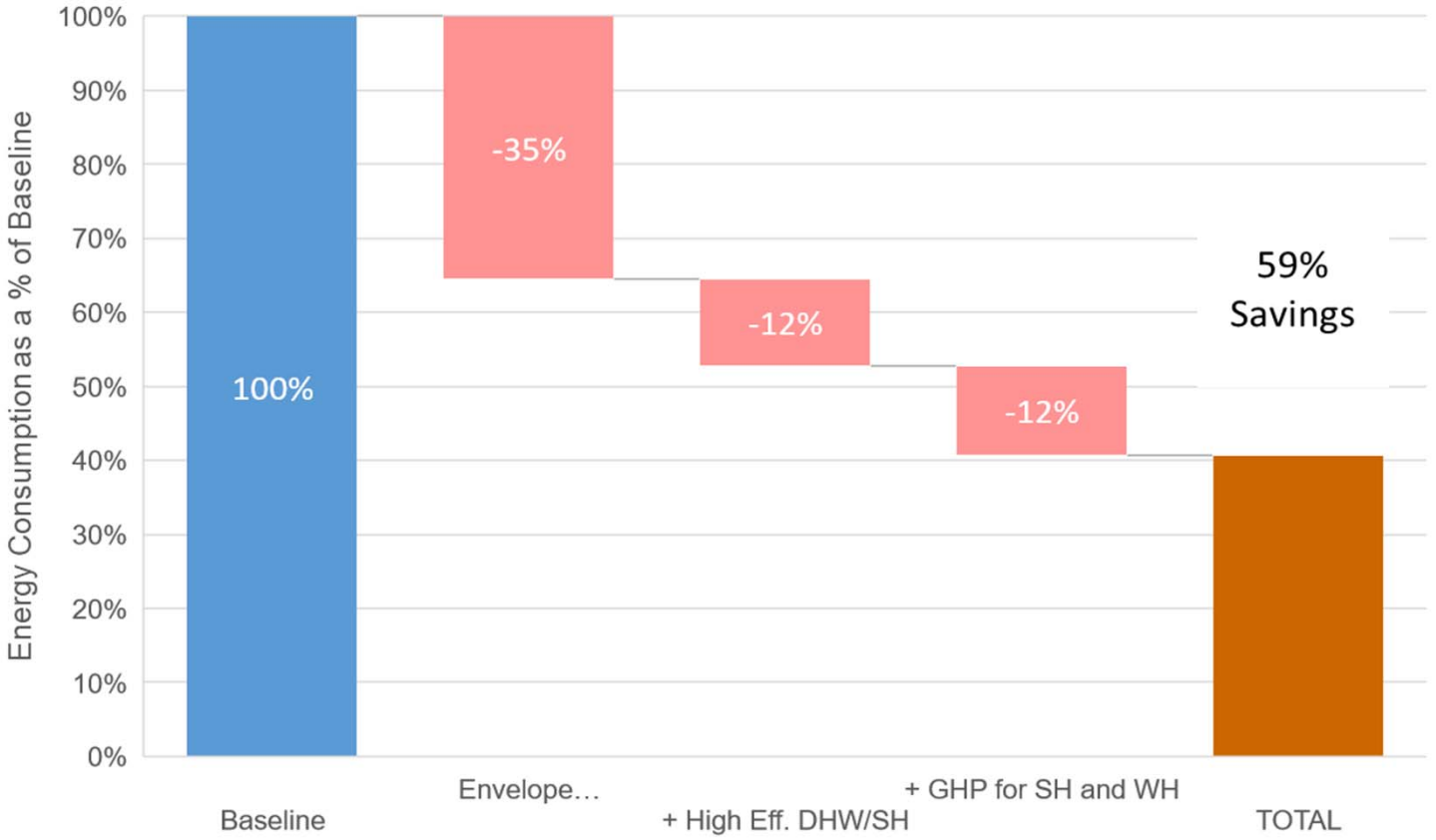
Deep Energy Retrofits – Residential Site



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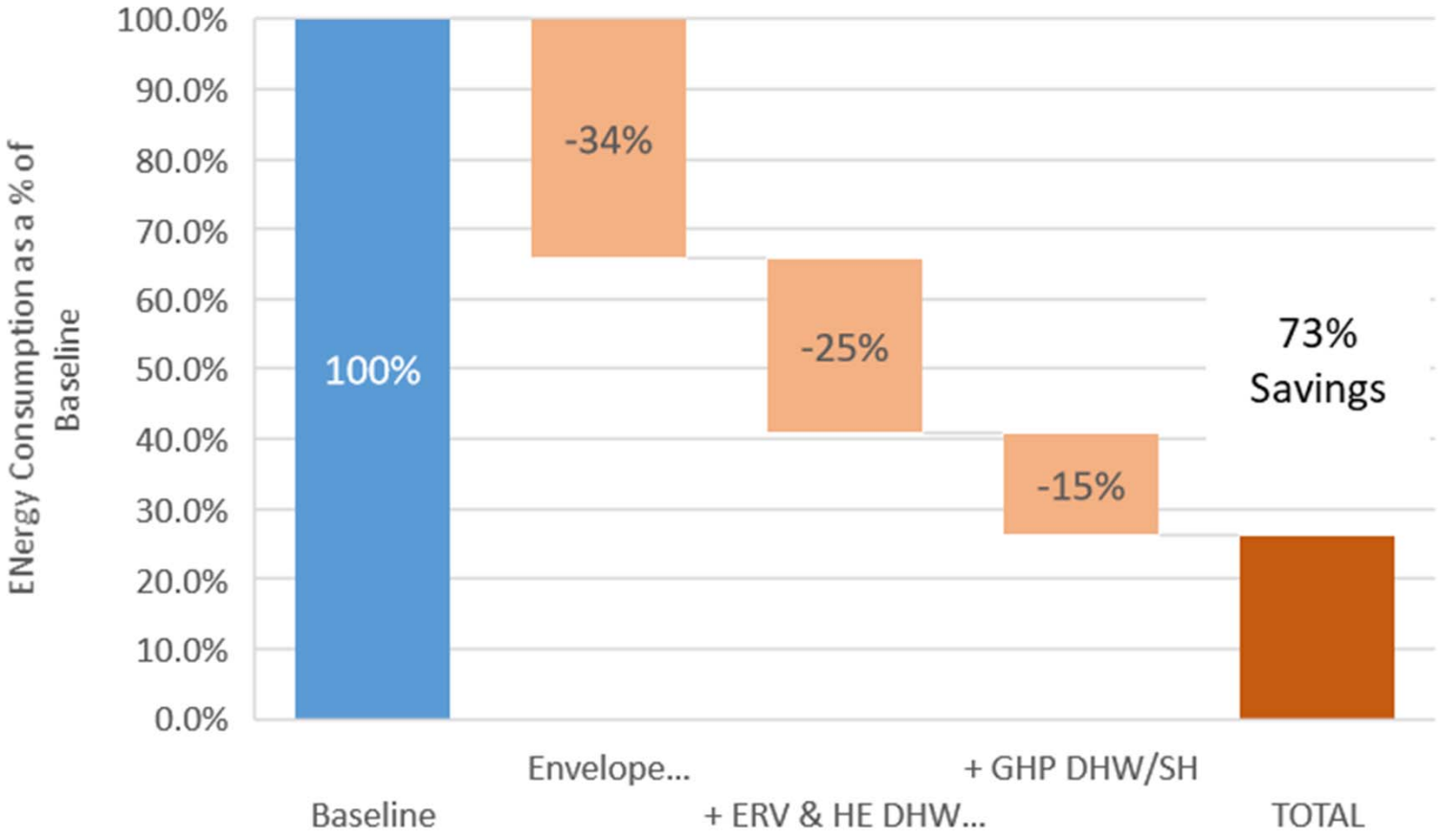
Deep Energy Retrofits – Commercial Site



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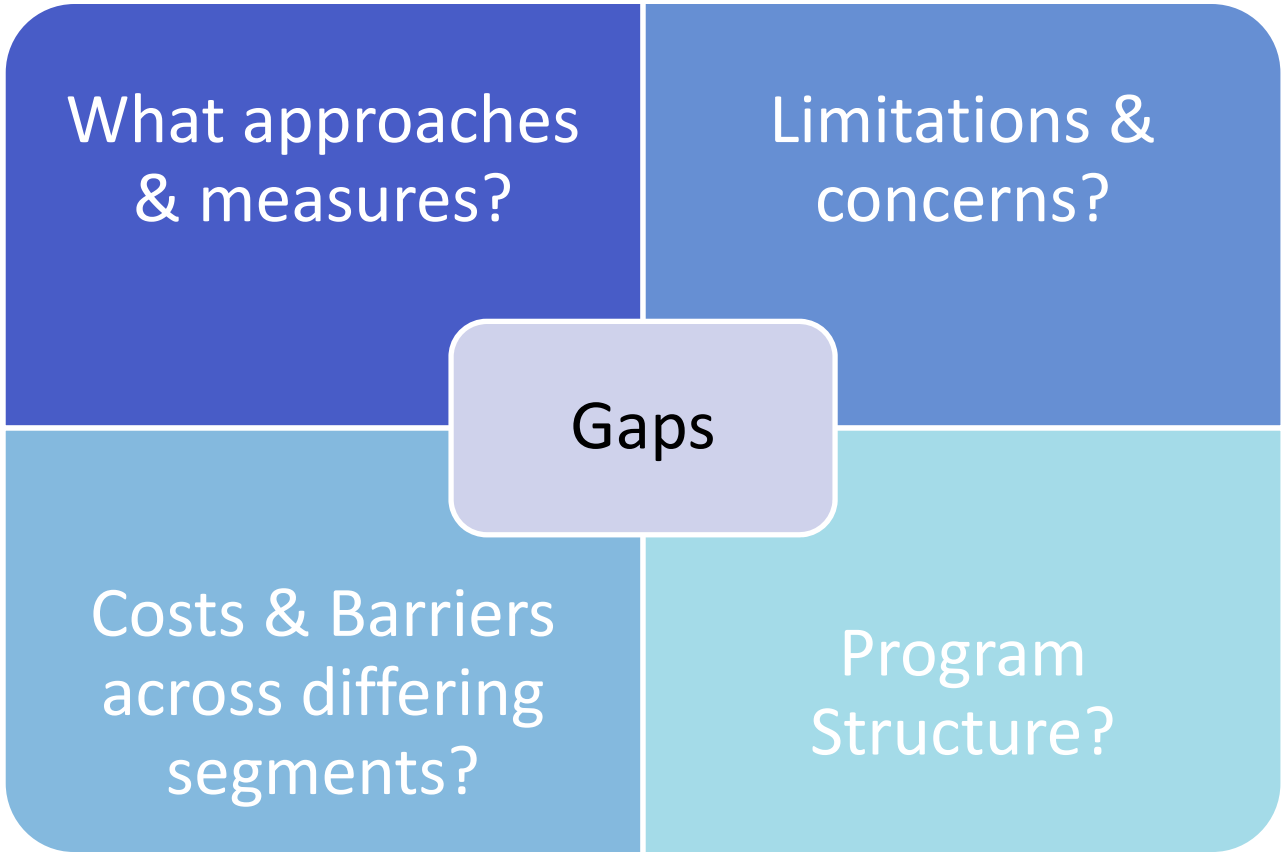
Information Gaps



