

ACTIONS

CATALOGUE

HalifACT 2050
ACTING ON CLIMATE TOGETHER





About this catalogue

This actions catalogue has been developed through research on best practices to reduce greenhouse gas emissions in cities, and is intended to showcase a suite of potential actions that HRM and stakeholders may consider for implementation in the HalifACT2050 plan (currently under development). In this context, the actions contained herein are not necessarily prescriptive, nor comprehensive; they are intended to catalyze discussion and debate, and support the development of a Halifax-specific set of actions to be implemented through HalifACT2050.

Themes

	BUILDINGS	1
	TRANSPORTATION	7
	ENERGY SUPPLY	12
	WASTE	16
	WATER & WASTEWATER	18
	GREEN & BLUE INFRASTRUCTURE	21
	FOOD & AGRICULTURE	23
	LAND USE	24
	FINANCE & ECONOMIC DEVELOPMENT	27

POTENTIAL CO-BENEFITS

The set of icons at the foot of each page indicates potential co-benefits of the low-carbon strategies. Highlighted icons indicate that the co-benefit could be realized as a result of employing the strategies.



REDUCED AIR POLLUTION



ECONOMIC PROSPERITY



IMPROVED INDOOR AIR QUALITY



RESILIENCE



SOCIAL EQUITY



INCREASED PHYSICAL ACTIVITY



REDUCED NOISE POLLUTION



HEALTHY DIET



REDUCED RISK OF INJURY

SAMPLE PAGE



BUILDINGS

Building performance rating and reporting

←..... This is the **STRATEGY** under which several mechanisms to reduce emissions are grouped.

DESCRIPTION

←..... A brief description of the strategy.

Building performance monitoring, reporting and benchmarking measures are critical enablers in achieving emissions reduction goals. They allow the city to compile building data from a range of uses and track energy performance (and therefore GHG emission reductions) year by year, enabling cities to understand where to target their continued efforts.

SAMPLE MECHANISMS

←..... These are **MECHANISMS** that are associated with the sub-category. They can be made up of plans, policies or programs. The actual implementation of these (considered **ACTIONS**) contributes to reducing emissions.

- Advanced metering (smart, net and sub-metering)
- Benchmarking
- Energy performance certification
- Mandatory audits and advice

BRIDGING INITIATIVES

←..... This highlights steps already being taken in this area.

- In 2018, HRM began an effort to register all of its municipally owned, administered and leased spaces on the USEPA's EnergyStar Portfolio Manager platform. This allows regular, systematic monitoring of energy consumption and emissions, and provides important information on each building's performance relative to other similar structures in the region.

WHAT OTHER CITIES ARE DOING

←..... These are examples of mechanisms that other cities have used in this area.

- NYC: Requires sub-metering in non-residential tenant spaces larger than 5,000 square feet in area in all large and mid-sized buildings. The 2009 Greener, Greater Buildings Plan requires benchmarking and disclosure for public buildings greater than 10,000 sf, and commercial or multifamily buildings greater than 50,000 sf.

IMPLEMENTATION LEVER

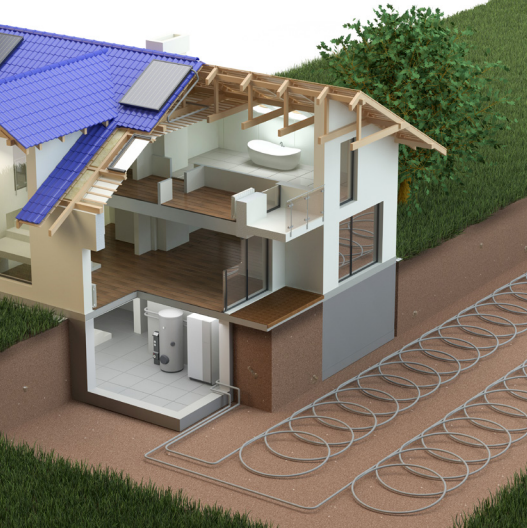
Policy / Incentive / Program / Procurement

←..... This is a classification of what type(s) of levers can be used to implement the mechanism.

