

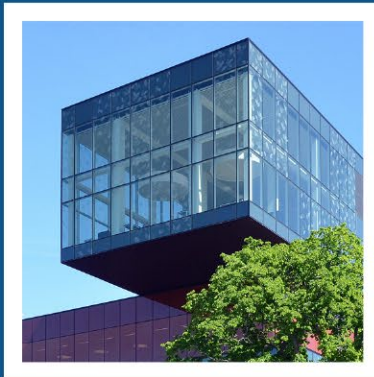
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NOVA SCOTIA

HRM CORPORATE BUILDING ENERGY EFFICIENCY

ANNUAL REPORT 2020





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EXECUTIVE SUMMARY

The Halifax Regional Municipality (HRM) is accelerating energy efficiency progress in year-three of its partnership with Efficiency Nova Scotia. Despite COVID-19 interruptions and budgetary pressures, HRM is building off the 118 projects completed to date. After implementing proposed year-3 projects, cumulative energy cost savings are estimated to increase to over \$2 million annually, reducing corporate buildings emissions by 15% over 2018 levels. Through projects completed to date, the Municipality has reduced annual corporate building emissions by the equivalent of planting 235,000 trees or taking 1112 vehicles off the road.

Year-three funding has increased to \$2 Million in the dedicated energy efficiency capital account, up from \$400,000 in 2018/2019 and \$1,000,000 in 2019/2020. Halifax Regional Council has also approved and submitted a \$9 Million list of shovel-ready energy efficiency projects to the Province for consideration. Approval of these projects is contingent upon future COVID-19 related stimulus funding.

This report provides energy efficiency program highlights including:

- Case studies of key energy efficiency projects;
- Corporate building energy usage and greenhouse gas inventory;
- Update on corporate;
- ENERGY STAR Portfolio Manager benchmarking initiative; and
- Update on HRM's Low Carbon Communities Arena Heat Recovery initiative.

HRM should be commended for its achievements to date and for maintaining its commitment to efficiency through difficult economic times. The Municipality recognized energy efficiency's overall importance in responding to the global climate crisis, maintaining positive momentum surrounding energy efficiency, generating operating savings, and keeping contractors working during a period of economic uncertainty. ■

2 Year Partnership Results

Completed Projects

118

Jobs Created

20

Investment

\$2.1 Million

Rebates/Grants

\$487,912

Annual Energy Savings

9,827,195 ekWh

Annual Cost Savings

\$1.3 Million

10 Year Net-Present Value

\$8,426,167

GHG Equivalent

1112

Cars Removed

234,772

Trees of Planted

INTRODUCTION

BACKGROUND

On April 16, 2017, Halifax Regional Municipality and Efficiency Nova Scotia began a partnership to reduce energy consumption in the Municipality's 250 corporate buildings and to accelerate efforts to meet its corporate emissions reduction objectives. Through this partnership, Efficiency Nova Scotia provides the Municipality with a full-time senior on-site energy manager to help identify and develop energy savings opportunities in the organization.

POLICY



Corporate building energy efficiency is a critical component of HalifACT 2050: Acting on Climate Together, the Municipality's long-term climate action plan, approved by Halifax Regional Council on June 23, 2020. The plan is an update and consolidation of two existing priority plans; the Community Energy Plan and the Corporate Plan to Reduce GHG Emissions 2012-2020. The plan aligns with the special report released in October of 2018 by the Intergovernmental Panel on Climate Change which stresses the need to limit global warming to 1.5°C above pre-industrial levels to prevent irreversible economic, environmental and social impacts. The plan also aligns with the climate emergency that was declared by Halifax Regional Council on January 29, 2019, emphasizing that climate change is a serious and urgent threat to our community.

OBJECTIVES

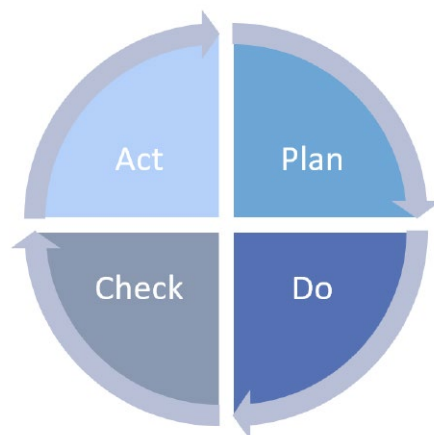
The objectives for the energy management partnership include:

1. Develop the business case for energy efficiency projects with a goal to achieve an annual energy reduction of 4 eGWh (\$500,000 in saving) in first two years;
2. Maximize incentives from Efficiency Nova Scotia and other funding sources;
3. Benchmark energy usage with ENERGY STAR Portfolio Manager to track and assess energy performance of buildings;
4. Increase organizational awareness of energy efficiency: and
5. Establish processes to enable continuous energy improvement in the future.