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Deep Energy Retrofit Budget - Potential Options

Activity Area	Utility Expenditures ($000s)			
	Option 1		Option 2	
	2021	2022	2021	2022
Deep Retrofits - Residential	**1,072**	**2,272**	**1,072**	**2,272**
Design Offer	420	700	420	700
Construction	552	1,472	552	1,472
Labour	100	100	100	100
Deep Retrofits - Commercial	**1,663**	**17,507**	**993**	**6,647**
Feasibility Assessments	70			
Detailed Design	800		200	
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TOTAL	**2,735**	**19,779**	**2,065**	**8,919**

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Portfolio Expenditure Increase

Program Area	Total Utility Expenditures ($000s)*					
	2021			2022		
	DSM Plan	New Forecast	Variance %	DSM Plan	New Forecast	Variance %
Residential	28,476	30,108	106%	31,383	30,501	97%
Commercial	27,437	19,500	71%	31,074	19,650	63%
Industrial	3,644	7,925	217%	3,708	8,459	228%
Low Income	6,984	7,125	102%	7,217	7,469	103%
Conservation Education and Outreach	8,578	8,077	94%	9,433	9,229	98%
Innovative Technologies						
Existing	2,631	3,606	137%	3,062	3,423	112%
Deep Retrofits Commercial (New)		1,663			17,507	
Deep Retrofits Residential (New)		1,072			2,272	
Enabling Activities	9,231	9,231	100%	8,921	8,921	100%
Portfolio Level Activities	1,822	1,822	100%	1,979	1,979	100%
ALL PROGRAMS	**88,803**	**90,129**	**101%**	**96,775**	**109,410**	**113%**

** Includes estimated inflation*

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Stick to Portfolio Budget

Program Area	Total Utility Expenditures ($000s)*					
	2021			2022		
	DSM Plan	New Forecast	Variance %	DSM Plan	New Forecast	Variance %
Residential	28,476	30,108	106%	31,383	30,501	97%
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** Includes estimated inflation*

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Thank you

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For further information, please contact:

Jim Kobialko, jim.kobialko@fortisbc.com

Find FortisBC at:

Fortisbc.com

604-576-7000

Next Steps

- Draft session notes from today's meeting out to members by **Monday, November 9**. Please review for errors or omissions.
- Please provide any additional feedback by **November 20, 2020**:
    - ken.ross@fortisbc.com or call 604-576-7343.
- Your feedback will inform FortisBC's application to the BC Utilities Commission (BCUC) for adjustments to the Portfolio of natural gas DSM programs in 2021 and 2022.
- Regulatory proceeding and schedule will be determined by BCUC.
- SPRING EECAG SESSION: Discussing ideas for the next DSM Plan, beginning in 2023.

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FORTIS BC

Confidential: Please do not share this information beyond EECAG members at this time as it may contain sensitive market information.

FortisBC Energy Efficiency & Conservation Advisory Group (EECAG)

December 8, 2020 Session Notes

Session Objective:
Seek EECAG input on proposed 2021 and 2022 funding increases for the Innovative Technologies program area.

Link to FortisBC's Clean Growth Pathway (as part of back ground for the November and December EECAG Sessions): https://www.fortisbc.com/about-us/rethinking-bc-low-carbon-future

Agenda

1:00 am	Welcome, Introductions & Agenda Overview Previous Meeting Recap Clarification Questions Discussion/Feedback
2:25 am	Next steps

Attendees

- Jeff Fisher, Urban Development Institute
- Tom Hackney, BC Sustainable Energy Association
- Phil Stallard, BC Utilities Commission
- Peter Love, York University/Love Energy Consultants Inc.
- Carmen Proctor, Nelson Hydro/City of Nelson
- Leigha Worth, BC Public Interest Advocacy Centre
- Katherine Muncaster, BC Ministry of Energy, Mines & Petroleum Resources
- Tom-Pierre Frappé-Sénéclauze, Pembina Institute
- David Craig, Commercial Energy Consumers
- Kerly Hitchcock, BC Institute of Technology
- Irina Mis, BC Public Interest Advocacy Centre (Guest)
- Janet Rhodes, Commercial Energy Consumers (Guest)
- Pat Caraher, Aboriginal Housing
- Steven Groves, BC Ministry of Energy, Mines & Petroleum Resources (Guest)
- Sarah Fralin, Aboriginal Housing (Guest)
- Teddy Townsend, Canfor Pulp

EECAG Discussions and Additional Follow-up Information from FortisBC Where Applicable

The slides presented for each topic are attached to these notes. These notes are not intended to recap the presentations, rather capture the questions and comments raised by EECAG members and the responses from FortisBC staff. A number of slides containing additional information to the presentation are included as an appendix within the slide deck, some of which we referred to and presented during the December 8th session.

Topic: 2021-2022 Innovative Technologies & Deep Retrofits – Previous Meeting Recap

Question/comment: There was concern expressed that (for gas fired heat pumps) an efficiency factor of 1.04 may not be worthwhile. FortisBC may want to introduce a floor on the efficiency of technologies included in the pilot. Full support was offered by this member for the larger (more in depth) of the two pilot study options/requests presented and agreement that we need better knowledge on which to make decisions. A suggestion was offered to make sure FortisBC is in touch with the Federal government and explore work being done by Rocky Mountain Institute – supporting a higher budget and allocating that budget to different buildings.

Response: The Gas Heat Pump technologies that we have seen so far are quite promising (performing well in pilots) and there is a lot of work and development going on in this space. Jim will present more information later in the meeting.

Question/Comment: Could you review the building types that will be part of the study and the achievable potential relative to the technical potential for these technologies?

Response: FortisBC is so far looking at high rise buildings, but may also look at some low-rise opportunities if applicable. With regard to potential, it is very site specific (refer to slide 20). Each site may have specific hurdles to overcome and the full nature and extent of those hurdles won't be known until FortisBC begins to examine potential projects. The pilot will be designed to help us better understand the achievable potential that exists.

Question/Comment: In considering the achievable potential, bear in mind that BC is in a changing policy environment and it will be useful for FortisBC to document the nature and extent of barriers that cause a project not to proceed as the barriers could change over time. For example, zoning limitations could cause a political barrier which may change over time. Suggestion that FortisBC has the resources to document and share findings related to addressing barriers as this is critical knowledge in addressing deep retrofit market need.

Comment/Question: Does FortisBC have funding partners?

Response: FortisBC does have funding partners in place for one project (City of Vancouver, BC Housing and BC Non-Profit Housing Association) and are interested where additional funding partners might want to participate, as long as the goals of the pilot can be met under the partnership. An example might be a partner that wants to include non-energy upgrades such as re-piping, accessibility and tenant engagement.

Comment/Question: Can you share the results of your gas heat pump studies (costs, savings, barriers) and deep retrofit studies when completed?

Response: FortisBC does share findings and study results. The timing and format of such will be determined as the studies proceed.

Question/Comment: Will renters get rent reductions as a result of retrofits? What will FortisBC do to ensure that renters will benefit?

Response: FortisBC acknowledges that this is a concern and will do its best to ensure that renters are not

taken advantage of through diligent program design and related agreements. FortisBC also notes that there will be live-ability benefits to undertaking deep-retrofits and plans to survey tenants to find out how they are impacted by the project and what benefits they realize from it.

Question/Comment: Council for BCPIAC cannot take a position on the alternatives at this time. It will depend on the details of the proposed pilot(s) as filed with the BC Utilities Commission.

Question/Comment: If you are trying to have an impact on the market, then the more information you can gain and the more diverse your experience, the better.

Question/Comment: One member noted they were in full support of the larger proposal.

Question/Comment: Although impressed with FortisBC on its 30by30 targets, has FortisBC set any 2050 or other longer term goals (Other examples of utilities having longer term goals were provided)? Deep retrofits should be able to take emission reductions beyond 2030, what is after that.

Response: FortisBC's 30by30 initiative is really an interim target toward the Company's 2050 Clean Growth Pathways. The 2030 timeline and goals were seen as an important nearer term target on which to set tangible goals and activities and build momentum toward 2050.

Question/Comment: There may be property tax impacts on the building owners. We have found that adding these features to buildings can increase their tax assessments and therefore property taxes.

Question/Comment: There is the issue that making a building more attractive through deep retrofits will create more demand and rents may go up. Recommend seeing if you can work with Government to introduce some kind of controls on these buildings.

Question/Comment: There is also a concern that residential use rates have been coming down. As that happens rates go up. Lower income customers may realize affordability issues as a result of these programs since they may not have access to the individual project benefits. What options are government and FortisBC exploring to address this.

Response: Agree that this is an important concern. FortisBC's guiding principle of universal access to programs and funding will continue to be an important tenet. Information from pilot studies will help to ensure there are programs and options for all customers. In terms of future rate design - people are starting to get exploratory… FortisBC has been operating in current mode for years and are starting to have these conversations and next rate design will be interesting one.

Question/Comment: Very supportive of option 1 (larger option). A pilot study large enough to have redundancy and multiple projects is important in case anything goes wrong with a single project. Further to earlier comments on what a project costs and what customers can afford – the gap could be addressed through a variety of financing options. Government is looking at this but are moving slowly, the utility could also look. Consideration of financing options could get underway while the pilot study is happening since that will take time as well. Consider two streams: perhaps a return to on-bill financing, or: metered energy efficiency with the utility owning the assets of the deep retrofit and earning a return over time. Hybrid fuel options and creative solutions can make this tricky as far as who gets paid and the utility earning its fair return over time. This might be solvable through a single utility owning the retrofits.