←..... This highlights potential co-benefits associated with the strategy.



POTENTIAL CO-BENEFITS





BUILDINGS

Building codes and standards for new construction

DESCRIPTION

Energy codes and/or standards seek to encourage or mandate energy efficiency in buildings through either prescriptive or performance methodologies. Prescriptive methodologies require developers to meet minimum thresholds for key energy drivers such as insulation, HVAC efficiency and lighting for example, and are generally in the form of a checklist requiring specific items. Performance methodologies are more focused on how the building performs overall, rather than on the individual physical items it takes to get there (though these can still be identified), require developers to meet minimum thresholds for energy use intensity (EUI), on a per square metre basis (eg. GHG/m², or thermal energy demand intensity (kWh/m²)), or a percentage reduction from a baseline. These can also be adopted through minimum energy performance rating systems such as Passive House, Net Zero or Energy Star for the various categories of building types.

SAMPLE MECHANISMS

- Appliance efficiency standards
- Energy consumption/GHG emissions cap for new construction
- District heating/cooling connection
- HVAC efficiency standard
- Lighting efficiency standards
- Mandatory energy performance rating or green community rating system (LEED, Energy Star, Passivhaus, Net-Zero, etc)
- Renewable energy installation requirements or incentives

BRIDGING INITIATIVES

- Efficiency Nova Scotia offers services for New Construction for businesses that support the design of energy efficient buildings that lower energy costs and reduce operating and maintenance costs. Support is available from planning stages through to building occupancy.



POTENTIAL CO-BENEFITS



BUILDINGS

WHAT OTHER CITIES ARE DOING

- NYC: In order to reach the PlaNYC GHG emissions reduction goal, a more stringent building code (Energy Conservation Code (NYECC)) has been adopted for new residential and commercial buildings and major renovations. The code will be phased-in with consumption reduction targets of 20 percent below 2016 consumption in 2019, 40 percent below 2016 consumption targets in 2022, and Zero-Net-Energy by 2030. Monetary incentives encourage voluntary adoption of stretch codes, with targets of 40 percent below 2016 consumption by 2019 and Zero-Net-Energy by 2022.
- Toronto - The Toronto Green Standard (TGS) is Toronto's sustainable design requirements for new private and city-owned developments. The Standard consists of tiers (Tiers 1 to 4) of performance measures with supporting guidelines that promote sustainable site and building design. Tier 1 of the Toronto Green Standard is a mandatory requirement of the planning approval process. Financial incentives are offered through a Development Charge Refund Program Version 3 or Version 2 for planning applications that meet higher level voluntary standards in Tiers 2 to 4.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



BUILDINGS

Building performance rating and reporting

DESCRIPTION

Building performance monitoring, reporting and benchmarking measures are critical enablers in achieving emissions reduction goals. They allow the city to compile building data from a range of uses and track energy performance (and therefore GHG emission reductions) year by year, enabling cities to understand where to target their continued efforts.

SAMPLE MECHANISMS

- Advanced metering (smart, net and sub-metering)
- Benchmarking
- Energy performance certification
- Mandatory audits and advice

BRIDGING INITIATIVES

- In 2018, HRM began an effort to register all of its municipally owned, administered and leased spaces on the USEPA's EnergyStar Portfolio Manager platform. This allows regular, systematic monitoring of energy consumption and emissions, and provides important information on each building's performance relative to other similar structures in the region.
- Halifax Regional Council declared a Climate Emergency in January 2019, which included provisions to establish a carbon budget for the Municipality's corporate and community emissions. Such a budget is a voluntary measure and could be articulated as a new policy during the implementation of HalifACT 2050.