METHODOLOGY

Each day the Halifax Regional Municipality makes a multitude of decisions that affect energy usage. In order to achieve long term and consistent savings, it is essential that the Municipality shift from considering energy usage as it does any other operational cost, to instead considering the capital and operating costs and savings holistically.

The ISO 50001 Energy Management System standard, adopted



	Managerial	Technical
Plan	-Policy/Goals/Targets -Resources	-Energy data management -Assessments
Do	-Training -Communication -Control equipment systems & processes	-Energy Purchasing -Design -Projects -Verification
Check	-Corrective/preventive action -Internal Audits	-Monitoring -Measuring
Act	-Management Review	-System Performance

by the Canadian Standards Association, is the internationally recognized standard that gives organizations a structured framework to manage energy. The Plan-Do-Check-Act cycle is the operating principle of the ISO 50001 system standards. By following this principle, the organization can effectively manage energy and make continuous improvements. The On-Site Energy Manager has begun to incorporate these principles into energy management activities in anticipation of more formal future adoption.

■ BENCHMARKING

The energy usage of HRM's 83 largest buildings are now being tracked and benchmarked in ENERGY STAR Portfolio Manager, a free software offered by Natural Resources Canada. Tracking building energy usage via Portfolio Manager has many benefits including:



- Targeting of poorly performing buildings for energy audits;
- Labeling buildings with ENERGY STAR score;
- Tracking of progress on energy cost savings and GHG reduction goals across the entire portfolio;
- Verification of savings from completed projects; and
- Recognizing high performing buildings with ENERGY STAR Certification.

In 2020, HRM worked with Efficiency NS to automate entry of electricity data into Portfolio Manager and plans to increase the number of buildings being tracked to 120 in 2020/2021. To show leadership, the Municipality will be participating in the Province's new voluntary benchmarking pilot that encourages large organizations to disclose their energy usage via Portfolio Manager. ■



HRM ENERGY USAGE

HRM ENERGY USAGE

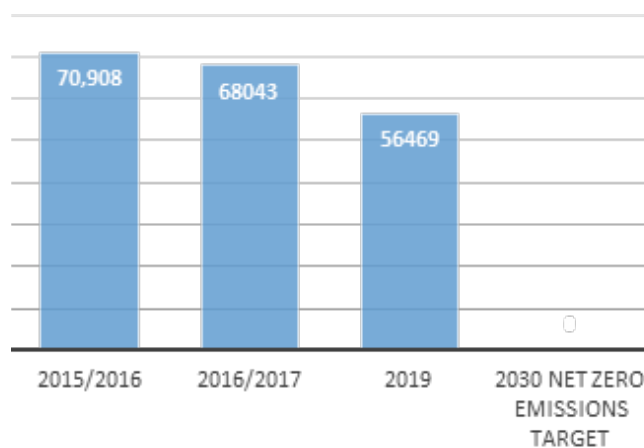
In 2018, HRM's 83 largest buildings, representing 85% of gross floor area, consumed 117.2 eGWh of energy, at a cost of \$11 Million. These buildings were responsible for about 48,000 tonnes of eCO₂ emissions.

The three primary fuel sources for municipal buildings are electricity, natural gas, and heating oil. The table below shows a breakdown of fuel sources by usage and cost. Electricity, the leading fuel source, accounts for about 50% of overall energy usage and 72% of overall cost. Municipal buildings also use propane and diesel; however this quantity is very small in comparison.