Response: FortisBC conducts pilots in conjunction with the Program Area team that will eventually use the information to design a full program. Some aspects of program design/development can begin during the pilot stage. This potentially includes the many design options such as partnering and financing.

The independent facilitator observed that a number of members have indicated support for seeking an increase in funding for a deep retrofits pilot study, and asked if anyone wanted to raise objection to this option. Hearing none, further discussion on gas fired heat pumps was initiated.

Topic: Gas Fired Heat Pumps:

Question/comment: I cautiously in support of a pilot study that will provide more information, but concerned about the possibility that gas fired heat pumps may compete against even lower carbon options.

Question Comment: I tend to agree with (previous comment). Less enthusiasm for the heat pump pilot but agree that someone should be looking at it. I would be interested in reviewing any data that indicates this is a good opportunity.

Question/Comment: I feel that the utility should take advantage of gas heat pump technologies. Decarbonizing the gas system is the end goal and losing load would detract from the utilities ability to do that. It is therefore important for the utility to understand the real practical implications (of new efficient gas technologies).

Question/Comment: One thing that needs to be explored is where gas heat pumps might be more feasible to implement in older buildings than electric systems. We have seen situations where other alternatives are more difficult to implement.

Response: Early indications on gas heat pump technology is that there is a lot of potential – in the range of 30 to 50% efficiency improvement, and that there is a lot of new technologies coming onto the market.

Question/Comment: Clarification on the timing and expenditures for the gas heat pump pilot was requested and provided.

Question/Comment: Will measurement and verification (M&V) of savings associated with the pilot be conducted as part of the work?

Response: Yes, a detailed M&V plan will be developed and implemented and will inform the results of the pilots.

Question/Comment: Is partnering with BC Hydro a possibility for the pilot? Can you talk a bit more about the technology?

Response: Yes, FortisBC would consider such partnerships but the gas utility would only provide incentives and funding for the gas technologies. A variety of technologies are under consideration and more are currently under development.

With no further questions arising, the independent facilitator drew the discussion to a close. FortisBC reviewed its next steps including review of the meeting notes and a request for any further feedback from EECAG Members by December 18th in order to facilitate completing of FortisBC's application to the BC

Utilities Commission.

FortisBC Participants

Danielle Wensink
Director, Conservation & Energy Management

Colin Norman
Manager, Portfolio & Marketing Strategies

Jim Kobialko
Manager, Innovative Technologies & Projects

Beth Ringdahl
Manager, C&EM Programs

James Allen
Program Manager, Commercial & Industrial

Ken Ross
Manager, Integrated Resource Planning and DSM Reporting

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Agenda

1. Previous Meeting Recap
2. Clarification Questions
3. Discussion/Feedback
4. Next Steps

Energy at work FORTIS BC™

2021-2022 Innovative Technologies & Deep Retrofits – Previous Meeting Recap

Colin Norman, Manager, Portfolio & Marketing Strategies

Jim Kobialko, Program Manager, Innovative Technologies & Projects

December 8th, 2020

Energy at work FORTIS BC™

Option 1: Portfolio Expenditure Increase

Program Area	Total Utility Expenditures ($000s)*					
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** Forecast as of October 15, 2020. Includes estimated inflation.*

Energy at work FORTIS BC™

Option 2: Stick to Portfolio Budget

Program Area	Total Utility Expenditures ($000s)*					
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Deep Energy Retrofit Budget - Potential Options

Activity Area	Utility Expenditures ($000s)			
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TOTAL	**2,735**	**19,779**	**2,065**	**8,919**

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Proposed BCUC Requests

- Increase the Industrial program area budget by $4.3 million and $4.8 in 2021 and 2022, respectively
- Increase the Innovative Technologies budget (amount TBD pending EECAG feedback)
  - Advance gas fired heat pumps analysis work
  - New Deep Retrofit budget areas
- Transfer over 25% of Commercial program area budget
- Enable 25% program area transfer rule to apply to Innovative Technologies

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Clarification Questions?

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Discussion/Feedback

Key Questions

What are your thoughts/preferences on the deep energy retrofit investment options presented?

- Which do you favour?
  - Option #1, #2, or do you have another suggested option?

Are you in favour of increased investment in gas fired heat pump pilot activities to align with market advancements?

- If so, why? If not, why not?

Other comments?

Energy at work FORTIS BC™

Next Steps

- Draft session notes from today's meeting out to members week of ***December 14***. Please review for errors or omissions.
- Please provide any additional feedback by ***December 18***:
  - ken.ross@fortisbc.com or call 604-576-7343.
- Your feedback will inform FortisBC's application to the BC Utilities Commission (BCUC) for adjustments to the Portfolio of natural gas DSM programs in 2021 and 2022.
- Regulatory proceeding and schedule will be determined by BCUC.
- SPRING EECAG SESSION: Discussing ideas for the next DSM Plan, beginning in 2023.

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Appendix

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Energy Savings

FEI (Gas) Forecast Energy Savings vs 2021-2022 Approved Plan

Program Area	Incremental Annual Gas Savings, Net (GJ)					
	2021			2022		
	DSM Plan	New Forecast	Variance	DSM Plan	New Forecast	Variance
Residential	300,891	257,764	86%	328,860	270,879	82%
Commercial	418,482	337,225	81%	478,288	311,726	65%
Industrial	316,955	488,910	154%	316,955	483,246	152%
Low Income	77,141	69,779	90%	77,707	64,389	83%
Conservation Education and Outreach	Savings Not Estimated			Savings Not Estimated		
Innovative Technologies	Savings Not Estimated			Savings Not Estimated		
Enabling Activities	Savings Not Estimated			Savings Not Estimated		
Portfolio Level Activities	Savings Not Estimated			Savings Not Estimated		
ALL PROGRAMS	**1,113,469**	**1,153,678**	**104%**	**1,201,809**	**1,130,240**	**94%**

Energy at work FORTIS BC™

2021 – 2022 DSM Budget Submission

Innovative Technologies

- Increase funding from $2.6M in 2021 to $3.6M (137%)
- Increase funding from $3M in 2022 to $3.4M (112%)
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Deep Retrofits

- Increase funding to support both Residential and Commercial Deep Retrofits (*Budget Consultation)
  - *Support local governments with hitting their GHG reduction targets through NG **deep retrofits***

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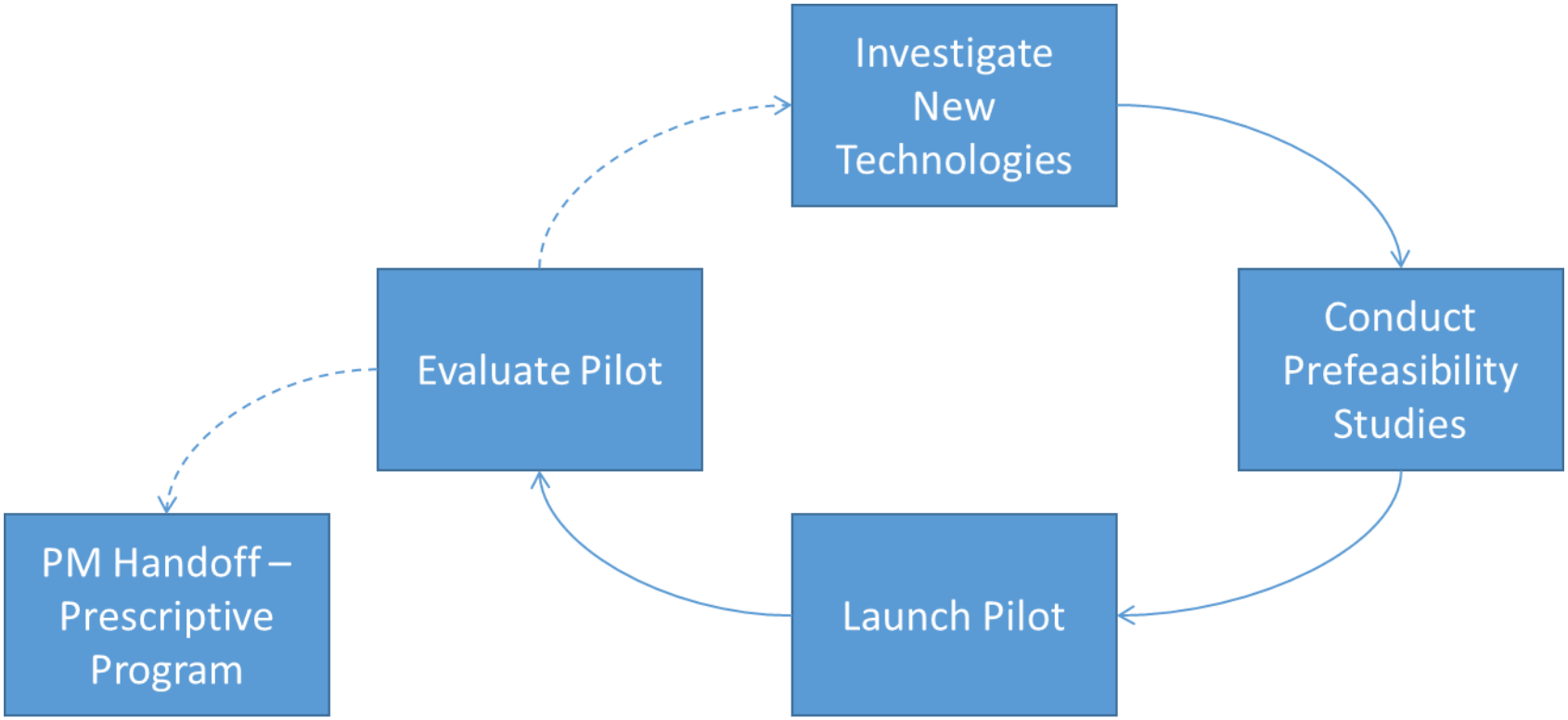
Innovative Technologies Framework