WHAT OTHER CITIES ARE DOING

- NYC: Requires sub-metering in non-residential tenant spaces larger than 5,000 square feet in area in all large and mid-sized buildings. The 2009 Greener, Greater Buildings Plan requires benchmarking and disclosure for public buildings greater than 10,000 sf, and commercial or multifamily buildings greater than 50,000 sf. A key future suggestion is that utility companies bear the onus of collecting the data, as opposed to the City (e.g. NYSEERDA). This would achieve great cost reductions, as the utilities already have access to the data.
- EU: Energy Performance Certificates (EPC) introduced in 2002 as part of Energy Performance Buildings Directive (EPBD), updated in 2010. All properties (homes, commercial, and public buildings) must obtain an EPC when built, sold, or rented. The EPC details building information, energy performance data, calculation methods, inspector qualifications, and recommendations for improvement.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



BUILDINGS

Energy efficiency and retrofit measures for existing buildings

DESCRIPTION

If cities are to achieve carbon emissions reduction targets, it is not enough to build new energy-efficient buildings - existing buildings will need to be retrofitted. While contributing a large portion of city emissions, most of the current buildings will still be around in 2050. Retrofitting, energy auditing and re-commissioning of existing buildings provides opportunities for achieving significant energy savings.

SAMPLE MECHANISMS

- Building Energy Management Systems
- Cooling efficiency
- Daylighting & controls
- Demand response programs
- Efficient lighting systems
- Energy efficient appliance purchases
- Energy performance contracting
- Heating efficiency
- Building operations staff training
- HVAC operations & maintenance
- Insulation (windows, wall, roof)
- Mandatory deep energy retrofit studies with audits
- Minimum performance standards for existing buildings
- Other plug loads or process loads
- Re-commissioning
- Renovation threshold requirement to meet codes and standard
- Create retrofit incentives

BRIDGING INITIATIVES

- Efficiency Nova Scotia's On-site Energy Manager (OEM) program for businesses and institutions supports a co-funded on-site energy manager that works with staff to improve energy-related activities in businesses, identify and obtain funding and financing opportunities, and plan, implement and evaluate energy saving projects.

WHAT OTHER CITIES ARE DOING

- NYC: Requires owners of mid-sized buildings to upgrade lighting in non-residential areas to meet current Energy Code standards by 2025; requires buildings over 50,000 gross sf to undergo periodic energy audit and retro-commissioning measures; and have tailored energy standards for appropriate application to historic buildings, which are currently exempt from Energy Code compliance.
- Toronto: Launched in January 2014, the Home Energy Loan Program (HELP) offers low interest loans of up to \$75,000 to homeowners to cover the cost of home energy improvements. The program offers low fixed interest rates, terms of up to 15 years, and access to rebates offered by the Province of Ontario and utility companies.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



BUILDINGS

Industrial carbon emissions reduction

DESCRIPTION

The industrial sector consumes a significant amount of energy to produce the goods and raw materials that we use everyday. Specific measures on energy efficiency are challenging due to the sheer range of production mechanisms and technologies. As an alternative, carbon emission trading systems provide incentives to encourage firms to identify financially optimal solutions to reduce emissions.

SAMPLE MECHANISMS

- Carbon emissions reporting
- Carbon reduction targets for industry
- Energy efficiency or waste energy recovery in industrial processes
- Industrial emissions trading system (ETS)
- Voluntary carbon budgets
- Engagement and peer support programs

BRIDGING INITIATIVES

- Nova Scotia has a closed market Cap-and-Trade program already in place. About 21 entities are implicated in the regulations, and entry into the program is based on emissions thresholds and provincial discretion, as per the regulations.