HRM CORPORATE BUILDINGS GHG EMISSIONS

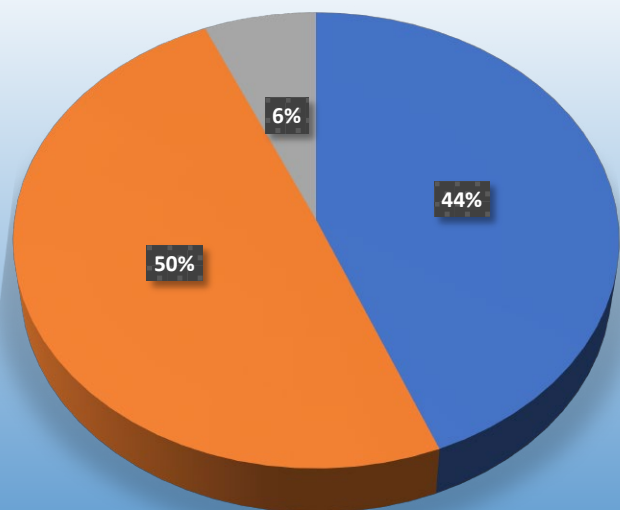
Corporate building emissions have steadily declined since the 2015/2016 fiscal year as a result of energy efficiency efforts and a cleaner electricity grid. Annual building emissions were approximately 56,500 tonnes of eCO₂ in 2019, which is

Building Emissions (t CO₂)

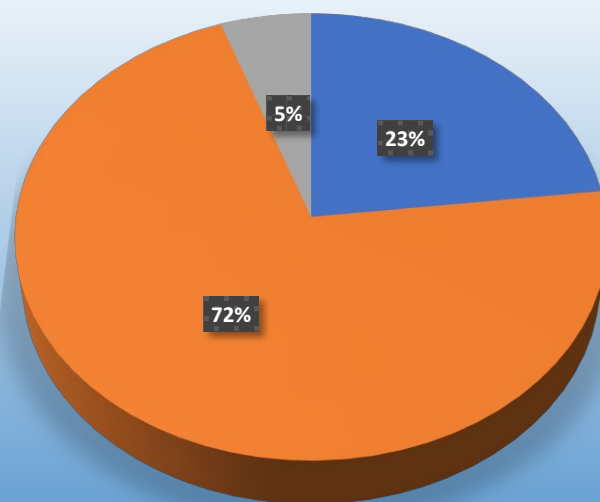


expected to decline further after the 2019 project reductions are realized. The 2020 annual emission totals will be the benchmark to a target of net-zero emissions by 2030.

HRM Energy Usage Breakdown



HRM Energy Cost Breakdown



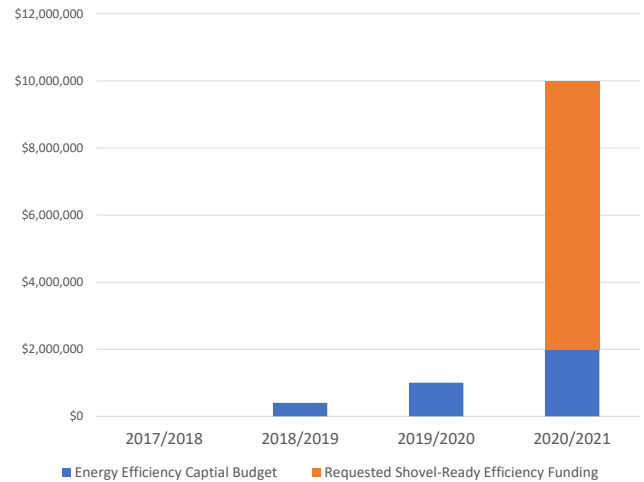
■ Natural Gas ■ Electricity ■ Heating Oil

ENERGY MANAGEMENT RESULTS

The Municipality made significant energy efficiency progress in the first two years of its partnership with Efficiency Nova Scotia. 118 energy efficiency projects were implemented, saving \$1.3 Million in energy costs annually and reducing corporate building emissions by 10%, the equivalent of planting 235,000 trees or taking 1,112 vehicles off the road.

The energy efficiency budget for year three of the partnership has been increased to \$2 Million. Current projects planned for this year are expected to save an additional \$765,600 (\$2.05 million total) in energy costs and 3,365 tonnes of eCO₂ (8,530 tonnes total) annually. This will realize a 15% reduction in corporate energy usage since 2018. In addition, Council has recently approved a \$9 Million list of shovel-ready energy efficiency projects that will be submitted to the Province for consideration through COVID-19 related stimulus funding.