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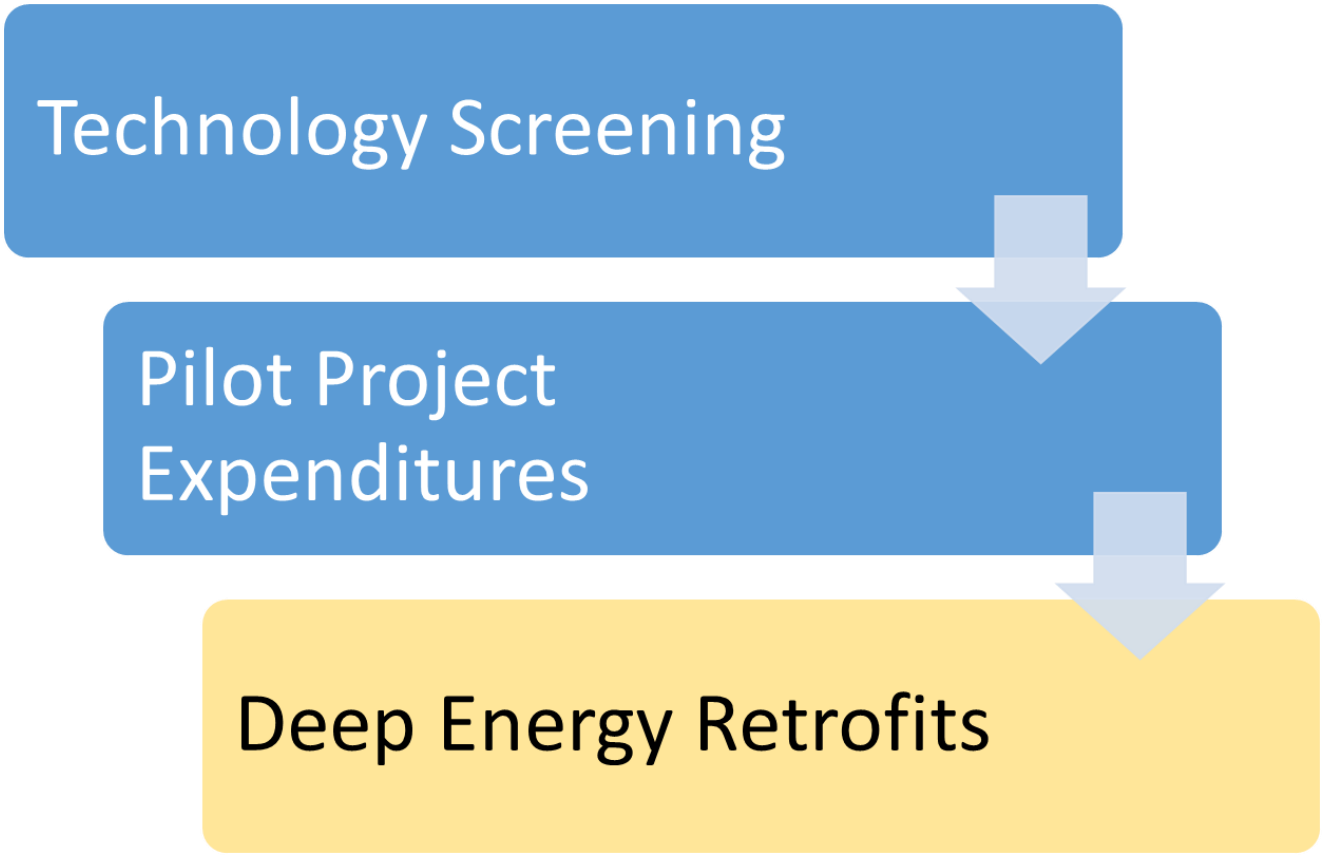
Innovative Technologies Activity Areas



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Gas Heat Pumps

Why	• By 2035 all Space and Water Heating appliances > 100% EF • No Residential-sized GHP commercially avail • High stakeholder interest
Energy Savings	• COP 1.07 – 1.4 • 500,000 GJ saved per year
Market	• Residential and Commercial Buildings • Space & Water Heating

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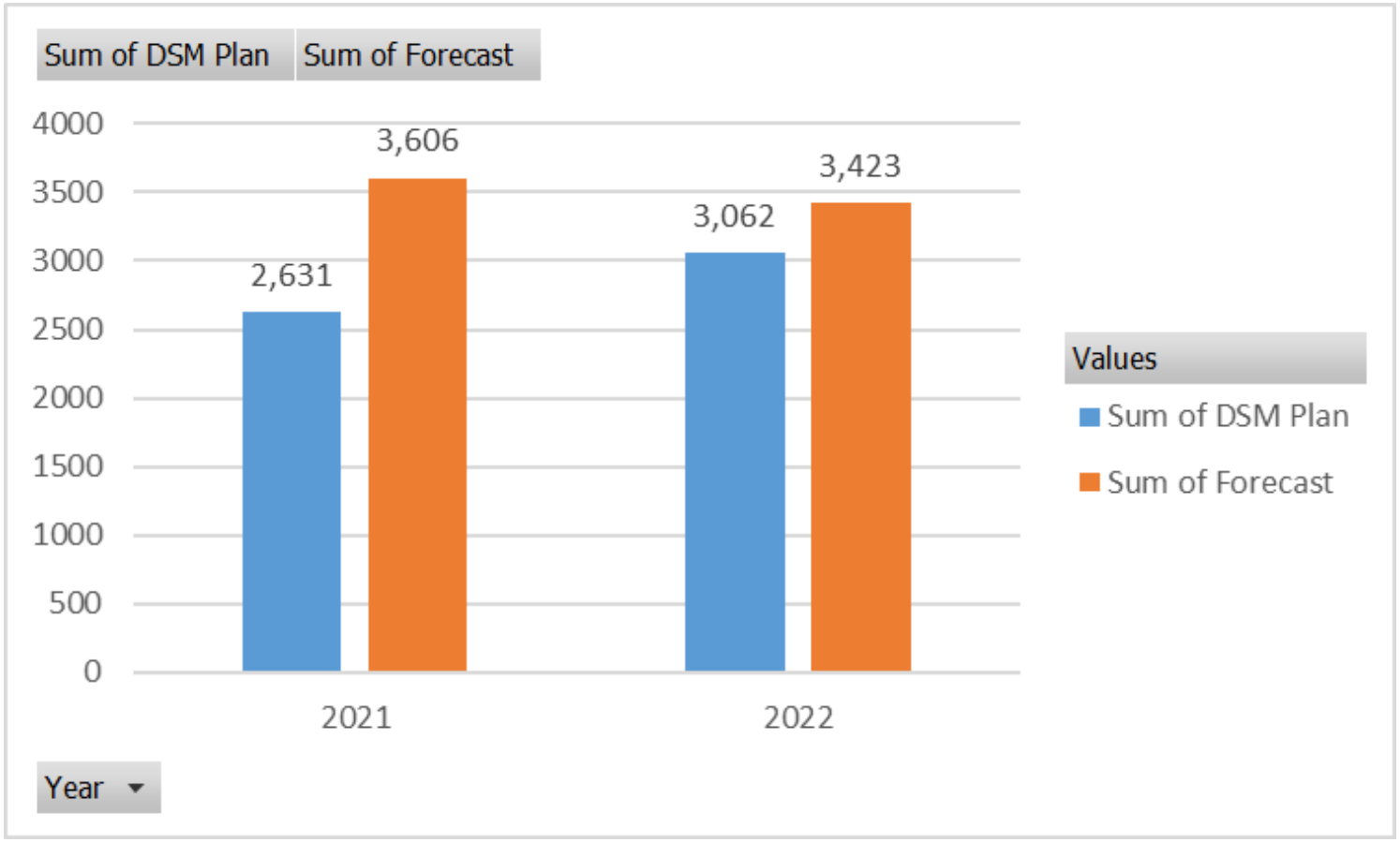
Innovative Technologies (Pilot/Studies Only) Budget Recommendation ($000's)



Energy at work FORTIS BC™

Deep Energy Retrofits

Why	• Low industry knowledge of NG Deep Retrofits • Current EE programs don't incent Deep Retrofits • High stakeholder interest
Energy Savings	• Reductions of >30% per DER • Total potential savings of 2.8 million GJ
Market	• 50% stock built prior to 1995 • 465,000 Part 9/ 38 million sq-m Part 3 • 35,000 Part 9 / 116 (16,000 units) Part 3

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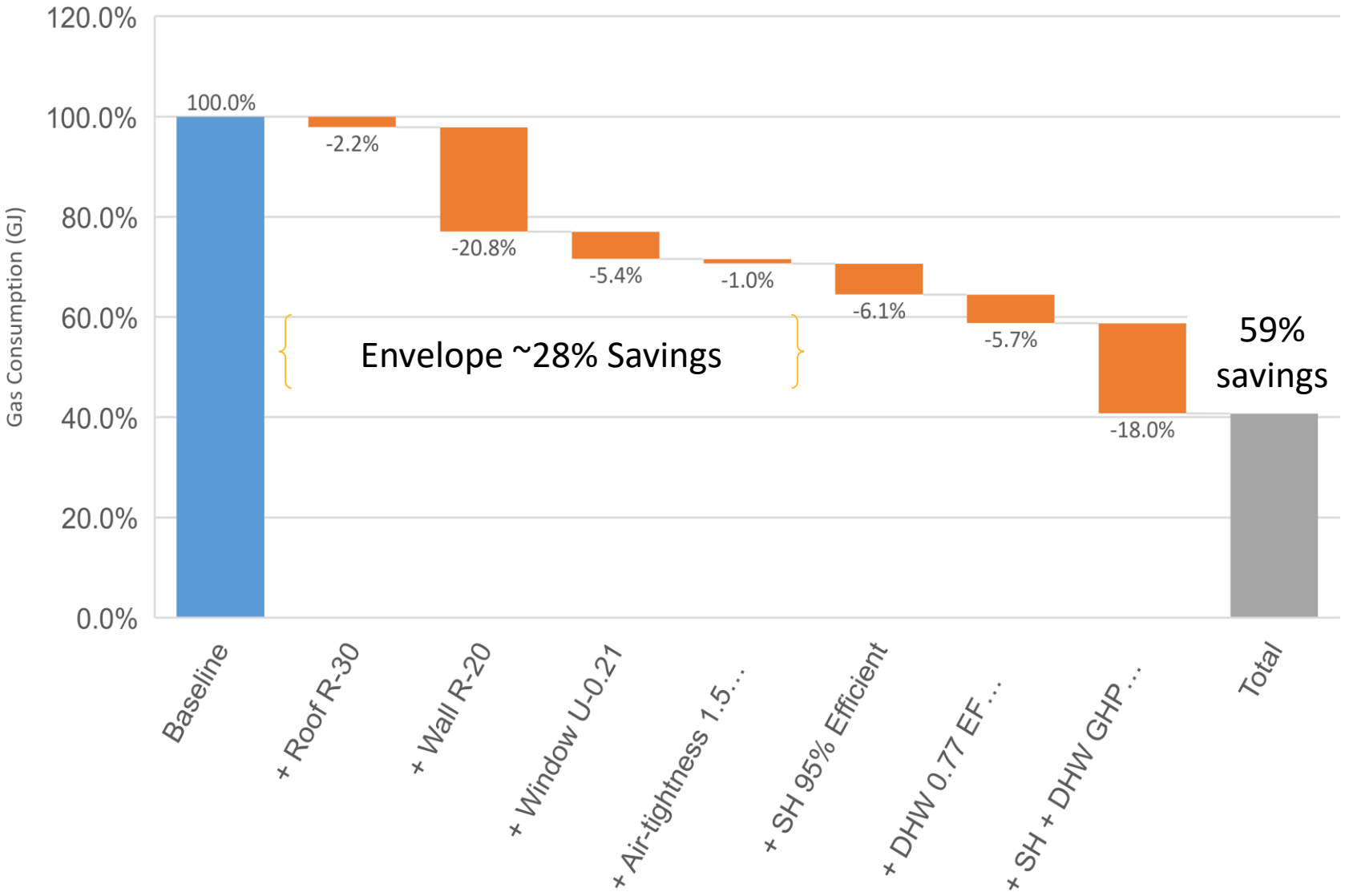
Deep Energy Retrofits – Residential Site