WHAT OTHER CITIES ARE DOING

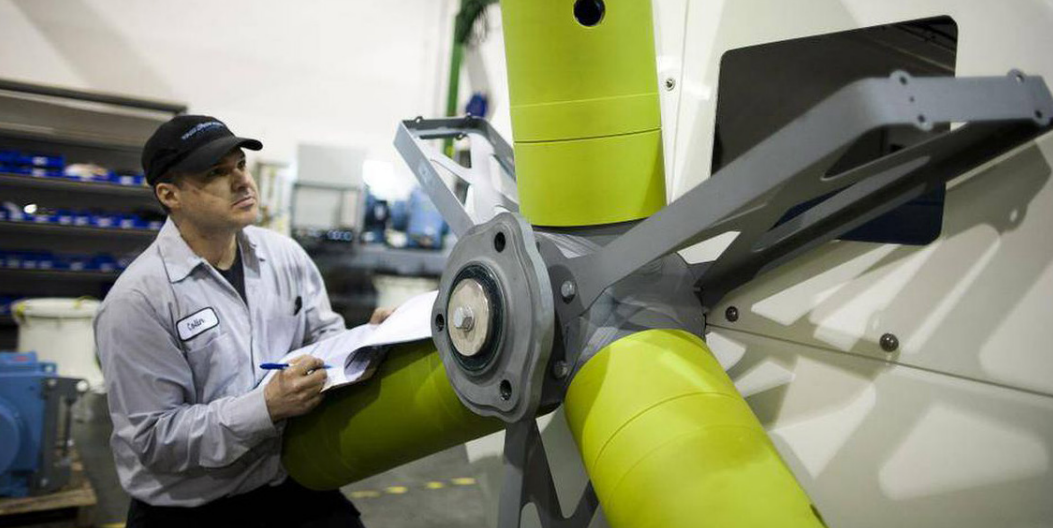
- Buenos Aires: A contest called "Environmental Care Recognition in Small and Medium Enterprises (SMEs) of the City of Buenos Aires" aims to reward and disseminate best environmental management practices implemented by those SMEs that voluntarily meet environmental regulations. The winners can receive the Gold, Green or Green Plus distinction.
- Tokyo: Tokyo implemented a local Emissions Trading System (ETS) in 2010 with a facility-level cap defined during three compliance periods. Industrial entities (factories or facilities that obtain at least 20% of energy from district heating and cooling plants) were required to implement a 6% reduction in 2010-2014, a 15% reduction in 2015-2019, and an undecided reduction in 2020-2022 below base levels (2002-2007). This ETS covers 40% of the industrial and commercial sectors' emissions.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS





TRANSPORTATION

Fuel economy - public transport

DESCRIPTION

The emissions of transit operations can be reduced by fuel-switching the transit fleet, including ferries, as well as reducing fuel consumption through reducing stop-start driving that includes less forceful acceleration and braking.

SAMPLE MECHANISMS

- Improve transit vehicle fuel economy through:
 - fuel-efficient bus driving
 - switching to low or zero carbon fuels
 - switching to electric vehicles
 - automated vehicle locating and monitoring systems
- Electrify ferries/river boats

BRIDGING INITIATIVES

- HRM is currently undertaking an alternate fuel study for Halifax Transit. One alternate fuel option considered in the study is electricity. The results are expected to be presented to Regional Council before 2020.

WHAT OTHER CITIES ARE DOING

- Copenhagen: The City is targeting to have carbon neutral public transport by 2025 through a combination of electrification and using biogas as a fuel source. This includes all harbour buses/ferries.
- Oslo: All public transport in Oslo is required to only use renewable energy by 2020; it is anticipated that transit will be supplied by a mixture of bio diesel, bio gas, hydrogen and electricity.
- British Columbia: BC Transit has committed to making its entire bus fleet fully electric by 2040, which includes replacing more than 1,200 existing buses and adding another 350 over the next ten years. The first heavy duty battery electric buses will be launched in 2021, and BC Transit will begin buying electric-only buses starting in 2023.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



TRANSPORTATION

Fuel economy - private transport

DESCRIPTION

Fuel consumption of private vehicle operations can be reduced through a number of technological, infrastructural, behavioural and management mechanisms. Improvements in vehicle fuel efficiency and switching to cleaner fuels reduce emissions. The supply of electric vehicle (EV) recharging stations supports greater uptake of electric vehicles, especially for urban travel. Financial incentives and disincentives can influence travel behaviour including trips taken and total vehicle kilometres travelled.