HRM Energy Efficiency Budget



Program Year	Cost	Rebate	Total ekWh	GHG (mt CO ₂ /yr)	Savings
Year 1	\$632,106	\$224,446	4,435,724	2,595	\$665,291
Year 2	\$1,422,887	\$263,446	5,391,471	2,570	\$637,729
Proposed Year 3	\$2,000,000	\$652,000	6,845,000	3,365	\$746,600
Totals	\$4,054,992	\$1,139,893	16,672,195	8,530	\$2,049,621



KEY PROJECTS

This section includes project highlights from the 118 energy efficiency projects completed to date.







WOODSIDE FERRY TERMINAL MAJOR RENOVATION PROJECT

The Woodside Ferry Terminal will undergo a major renovation in 2020. It will become one of HRM's most efficient facilities. The facility participated in Efficiency Nova Scotia's New Construction Program. Energy modeling was completed to optimize energy performance of the design. The building is expected to use 76% less energy upon completion than the 2016 baseline.

Woodside Ferry Terminal Energy Efficiency Summary				
Facility	Woodside Ferry Terminal			
				
Details	8,520 ft²		Built in 1986	Primary Use: Ferry Terminal
2016 Energy Baseline	876,447 ekWh		\$81,072	
Modeled Usage	214,000 ekWh		\$26,000	
Energy Measures	Variable Refrigerant Flow (VRF) Heating System, Enhanced Insulation, energy efficient windows, Optimized Ventilation, LED Lighting, Controls, Daylighting			
Energy Savings	662,447 kWh	75.6%	\$55,071	67.9%
Annual GHG Savings	65		11,640	




ENERGY EFFICIENCY UPGRADES TO BUS MAINTENANCE GARAGES

The Ragged Lake and Burnside Bus maintenance depots are two of HRM's largest energy consumers. Several energy efficiency upgrades have been implemented at these facilities through participation in Efficiency Nova Scotia's Business Energy Rebates program. Combined energy costs were lowered by \$420,000, a reduction of 25%. Significant additional energy savings will be realized through planned 2020 upgrades.

Bus Maintenance Garage Energy Efficiency Summary						
Facility	Ragged Lake Bus Garage			Burnside Bus Garage		
						
Details	119,837 ft ²	2010	Bus Maintenance	172,392 ft ²	1981	Bus Maintenance
2016 Energy Baseline	9.5 eGWh		\$839,734	10.2 eGWh		\$870,862
Energy Measures	LED Lighting, Ventilation Optimization (Phase 1 of 2), Instantaneous Service Hot Water			LED Lighting, Rooftop Unit Replacement (Phase 1 of 2), Air Curtains		
2019 Energy Usage	8.4 eGWh		\$597,679	8.5 eGWh		\$690,263
Energy Savings	1.1 eGWh		\$242,055	1.7 eGWh		\$180,599
	11.5%		28.8%	16.7%		20.7%
Future Energy Measures	Phase 2 Ventilation Optimization, Air Curtains, Solar Energy, EV Charging			Phase 2 Rooftop Unit Replacements, Ventilation Optimization, Compressed Air Sealing		
Annual GHG Savings to Date	345			62,120		




CAPTAIN WILLIAM SPRY ENERGY EFFICIENCY UPGRADES

The Captain William Spry Community Centre achieved significant energy efficiency improvements in the last two years. Several measures were implemented including recommissioning, LED lighting, and a natural gas conversion. The energy costs of the facility were 33% lower in 2019 than the 2016 baseline. The facility will see increased savings in the year ahead as the ventilation system is optimized.

Captain William Spry Energy Efficiency Summary				
Facility	Captain William Spry Community Centre			
				
Details	49,147 ft²		1985	Recreation Centre
2016 Energy Baseline	3,905,677		\$247,959	
Energy Measures	Natural Gas Conversion, Recommissioning, LED Lighting.			
2019 Energy Usage	3,337,129		\$167,201	
Energy Savings	568,548 ekWh		\$80,750	
	14.5%		32.5%	
Future Energy Measures	Ventilation Optimization, Solar PV			
Annual GHG Savings	85		15,280	

CANADA GAMES CENTRE ENERGY EFFICIENCY SUMMARY

The Canada Games Centre completed a series of upgrades with the help of Efficiency Nova Scotia. These upgrades included cooling upgrades, recommissioning, and LED lighting. The energy costs of the facility were 16% lower in 2019 than the 2016 baseline. Additional upgrades are planned for 2020 including LED pool lighting.