Cost Effectiveness – Residential

	Current Market DER	TRC positive DER
Average Gas Savings Assumption (GJ/ dwelling)	65	
Measure Life	27 years	
Incremental Cost ($/dwelling)	$50,000 for SFD $40,000 for Row	$26,400 for SFD $17,600 for Row
TRC/mTRC	0.44/1.02	1.0/2.3

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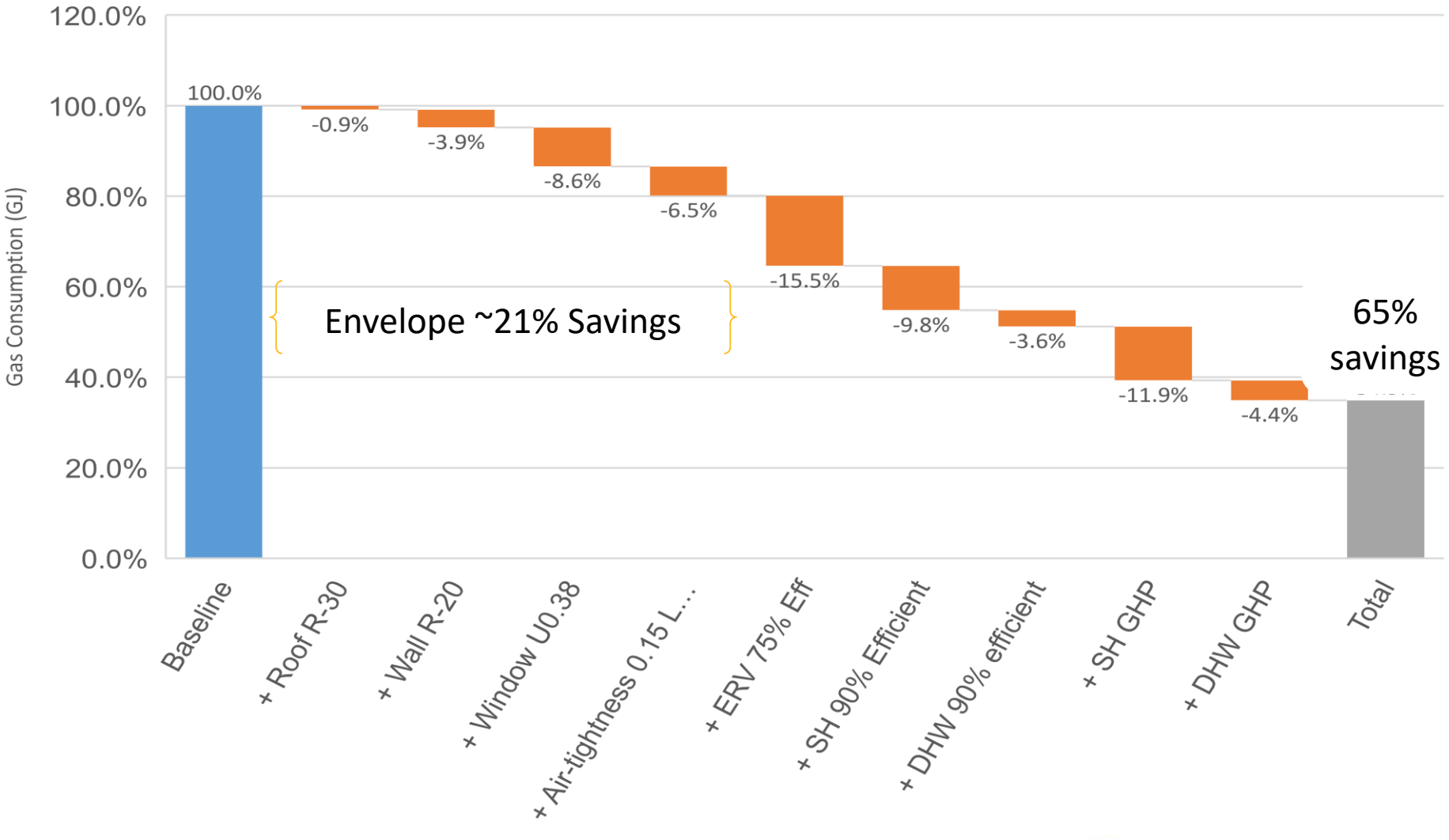
Deep Energy Retrofits – Commercial Site



Cost Effectiveness – Commercial

	Current Market DER	TRC-positive DER
Gas Savings Assumption (GJ/sq-m)	0.549	
Measure Life	27 Years	
Incremental Cost ($/sq-m)	$130/sq-m	$54/sq-m
TRC/mTRC	0.6/2.9	1.0/4.7

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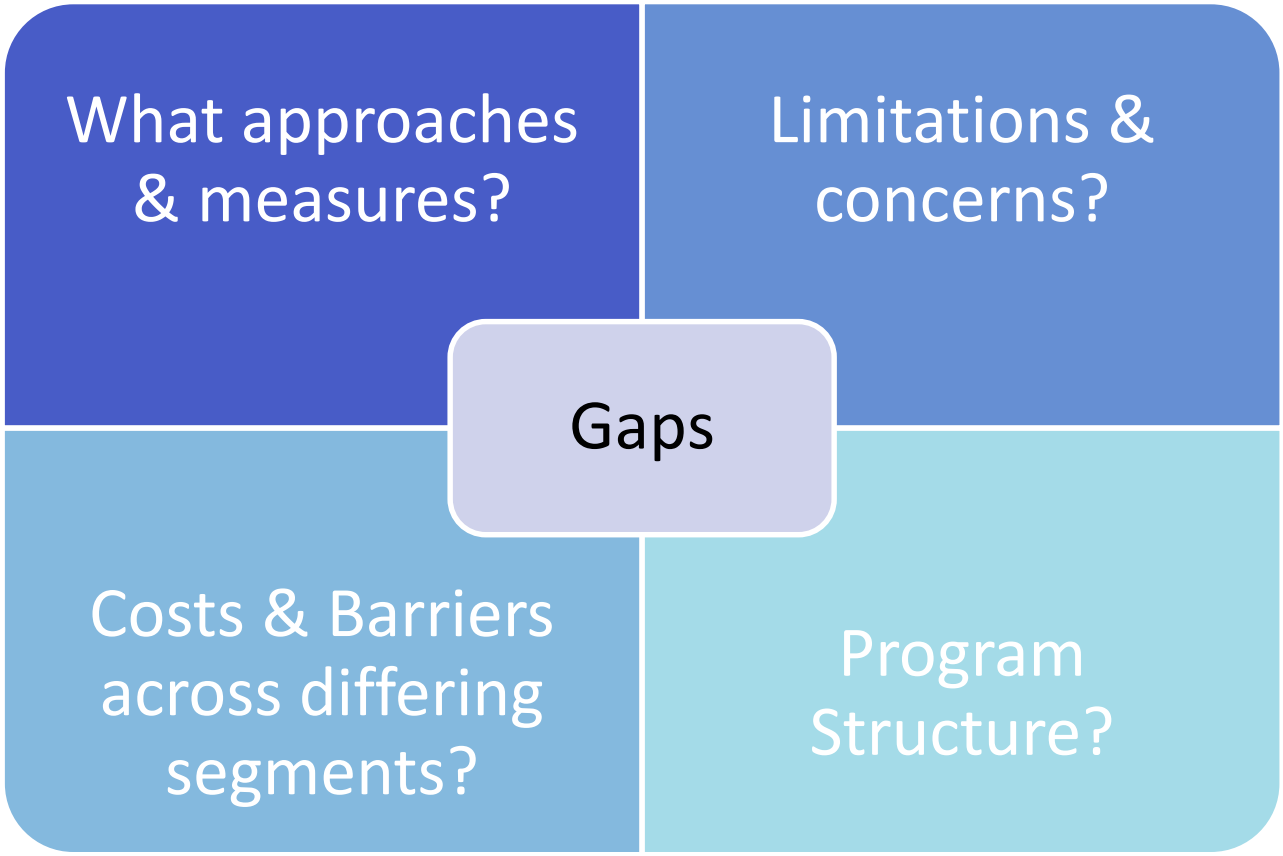
Information Gaps



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Appendix C

ICF CANADA DSM PLAN 2021-2022 UPDATE REPORT

FORTISBC ENERGY INC. DSM PLAN 2021-2022 UPDATE REPORT

Program Description and Cost-Effectiveness Results

March 12, 2021

Submitted to:
FortisBC

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Table of Contents

1 Introduction

1.1 Background and Objectives

This update to the 2021-2022 period of FortisBC Energy Inc.'s (FEI's) previously approved 2019-2022 Demand Side Management (DSM) Plan for Conservation and Energy Management (C&EM) focuses on proposed budget updates to the following previously approved program areas:

- Industrial Energy Efficiency Program Area
- Innovative Technologies Program Area

This DSM Plan Update covers all of FEI's natural gas service territory. In addition, this plan update provides program details and planned cost-effectiveness results for the above noted Industrial and Innovative Technologies DSM program areas. Other program areas within the previously approved 2019-2022 DSM Plan have also been updated with revised high level forecasts for the purposes of supporting updates within the Portfolio level Exhibits 1 through 5.