SAMPLE MECHANISMS

- Eco-driving courses
- Electric vehicle charging infrastructure
- Improve commercial fleet (taxis/hire cars/delivery service) fuel economy
- Incentives/rebates/mandates to switch personal and commercial vehicles to electric/hybrid/low-carbon vehicles
- Registration fees and or road-user charges (e.g. tolls or congestion charges) tied to vehicle efficiency
- Fuel tax surcharges for higher carbon density fuels
- Renewable fuel minimum standard (e.g. minimum blend requirements)
- Switch City authority fleet of vehicles to electric/hybrid/low-carbon (including waste vehicles, if appropriate)

BRIDGING INITIATIVES

- HRM recently evaluated its 2008 Vehicle and Equipment Anti-idling Policy for Municipal fleet vehicles and equipment. The evaluation, which relied in part on data from AVL devices equipped on most Municipal vehicles, recommended more driver education and regular communication on progress toward GHG reduction targets for the entire fleet.

WHAT OTHER CITIES ARE DOING

- Buenos Aires: Eco-driving promotion focuses on strengthening ecological driving through workshops for private and professional drivers who wish to get or renew their driving licenses.
- Montreal: The provincial government has introduced Canada's first public charging network, The Electric Circuit, for plug-in electric vehicles. The network is a collaborative effort between Hydro Quebec, regional and municipal governments, and partners from the private sector.
- Singapore: Through the Carbon Emissions-based Vehicle Scheme (CEVS), all new and imported used cars, as well as taxis, are assigned to categories based on their CO₂/ km performance data. Low-emission cars are given incentives, while higher emission cars incur a penalty in the form of a registration surcharge. The aim is to encourage consumers and taxi companies to choose lower-emission car and taxi models.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



TRANSPORTATION

Active transportation

DESCRIPTION

Improvements to walking and cycling environments increase active mode shares. In more dense, urban environments, this can encourage more local trips (multi-purpose trips by foot or cycle), rather than vehicle trips to more distant destinations. It can also encourage more transit trips (especially for commutes) as people are more willing to walk or cycle between transit stops and their origins and destinations. In less dense and more suburban environments, it can increase the incidence of short task-oriented walking and cycling trips that might otherwise be taken by private vehicle (e.g. to local shops and schools).

SAMPLE MECHANISMS

- Cycling schemes;
 - Expanded hire/share programmes
 - Separated bike lanes and traffic lights, cycle only parking, signage
 - Implement road diets to reduce road space for motorised modes (chiefly, single-occupancy vehicles) and reallocate to active transport (walking and cycling)
- Walking Schemes:
 - improve pedestrian crossings, install better-connected, generous and comfortable walking routes, and provide walking maps and signage

BRIDGING INITIATIVES

- In 2014, HRM adopted an Active Transportation Priority Plan to guide its efforts to improve infrastructure for and access to active transportation. Halifax's new All Ages & Abilities (AAA) Bikeway Connections are a result of this plan.

WHAT OTHER CITIES ARE DOING

- Copenhagen: Intelligent transport systems optimise the city's traffic signals to the benefit of bicyclists and buses. The Danish have also invested significantly in cycling priority infrastructure including separated cycle lanes along many streets. In 2017, 41 % of all trips to work and study to/from Copenhagen was by bike and 62 % of Copenhageners chose to bike to work and study in Copenhagen. In total, 1.4 million km is cycled in the city on an average weekday.
- Montreal: BIXI Montreal is North America's first large-scale bike sharing systems. The BIXI network has 7,250 bikes and 600 stations spread out across the areas of Montreal, Longueuil and Westmount. In 2018, approximately 5.8 million bicycle trips were made on the BIXI system.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



TRANSPORTATION

Public transport - infrastructure, services and operation

DESCRIPTION

Improving bus infrastructure, service and operations encourages residents to use public transport more frequently, resulting in significantly lower transport carbon emissions per capita.