Canada Games Centre Energy Efficiency Summary				
Facility	Canada Games Centre Energy Efficiency Summary			
				
Details	170,400 ft²	Built in 2010		Primary Usage: Recreation
2016 Energy Baseline	7,305,935 ekWh		\$756,738	
Energy Measures	Pumping, Heating and Solar Thermal Optimization, Recommissioning, LED Lighting			
2019 Energy Usage	6,358,870 ekWh		\$634,885	
Energy Savings	947,065 ekWh		\$121,853	
	13.0%		16.1%	
Future Energy Measures	LED Pool Lighting			
Annual GHG Savings	85		15,320	

CENTRAL LIBRARY ENERGY BOMA BEST PLATINUM AND EFFICIENCY UPGRADES

The Halifax Central Library achieved Building Owners and Managers Association (BMOA) Best Certification in 2019. BOMA Best is Canada's largest environmental assessment and certification program for existing buildings. This process included conducting an energy audit, setting energy targets and developing an energy action plan. The library received Platinum certification which is the highest level possible. Several energy efficiency measures were also completed including interior LED lighting and controls optimization. In 2020 the library will undergo further improvements including chiller optimization, air handling unit scheduling, and full recommissioning. The result will be a 20% reduction in GHG emissions compared to the 2016 baseline.

Central Library BOMA BEST Platinum and Efficiency Summary				
Facility	Halifax Central Library			
				
Details	107,949 ft²	2012	Library	
2016 Energy Baseline	3,390,889 ekWh		\$359,006	
Energy Measures	BOMA BEST Platinum Certification, LED lighting, Controls Recommissioning			
Energy Savings	565,000		\$67,800	
	16.7%		18.9%	
Future Energy Measures	Chiller optimization, AHU scheduling, Additional Recommissioning			
Annual GHG Savings	75		13,560	

ENERGY EFFICIENT NEW CONSTRUCTION PROJECTS

HRM is integrating comprehensive energy efficiency measures into new construction projects with the help of Efficiency Nova Scotia. The energy efficient Williamswood Fire Station is participating in the Business Energy Rebate Program and will serve as a template for future fire station developments. The net-zero Needham Park Washroom facility will produce as much energy as it consumes due to an efficient design and rooftop solar panels. The MacKintosh Depot is participating in the Efficiency NS New Construction Program and is designed to exceed the 2017 National Energy Code by 15% and achieve LEED Silver Certification. HRM is pushing to make all new developments net-zero ready as per the direction of HalifACT 2050.

Energy Efficient New Construction Summary						
Facility	Williamswood Fire Station		Net-Zero Needham Washroom		MacKintosh Maintenance Depot	
						
Details	11,974 ft ²	Fire Station	700 ft ²	Washroom	43,000 ft ²	Fire Station
Williamswood Features	Energy efficiency template for future HRM fire station developments. Includes: Air-to-water space and water heating, air curtains, Solar PV, Controls, Enhanced Insulation, Destratification Fans Significantly better than National Energy Code 2017.					
Needham Features	Net-Zero Energy Usage					
MacKintosh Features	15% better than National Energy Code 2017 + LEED Silver Certification.					
Annual GHG Savings	70		12,600			

HRM FACILITY RECOMMISSIONING PROJECTS

HRM is achieving exceptional savings at low costs recommissioning its buildings through Efficiency Nova Scotia's Building Optimization Program. The program provides incentives towards studies and implementation costs on low to no cost building operational improvements. Over 15 recommissioning projects are now completed or underway across the municipality with many others planned.

HRM Recommissioning Examples						
Facility	Sackville Sports Stadium		Centennial Pool		Gordon Snow Community Centre	
						
Details	122,000 ft ²	1989	17,417 ft ²	1985	35,986 ft ²	2008
2018 Energy Baseline	4,929,043 ekWh	\$541,022	2,814,644 ekWh	\$185,888	898,768 ekWh	\$136,325
Energy Measures	Recommissioning, LED Lighting		Recommissioning, Solar Optimization, LED Lighting		Recommissioning, LED Lighting	
Energy Savings	\$95,044	17.5%	\$32,686	17.5%	\$13,999	10.3%
	850,990 ekWh	17.2%	705,184 ekWh	25.0%	109,597 ekWh	12.2%
Future Energy Measures	Ventilation Optimizaion, Building Automation, Lighting Controls, Heat Recovery, Solar PV		Pumping Optimization, Energy Efficient Filtration		Ventilation Optimization	
Annual GHG Savings	165				29,640	
						

ERIC SPICER BUILDING ENERGY EFFICIENCY UPGRADES

The Eric Spicer Building underwent several energy efficiency improvements resulting in a more comfortable building with reduced costs, energy usage, and emissions. The building was converted from oil to natural gas heating and LED lighting was installed. The buildings high capacity service water heaters were de-rated due to decreased water consumption. A full recommissioning study was completed through Efficiency Nova Scotia's Building Optimization Program. Implementation in 2020 will result in additional savings.