The programs listed in the Industrial Energy Efficiency program area are continuations of programs that FEI is currently operating, and has reported on in their most recent DSM Annual Report. The activity areas listed in the Innovative Technologies program area are continuations of activity areas that FEI is currently operating, and has reported on in their most recent DSM Annual Report, plus two new proposed activity areas named "Deep Retrofits – Residential" and "Deep Retrofits – Commercial".

As with all long-term plans, it should be noted that this DSM Plan is subject to changes in market conditions, customer responses to programs, consultation input from stakeholders, including program partners, and changes in government direction and policy. Therefore, information and forecasts listed in the Program Profiles represent best estimates as of the filing of this DSM Plan and are subject to adjustments, as required.

1.2 Approach

Since this DSM Plan Update is focused on incremental funding in the Industrial and Innovative Technologies program areas, a similar bottom-up approach was used for the Industrial and Innovative Technologies program areas as has been used in previous DSM Plans:

- The detailed Program Profiles that were developed for the 2019-2022 DSM Plan were used as a starting point
- FEI program area managers updated the Program Profiles to reflect proposed changes in program spending and changes to some of the measure input assumptions based on program performance to date. Individual profiles are included in the body of this report.

For all other program areas, a top-down approach was deemed sufficient to complete the DSM Plan Update as the considerable extra work required to conduct a bottom-up update would not have resulted in material differences to the portfolio cost-effectiveness or to the expenditures attributable to MTRC cost-effective only programs. The following top-down approach was employed for the DSM plan forecast update for these other program areas:

- For each program with energy efficiency measures, a representative measure was developed based on the weighted average of the measure input assumptions (e.g. incremental cost, incentive, lifetime) from the 2019-2022 DSM Plan
- FEI program area managers provided input with regards to any proposed changes in program participation and program-level spending, broken down by incentive and non-incentive funding. The representative measures and the program administration budgets were adjusted to reflect these changes.

Subsequently, the following approach was used to complete the DSM Plan Update:

- Updated input assumptions were fed into the cost-effectiveness model used to complete the DSM Plan Update. Initial results were generated at the level of total DSM program portfolio, program area (e.g., Residential, Commercial, etc.) and individual program.
- The initial results were reviewed collaboratively and revisions were made, as necessary
- The final results were compiled into the current report

1.3 Report Organization

The remainder of this report is presented in the following sections:

- Section 2 provides an overview of the **Overall DSM Program Portfolio Results**
- Section 3 provides a description of the individual programs and cost-effectiveness results for the **Industrial Energy Efficiency Program Area**
- Section 4 provides a description of the individual activity areas and cost-effectiveness results for the **Innovative Technologies Program Area**

1.4 Notes

The following general notes apply to all the program areas:

- Totals in Exhibits may not add exactly; any differences are due to rounding.
- All budgets values in this report are in nominal dollars (i.e. including inflation)
- A “Non-Program Specific Expense” line item has been included in Exhibit 6 and Exhibit 9. These planned expenditures represent the costs that are attributable to that program area but support multiple programs and, therefore, are not specific to only one program. Generally, these expenditures represent items such as training, travel, marketing materials and consulting services that support the overall program area. The amounts in this plan are based primarily on past reported non-program specific expenses with scaling up factored in as deemed appropriate.

2 Overall DSM Program Portfolio Results

2.1 Introduction

This section provides a summary of the total expenditures, estimated natural gas savings, and associated cost-effectiveness for FEI's proposed portfolio of Demand Side Management (DSM) programs for the 2021-2022 period. The DSM portfolio is organized into the following program areas:

- Residential Energy Efficiency Program Area
- Commercial Energy Efficiency Program Area
- Industrial Energy Efficiency Program Area
- Low Income Energy Efficiency Program Area
- Conservation Education and Outreach Initiatives
- Innovative Technologies Program Area
- Enabling Activities

2.2 Overall Portfolio Results

The overall DSM program results are summarized in the following exhibits:

- Exhibit 1 provides a summary of expenditures
- Exhibit 2 presents the results for the total DSM program portfolio
- Exhibit 3 summarizes the annual expenditures for the programs that require the Modified TRC (MTRC) adder and compares these expenses to those for the entire portfolio
- Exhibit 4 and Exhibit 5 present the results for each individual program area and for the total DSM program portfolio

Exhibit 1 - Summary of Annual Expenditures

Program Area	Total Utility Expenditures ($000s)		
	2021	2022	Total
Residential	30,108	30,501	60,609
Commercial	19,600	19,800	39,401
Industrial	7,913	8,462	16,375
Low Income	7,125	7,469	14,594
Conservation Education and Outreach	8,077	9,229	17,306
Innovative Technologies	5,064	11,871	16,935
Enabling Activities	9,112	8,371	17,483
*Portfolio Level Activities	1,822	1,979	3,801
ALL PROGRAMS	**88,822**	**97,682**	**186,504**

*Portfolio Level Activities are those activities for which the costs cannot be assigned to individual DSM programs. It should be noted that these activities are distinct from Enabling Activities. These distinct Portfolio Level Activities include expenditures such as DSM support and portfolio level staff labour, some staff training and conferences, facilities and equipment, some industry association memberships, regulatory work, and EECAG[1] activities.

[1] The Energy Efficiency and Conservation Advisory Group (EECAG) provides insight and feedback on FEI's portfolio of DSM activities and related issues.

Exhibit 2 - Results for the Total DSM Program Portfolio

Indicator	Year	Total
Utility Expenditures, Incentives ($000s)	2021	60,074
	2022	61,001
	Total	**121,075**
Utility Expenditures, Non-Incentives ($000s)	2021	28,747
	2022	36,681
	Total	**65,428**
Utility Expenditures, Total ($000s)	2021	88,822
	2022	97,682
	Total	**186,504**
Net Incremental Annual Gas Savings (GJ/yr.)	2021	1,173,995
	2022	1,192,112
Cumulative Net Annual Gas Savings (GJ)	2021-2022	**2,366,108**
NPV of Net Gas Savings (GJ)		**21,072,299**
Benefit/Cost Ratios	TRC	**1.2**
	Portfolio*	**1.7**
	Utility	**0.9**
	Participant	**2.2**
	RIM	**0.5**

*Includes the MTRC adder for programs that require it (i.e., TRC/MTRC hybrid)

Exhibit 3 - Summary of the Expenditures for Programs that Require the MTRC Adder

Program	Total Utility Expenditures ($000s)		
	2021	2022	Total
Home Renovation Program (Residential)	24,591	25,235	49,826
New Home Program (Residential)	4,728	4,473	9,201
ALL MTRC PROGRAMS	**29,319**	**29,708**	**59,026**
ENTIRE PORTFOLIO	**88,822**	**97,682**	**186,504**
PORTFOLIO UTILIZING MTRC (%)	**33.0%**	**30.4%**	**31.6%**

Exhibit 4 - Expenditures for Each of the Program Areas and the Total DSM Portfolio

Program Area	Utility Expenditures ($000s)								
	Incentives			Non-Incentives			Total Expenditures		
	2021	2022	Total	2021	2022	Total	2021	2022	Total
Residential	27,418	27,832	55,251	2,690	2,669	5,359	30,108	30,501	60,609
Commercial	16,900	16,850	33,750	2,700	2,950	5,651	19,600	19,800	39,401
Industrial	7,137	7,652	14,789	776	810	1,586	7,913	8,462	16,375
Low Income	5,012	5,153	10,165	2,113	2,316	4,429	7,125	7,469	14,594
Conservation Education and Outreach	0	0	0	8,077	9,229	17,306	8,077	9,229	17,306
Innovative Technologies	200	200	400	4,864	11,671	16,535	5,064	11,871	16,935
Enabling Activities	3,407	3,314	6,721	5,705	5,057	10,762	9,112	8,371	17,483
Portfolio Level Activities	0	0	0	1,822	1,979	3,801	1,822	1,979	3,801
ALL PROGRAMS	**60,074**	**61,001**	**121,075**	**28,747**	**36,681**	**65,428**	**88,822**	**97,682**	**186,504**

Exhibit 5 - Gas Savings and Cost-Effectiveness Results for Each of the Program Areas and the Total DSM Portfolio

Program Area	Incremental Annual Gas Savings, Net (GJ)		Cumulative Annual Gas Savings, Net (GJ)	NPV Gas Savings, Net (GJ)	Benefit/Cost Ratios				
	2021	2022			TRC	Portfolio*	Utility	Participant	RIM
Residential	257,763	270,879	528,642	5,077,086	0.8	2.6	0.7	1.8	0.4
Commercial	388,041	381,421	769,462	7,174,124	1.2	1.2	1.6	1.9	0.6
Industrial	458,769	466,317	925,086	7,638,830	3.1	3.1	4.0	3.7	0.8
Low Income	69,422	73,495	142,917	1,182,258	4.0**	4.0	0.7	2.5	0.4
Conservation Education and Outreach	Savings Not Estimated				Savings Not Estimated				
Innovative Technologies	Savings Not Estimated				Savings Not Estimated				
Enabling Activities	Savings Not Estimated				Savings Not Estimated				
Portfolio Level Activities	Savings Not Estimated				Savings Not Estimated				
ALL PROGRAMS	**1,173,995**	**1,192,112**	**2,366,108**	**21,072,299**	**1.2**	**1.7**	**0.9**	**2.2**	**0.5**

*Includes the MTRC adder for programs that require it (i.e., TRC/MTRC hybrid)

**Section 4 of the BC Demand-Side Measures Regulation, as amended in March 2017, requires the use of the Zero Emission Energy Alternative and a 40% benefit adder in calculating the TRC for Low Income programs.