SAMPLE MECHANISMS

- Construct bus rapid transitways or partial priority facilities for bus services
- Increase bus service density, coverage, and frequency
- Introduce bus rapid transit
- Introduce light rail
- Modernise bus fleet to improve passenger comfort and experience
- Allow bikes to be carried on transit
- Introduce e-scooters
- Construct more secure bike stackers/lockers at transit stations
- Improve design and legibility of transit stations
- Modify or eliminate transit fares to encourage travel in shoulder periods
- Introduce a free Central Area Transit Zone (CATZ)
- Increase priority within mixed traffic environments to improve journey speed and reliability
- Make all transit free

BRIDGING INITIATIVES

- Most of Halifax Transit's buses now feature bike racks to allow riders to quickly load and unload bicycles as they move around the municipality.
- HRM recently began installing priority signals for Transit buses to improve the efficiency and reliability of the service.

WHAT OTHER CITIES ARE DOING

- Connecticut: The Fastrak BRT – Bus Rapid Transit Program started in 2015 and includes dedicated bus-only roads, travel times comparable or less than car, modern low-floor buses, modern bus stations with rising platforms, fare payment pre-boarding and WiFi. Ridership has doubled within the first year.
- NYC: 7 Downtown Connection buses offer free transportation routes in New York's financial district to reduce taxi use in the area.
- Copenhagen: To add convenience, bikes were integrated into the wider transport network, so passengers could easily transfer between cycling and public transport. Carriages on trains were upgraded to accommodate cycles, including travel at peak times.
- Calgary: The Calgary CTrain light rail system has a Free Fare Zone downtown, where rides taken solely within the downtown are free.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



TRANSPORTATION

Freight systems

DESCRIPTION

Fuel consumption and emissions from the freight transport sector can be reduced through freight traffic planning (mode, route/ distribution and timing), pricing models, route/area restrictions and application of low-carbon fuels and fuel efficiency measures in vehicles.

SAMPLE MECHANISMS

- Preparation of a Freight Master Plan (or equivalent function plans) that designates freight routes, intermodal transfer locations, load break-down locations and freight traffic management (e.g. restricted travel hours via selected routes).
- Incentives/rebates/mandates to switch freight trucks to electric/hybrid/low-carbon
- Low emissions zones/congestion charges
- Real-time information for logistics conveyed digitally
- Registration fees and/or road-user charges (e.g. tolls or areal congestion charges) tied to vehicle efficiency and VKT/VMT
- Trucks - restricted access to particular areas (time-based or permanent)
- Shipping port operations - fuel switching; port electrification; more efficient vehicles

BRIDGING INITIATIVES

- Halifax's Macdonald Bridge is closed to large trucks and commercial vehicles, which are instead diverted to Highway 118 and the MacKay Bridge instead of moving through residential sections and downtown Halifax.

WHAT OTHER CITIES ARE DOING

- Chicago: Chicago is undertaking a \$3 billion CREATE freight rail program aimed at reducing freight rail emissions and improving efficiency.
- San Diego: Green Port Program specifies a number of sustainable initiatives for the seaport, one of which is to reduce the Port's operational energy use by at least 170,000 kilowatt hours per year.
- Florida: The "AV/CV/ITS Freight Applications" pilot project is exploring the feasibility of using AV trucks in the perishable freight industry. It is a three-phase project in which Connected Vehicle (CV) technology will be used to study truck traffic patterns (phase 1), then connected to street signals (phase 2), then given street signal priority for travel time optimization (phase 3).

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



ENERGY SUPPLY

Local low or zero carbon energy generation (community scale)

DESCRIPTION

Electricity generation can be one of the biggest drivers of citywide carbon emissions, especially in provinces with more carbon-intensive electricity grids. Cities and residents may either influence utility providers to decarbonize, or seek development of local city-scale or community-scale low-carbon energy generation facilities themselves. Local decentralized generation, especially when combined with storage, also enables self-sufficiency and resilience.