Eric Spicer Building Energy Efficiency Summary				
Facility	Eric Spicer Building			
				
Details	93,167 ft²		1974	Office Building
2016 Energy Baseline	2,854,595 ekWh		\$303,771	
Energy Measures	Hot Water Tank De-Rating, LED Lighting, Natural Gas Conversion, Building Controls			
2019 Energy Usage	2,484,772		\$233,422	
Energy Savings	359,822		\$70,349	
	12.6%		23.1%	
Future Energy Measures	Recommissioning, Ventilation Optimization			
Annual GHG Savings	60		10,720	

LOW CARBON COMMUNITIES ARENA WASTE HEAT RECOVERY PROJECT

Halifax Regional Municipality was awarded \$75,000 in 2019 from the Low Carbon Communities (LCC) Program to study opportunities to utilize arena refrigeration waste heat at six arenas. The LCC program is administered by the Nova Scotia Department of Energy and is intended to fund projects that can reduce emissions. The arenas being studied through LCC include:

- Sackville Sports Stadium
- Cole Harbour Place
- Scotiabank Centre
- New Forum Development
- BMO Centre
- RBC Centre

The municipality's arenas are some of its largest energy consumers and a typically arena rejects significant volumes of waste heat every year. This project is expected to lead to the development of economically attractive capital projects that have the potential to significantly reduce energy and emissions in our arenas. The first 3 of 6 studies were awarded to consultants last year and the full project will wrap up in 2020.

RATE CODE OPTIMIZATION

An analysis was completed to optimize HRM's power account rate codes with Nova Scotia Power. This ensures HRM gets billed according to the most favorable eligible rate code structure in each of several hundred power accounts. Opportunities were identified for significant savings. For example, a building with a 60% load factor moved from rate code 04 to a rate code 11 saves \$.029/kWh. It is estimated that rate code optimization exercise saved the municipality \$62,000 per year. ■



COMMUNICATIONS AND AWARENESS

A strategic communications plan is vital to the success of an energy management program. Management decisions must be aligned with energy management policy. Staff must be aware of energy management policy and impact of behavior on energy usage. A strategic communication plan was developed in partnership with HRM Corporate Communications. The plan objectives are to increase visibility for energy efficiency and to provide the necessary

education and training for staff. Communications channels will include: newsletter, the Employee HUB, building LCD Displays, signage, posters, and other literature. Keeping staff up to date and engaged is key.

This Plan will be implemented this fiscal year. ■



ABOUT EFFICIENCYONE

EfficiencyOne is a leader in the design and delivery of resource efficiency programs and services for homes, businesses, and large industrial customers. To date, EfficiencyOne, operating in Nova Scotia as Efficiency Nova Scotia, has helped over 400,000 program participants, and achieved more than \$1 billion in energy savings, avoiding nearly 1 million tonnes of CO2 annually.

We believe in the good things efficiency brings to our lives, and we work with a number of outstanding partners to transform how our customers use energy and other resources.

EfficiencyOne has a number of controls and processes to ensure transparency and oversight of performance. Electricity efficiency services are regulated by the Utility and Review Board (UARB) which approves the overall electricity efficiency plan and savings. EfficiencyOne is subject to a number of independent, third party audits and evaluations to ensure that efficiency projects were implemented effectively, and that energy savings are correctly measured. ■

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Energy efficiency has helped young professionals find meaningful work at home. David Brushett, a mechanical engineer who graduated from Dalhousie University, is one of them.

David has been working in energy efficiency for 12 years. He's a Senior Energy Manager with Efficiency Nova Scotia working directly with HRM and mentoring and developing other municipal energy managers across the province. For nearly three years, David lived and worked in Cape Breton Regional Municipality (CBRM) helping cut its energy use by 15%.

David is a Director of the successful Solar Scotia Energy (CEDIF), Chair of Solar Nova Scotia, Director of Martimes Energy Association and has done international energy efficiency work with EfficiencyOne Services. ■

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