3 Industrial Energy Efficiency Program Area

3.1 Introduction

For the 2021-2022 period of FEI's previously approved 2019-2022 DSM Plan, the customer offerings for the Industrial Energy Efficiency Program Area have been organized into the following programs:

- **Performance program:** This program includes measures that allow customers to identify, assess and implement custom designed energy efficiency projects.
- **Prescriptive program:** This program includes prescriptive initiatives to encourage the implementation of technologies and best practices targeted at specific industrial processes.
- **Strategic Energy Management program:** This is a comprehensive program offering for large natural gas industrial customers to provide energy modeling, energy efficiency coaching and strategic planning support to promote both operational savings projects and larger capital retrofits.

3.2 Selected Highlights

There are no major changes being proposed to the previously approved programs from the 2019-2022 DSM Plan. New measures included in the Prescriptive program in 2021 and 2022, previously described under "Other Measures" include:

- **Thermal Curtains:** These prescriptive measures, targeted at greenhouse facilities generating heat and carbon dioxide from natural gas boilers, will encourage customers to reduce thermal losses from the greenhouse envelope by installing single- and double-layer thermal curtains.
- **Condensing and Infrared Heaters:** These prescriptive measures, applicable to a variety of industrial facilities, will encourage customers to reduce natural gas used in space heating from heaters by installing high-efficiency condensing and infrared units.
- **Steam Boilers:** These prescritve measures, targeted at facilities using boilers to generate steam for space or procerss heating, will encourage customers to install a variety of energy conservation measures to improve efficiency in the steam plant.

Participation forecasts for the Performance and Prescriptive programs have been revised to reflect both the anticipated increase in demand and actual program incentives committed, but not yet realized, in 2019 and 2020.

3.3 Overview of Results

Exhibit 6 and Exhibit 7 provide a summary of the estimated savings, program expenditures and cost-effectiveness results for each of the programs noted above and for the Industrial Energy Efficiency Program Area as a whole.

Exhibit 6 - Summary of Expenditures for the Industrial Sector Program Portfolio

Program	Utility Expenditures ($000s)								
	Incentives			Non-Incentives			Total Expenditures		
	2021	2022	Total	2021	2022	Total	2021	2022	Total
Performance Program	4,297	4,297	8,594	351	369	720	4,648	4,666	9,314
Prescriptive Program	2,500	3,000	5,500	90	110	200	2,590	3,110	5,700
Strategic Energy Management Program	340	355	695	145	152	297	485	507	992
Non-Program Specific Expenses	0	0	0	190	179	369	190	179	369
ALL PROGRAMS	**7,137**	**7,652**	**14,789**	**776**	**810**	**1,586**	**7,913**	**8,462**	**16,375**

Exhibit 7 - Summary of Savings and Cost-Effectiveness Results for the Industrial Sector Program Portfolio

Program	Incremental Annual Gas Savings, Net (GJ)		Cumulative Annual Gas Savings, Net (GJ)	NPV Gas Savings, Net (GJ)	Benefit/Cost Ratios				
	2021	2022			TRC	MTRC	Utility	Participant	RIM
Performance Program	282,656	266,029	548,686	5,055,818	3.9	-	4.7	4.6	0.9
Prescriptive Program	120,112	144,288	264,400	2,142,954	2.1	-	3.3	2.5	0.8
Strategic Energy Management Program	56,000	56,000	112,000	440,058	4.2	-	3.6	7.1	0.8
Non-Program Specific Expenses	Savings Not Estimated				Savings Not Estimated				
ALL PROGRAMS	**458,769**	**466,317**	**925,086**	**7,638,830**	**3.1**	**3.1***	**4.0**	**3.7**	**0.8**

* MTRC is equal to TRC since there are no Industrial MTRC programs

3.4 Program Profiles

The following pages provide profiles for each of the programs shown above in Exhibit 6 and Exhibit 7.

3.4.1 Performance Program

Program Description	The Performance Program is a custom program to help industrial customers use natural gas more efficiently for process-related activities. The program provides funding for walkthrough-level plant wide audits, detailed engineering feasibility studies and custom capital incentives to implement cost effective energy conservation measures (ECMs).
Target Sub-Market	Industrial Customers
New vs. Retrofit	New construction and retrofit
Partners	FortisBC Inc.

Forecasted Measure Participation			
Measure	**2021**	**2022**	**2021-2022**
Technology Implementation	17	16	**33**
Feasibility Study	20	20	**40**
TOTAL	**37**	**36**	**73**

Expenditures ($000's)			
Expenditure Type	**2021**	**2022**	**2021-2022**
Incentives	$4,297	$4,297	**$8,594**
Admin	$61	$64	**$125**
Communication	$20	$21	**$42**
Evaluation	$50	$53	**$103**
Labour	$220	$231	**$451**
TOTAL	**$4,648**	**$4,666**	**$9,314**

Measure Details								
Measure	**Incremental Cost ($)**	**Incentive ($)**	**Contractor Incentive ($)**	**Annual Gas Savings (GJ)**	**Annual Elec. Savings (kWh)**	**Measure Lifetime (yrs)**	**Free Rider Rate (%)**	**Spillover Rate (%)**
Technology Implementation	$332,537	$242,424	$0	18,474	0	15	10%	0%
Feasibility Study	$19,800	$14,850	$0	0	0	-	-	-
Weighted Average per Participant	**$161,174**	**$117,726**	**$0**	**8,351**	**0**	**15**	**10%**	**0%**

3.4.2 Prescriptive Program

Program Description	Prescriptive initiatives to encourage the implementation of technologies for specific industrial processes using natural gas as an energy source.
Target Sub-Market	Large, medium and small industrial facilities
New vs. Retrofit	All measures available for both new construction and retrofit, except for the steam trap surveys and steam trap replacement (retrofit only)
Partners	FortisBC Inc.

Forecasted Measure Participation

Measure	2021	2022	2021-2022
Process Boiler (Hot Water)	10	12	**22**
Thermal Curtains	12	14	**26**
Condensing and Infrared Heaters	41	49	**90**
Steam Traps Survey	3	3	**6**
Steam Traps Replacement	11	13	**24**
Insulation (Pipe and Tank)	25	30	**55**
Steam Boiler Measures	10	13	**23**
TOTAL	**112**	**134**	**246**

Expenditures ($000's)

Expenditure Type	2021	2022	2021-2022
Incentives	$2,500	$3,000	**$5,500**
Admin	$3	$4	**$7**
Communication	$3	$4	**$7**
Evaluation	$41	$50	**$91**
Labour	$43	$53	**$96**
TOTAL	**$2,590**	**$3,110**	**$5,700**

Measure Details

Measure	Incremental Cost ($)	Incentive ($)	Contractor Incentive ($)	Annual Gas Savings (GJ)	Annual Elec. Savings (kWh)	Measure Lifetime (yrs)	Free Rider Rate (%)	Spillover Rate (%)
Process Boiler (Hot Water)	$29,388	$25,701	$0	1,116	0	20	18%	0%
Thermal Curtains	$172,950	$84,067	$0	3,950	0	10	27%	0%
Condensing and Infrared Heaters	$32,585	$10,909	$0	460	0	17	18%	0%
Steam Traps Survey	$1,500	$1,250	$0	0	0	-	-	-
Steam Traps Replacement	$12,062	$4,625	$0	1,096	0	6	18%	0%
Insulation (Pipe and Tank)	$24,000	$9,905	$0	1,727	0	11	18%	0%
Steam Boiler Measures	$61,485	$47,992	$0	1,904	0	20	18%	0%
Weighted Average per Participant	**$45,157**	**$22,358**	**$0**	**1,357**	**0**	**14**	**19%**	**0%**

3.4.3 Strategic Energy Management Program

Program Description	A comprehensive approach to energy management to achieve sustainable energy and cost savings over the long term for larger FEI natural gas industrial customers. Components may include operation energy analytics, energy expert expertise and support, assistance with applications for other program offers, industry collaboration and support for conservation initiatives. May include pay-for-performance aspect for verified energy savings at the end of the program period or for achieving identified milestones.
Target Sub-Market	Large and medium industrial facilities
New vs. Retrofit	Retrofit
Partners	BC Hydro

Forecasted Measure Participation			
Measure	**2021**	**2022**	**2021-2022**
Individual, Large Customer	5	5	**10**
Cohort, Medium Customers	10	10	**20**
TOTAL	**15**	**15**	**30**

Expenditures ($000's)			
Expenditure Type	**2021**	**2022**	**2021-2022**
Incentives	$340	$355	**$695**
Admin	$13	$13	**$26**
Communication	$13	$13	**$26**
Evaluation	$50	$53	**$103**
Labour	$70	$74	**$144**
TOTAL	**$485**	**$507**	**$992**

Measure Details								
Measure	**Incremental Cost ($)**	**Incentive ($)**	**Contractor Incentive ($)**	**Annual Gas Savings (GJ)**	**Annual Elec. Savings (kWh)**	**Measure Lifetime (yrs)**	**Free Rider Rate (%)**	**Spillover Rate (%)**
Individual, Large Customer	$30,500	$30,500	$0	10,000	0	5	20%	0%
Cohort, Medium Customers	$19,500	$19,500	$0	2,000	0	5	20%	0%
Weighted Average per Participant	**$23,167**	**$23,167**	**$0**	**4,667**	**0**	**5**	**20%**	**0%**

4 Innovative Technologies Program Area

4.1 Introduction

The Innovative Technologies[2] Program Area evaluates both pre-commercial and commercially available technologies and conducts pilot studies to validate manufacturers' claims related to equipment and system performance. The program area also assesses actual savings and customer acceptance of these newer technologies or systems of technologies. Technologies that successfully emerge from the Innovative Technologies Program Area are considered for inclusion within the applicable sector programs within the larger C&EM portfolio.

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

4.2 Selection and Implementation Process

Exhibit 8 shows the main steps employed in the selection and implementation process for candidate technologies included in the Innovative Technologies program. As illustrated, the process is organized into four main steps:

- **Step 1: Technology Screening**

  The process begins with the screening of candidate technologies. This step includes conducting prefeasibility studies, small demonstrations or lab tests in order understand the availability of the technology, applicable codes and testing standards, estimate the current adoption rate, evaluate any technical barriers, gather measure assumption data, determine the target customers and assess the market opportunity. The data is used to determine whether the technology meets the requirements of a technology innovation program as defined in the DSM Regulation. Candidate technologies that do not pass the DSM screen are

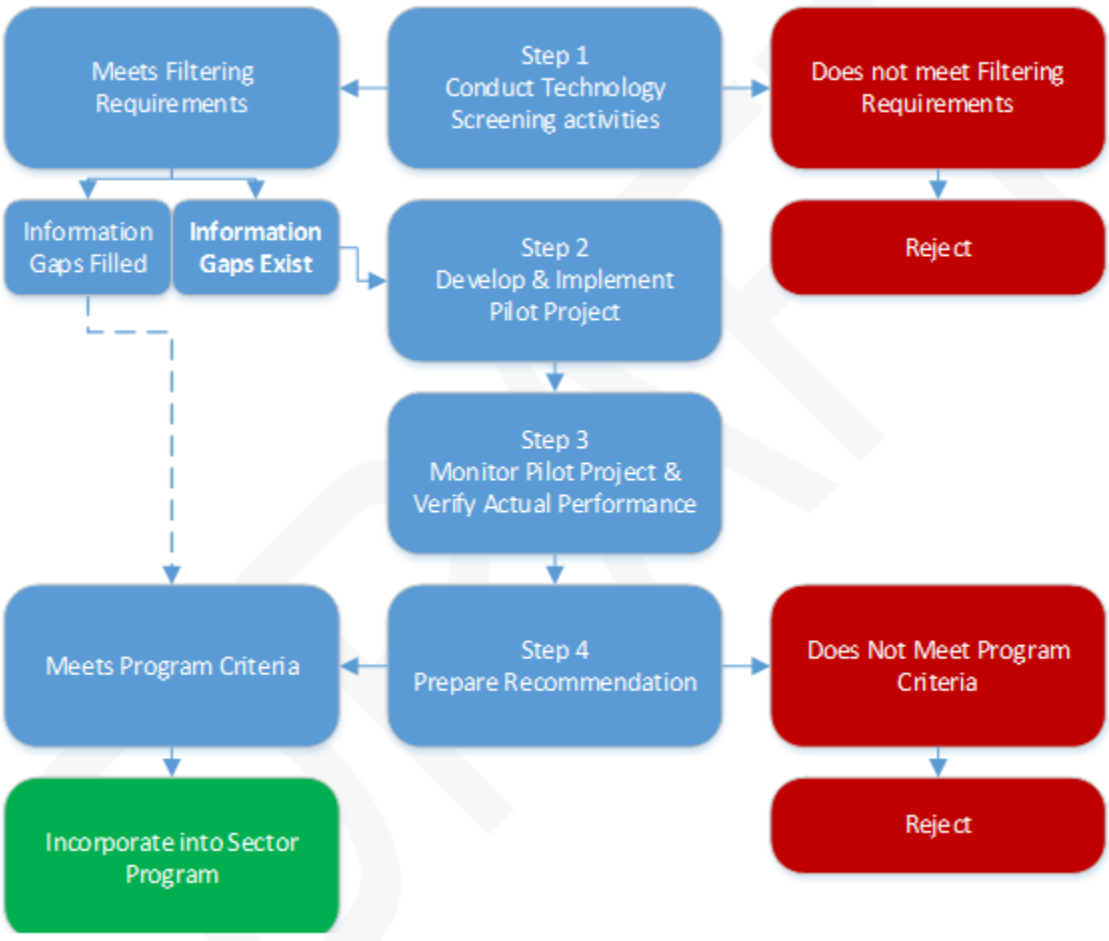
[2] The Demand Side Measure Regulation defines a technology innovation program as:
(a) to develop, use or support the increased use of a technology, a system of technologies, a building design or an industrial facility design that is:
(i) not commonly used in British Columbia, and
(ii) the use of which could directly or indirectly result in significant reductions of energy use or significantly more efficient use of energy,
(b) to do what is described in paragraph (a) and to give demonstrations to the public of any results of doing what is described in paragraph (a), or
(c) to gather information about a technology, a system of technologies, a building design or an industrial design referred to in paragraph (a).

rejected; those that do pass are considered further through the development of a pilot project if information gaps exist and are incorporated into a sector program if the information gaps are filled.

- **Step 2: Develop and Implement Pilot Project**

Pilot projects are used to gather actual operational experience with the candidate technologies. The development and implementation of a typical pilot project for those technologies that pass Step 1 takes approximately two to three years, depending on the complexities of the pilot design, program controls and participation requirements.

Exhibit 8 - Innovative Technology Selection & Implementation Process



- **Step 3: Monitor Pilot Project and Verify Actual Performance**

A measurement and verification (M&V) plan is developed for each pilot project. The plan includes details on the monitoring responsibilities, measurement equipment and meter specifications, procedures for establishing and monitoring the baseline conditions of the site, procedures for measuring the candidate technology performance, establishing the analysis procedure, and highlighting the reporting period. This step includes the procurement and installation of monitoring equipment, data analysis, and results reporting. Plans are compliant with the International Performance Measurement & Verification protocol (IPMVP) requirements.

Once performance data have been compiled over an acceptable period, it is analyzed to determine actual costs and savings as well as any other relevant operational considerations defined in the M&V plan.

- **Step 4: Prepare Recommendation**

A recommendation is prepared based on the results of Step 3. Pilot technologies that demonstrate acceptable levels of technical performance and cost-effective energy savings are typically considered favourably for inclusion into the applicable sector programs. Technologies that do not meet those criteria are typically rejected.

4.3 Expenditure Overview

The funding proposed for Innovative Technologies will be allocated primarily among:

1. Conducting technology screening activities such as prefeasibility studies, small demonstration and lab testing to screen candidate technologies
2. Development, implementation and M&V of pilot projects deemed to be feasible pursuant to screening study outcomes
3. Development, implementation and M&V of deep retrofit pilots for both residential and commercial buildings. These include feasibility assessments, detailed design work, and the installation of mechanical systems and envelope upgrades such that the energy and GHG performance is improved by at least 30%.

Exhibit 9 shows the proposed annual expenditure by activity area over the period 2021-2022.

Exhibit 9 - Expenditure by Activity Area

	Expenditures ($000's)		
Activity Area	***2021***	***2022***	***TOTAL***
Technology Screening	838	851	1,689
Pilot Project Expenditures	2,582	2,447	5,029
Deep Retrofits – Residential	1,072	2,272	3,344
Deep Retrofits – Commercial	387	6,176	6,563
Non-Program Admin	185	125	310
TOTAL[3]	**5,064**	**11,871**	**16,935**

[3] Annual labour expenditures for the Innovative Technology program area are estimated at approximately $450,000 to support technology screening and pilot activities and additional $200,000 to support Residential and Commercial Deep Retrofits.

4.4 Planned Activities

The following table provides a brief description of the potential technologies that are being evaluated for pilot projects over the period 2021-2022.

#	Technology	Description
1	Gas-fired Heat Pumps	A Gas Fired Heat Pump is a machine or device that moves heat from one place to another whether for space heating, space cooling or domestic hot water (DHW). Essentially it is a variation of a refrigeration machine. The heat pump basically takes heat from the outdoor air and moves it into your house in winter (space heating), and then takes heat from your house and moves it outdoors during summer (space cooling). The technology is suited for both residential and commercial applications and is expected to reduce natural gas consumption by approximately 25-33%.
2	Transpired Air Collectors	Transpired air collectors are solar air heating systems that pre-heat ventilation supply air by using solar energy. They work by transforming the exterior façade of a building into a solar absorber. The main components include an absorber plate, a perforated exterior surface, an air space, and an intake fan. These components are typically located on the roof or south-facing surfaces (in the Northern hemisphere) to maximize exposure to incidental solar energy. The perforated plate acts as a means for air to pass through the exterior surface and into the air space, which is in contact with the solar absorber. The absorber is typically painted black and is heated by incoming solar energy. This heat is then transferred to the supply air in the air space. This pre-heated air is ducted into the supply air intake of the building's mechanical system to provide tempered outdoor air. The technology can be applied to new or retrofit conditions.
3	Residential HVAC Zoning	Most residential HVAC systems treat the home as a single zone. Single zone control consists of one thermostat located in a central area of the house that controls HVAC operation. In a single zone system, all of the vent registers are open, distributing air into all areas of the house at once. Single zone control wastes energy because all rooms are being conditioned even when they are not occupied and individual rooms may not be kept at a temperature comfortable for their occupants. Incorporating zoning controls are estimated to save between 5-15% energy.
4	Boiler Cycling/Zoning Controls	Boiler cycling controls increase a boiler's seasonal efficiency by reducing unnecessary cycling. Boiler zoning controls reduce a boiler's consumption by providing a more even distribution of heat throughout the building and by eliminating overheating of spaces. Packaged cycling and zoning controls provide the benefits of both types of boiler controls as an integrated solution. Boiler controls can be installed in both existing and new construction commercial buildings. Gas savings are estimated to be between 8 and 18%, depending on building type and baseline equipment.
5	Thermal Bridging Measures	Design and/or installation measures that reduce thermal bridges in building envelopes.

#	Technology	Description
6	BC Energy Step Code STEP 5 Buildings Pilot	The BC Energy Step Code requires builders to use energy modelling software and on-site testing to demonstrate that both their design and the constructed building meet the requirements of the BC Energy Step Code. STEP 5 of the BC Energy Step Code represents a building design that combines a system of technologies that are innovative in nature and can directly or indirectly result in energy reductions of 50% or more when compared to a reference house. Some of these technologies can include gas-fired heat pumps, direct vent wall furnaces as well as innovative building design elements. The BC Energy Step Code STEP 5 Buildings Pilot will provide incentives to builders to adopt to STEP 5 of the BC Energy Step Code and be evaluated through participant surveys and billing analysis. Case studies will also be developed to showcase the results and provide an educational resource to be shared with builders across the province.
7	Deep Energy Retrofit Pilot	A Deep Energy Retrofit (DER) of a home or building is a retrofit in which the envelope and mechanical systems are improved such that there is a reduction in overall energy and GHG performance by at least 30 percent or more. Currently there is low customer awareness and affordability challenges associated with deep energy retrofits coupled with a lack of qualified trades and design/engineering professionals. Pilots need to be completed in both the commercial and residential market to better understand cost effective comprehensive solutions and feasible pathways to launch a full-scale rebate program.