SAMPLE MECHANISMS

- Anaerobic digestion of organic wastes
- Biogas / landfill gas recapture
- Community renewable energy projects
- District energy (electricity, heating or cooling) with renewable energy source (e.g. biomass)
- Large scale heat pumps (water, ground)
- Wind
- Solar electricity (photovoltaic, concentrating solar)
- Solar heat (solar thermal, solar hot water, solar hot air)
- Wastewater heat recovery systems
- Large scale purchases of renewable energy on behalf of the community
- Explore and support provincial regulatory requirements for renewable energy generation

BRIDGING INITIATIVES

- Halifax Water plans to construct a district energy network using waste heat from its wastewater treatment plant as part of the Cogswell Redevelopment.

WHAT OTHER CITIES ARE DOING

- Seattle: The Solar Market Transformation project uses American Reinvestment and Recovery Act funds to 1) develop a financial and ownership model that addresses all legal, technical and logistical requirements for community solar; 2) install the first Community Solar Project in Seattle (estimated 30-60 kW); 3) market the program and enrolling participants; and 4) establish a Solar Revolving Fund that will re-invest revenue generated by the first project into future projects.
- Okotoks, Alberta: Drake's Landing, a 52-home housing community, receives 90% of its space heating from solar thermal technology, and makes use of seasonal underground energy storage.
- Toronto: Toronto has a policy that requires developers in Community Energy Plan (CEP) areas to submit an Energy Strategy as part of a complete development application. The Energy Strategy addresses opportunities for embedded energy solutions that pertain to a particular development. The City provides the scope, reviews the strategy, and works with the developer on implementation.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



ENERGY SUPPLY

On-site (building scale) energy generation

DESCRIPTION

On-site renewable energy, such as solar, is a way to supply some of the required energy for a building or facility while reducing its reliance on fossil fuels. There has been increased deployment of on-site renewable systems in recent years, by both residential and non-residential energy consumers. The increased availability of tax incentives, credits, and grants for renewable energy, as well as financing mechanisms, such as the residential power purchase agreement and leasing options for solar, have contributed to this growth.

SAMPLE MECHANISMS

- Biomass heating
- Combined heat and power
- Fuel cells
- Heat pumps (water, ground, air)
- Micro wind
- Solar electricity
- Solar heating / hot water

BRIDGING INITIATIVES

- HRM's award-winning Solar City program for residential home owners and non-profits finances the up-front costs of installation for solar PV, solar hot air and/or solar hot water systems, based on a 10-year, fixed rate loan that is provided by HRM to eligible participants.

WHAT OTHER CITIES ARE DOING

- London: The Mayor's £34m Energy for Londoners programme aims to make London's homes warm, healthy and affordable, its workplaces more energy efficient, and to supply London with more local clean energy. It includes a Solar Action Plan to maximize solar power in London and achieve one gigawatt of installed solar capacity by 2030 (ten times more than 2018 levels), and two gigawatts by 2050.
- Berlin: Berlin's Solar Atlas shows precisely whether a roof is suitable for using solar energy and whether the investment will pay off.
- Basel-Stadt: When new buildings are erected or existing heating systems are renovated, 50% of the energy requirements for hot water must come from renewable sources. This point can be met by installing a thermal solar energy system, a ground source heat pump or a wood pellet heating system. The building can also be connected to the district heating network.
- Toronto: The Toronto Green Standard requires all new City-owned buildings to generate at least 5% of total energy load from one or a combination of renewable sources.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



ENERGY SUPPLY

Smart grid

DESCRIPTION

Smart grid refers to a modernization of the electricity delivery system so that it monitors, protects, and automatically optimizes the operation of its interconnected elements: from the distributed generator through the distribution system to industrial users and building automation systems, to energy storage installations, to end-use consumers and their thermostats, electric vehicles, appliances, and other household devices. Benefits include reductions in electricity demand, integration of disparate renewable energy sources and plug-in vehicles and greater grid reliability.

SAMPLE MECHANISMS

- Demand-responsive pricing (time-of-day pricing)
- Development of smart grids
- Energy storage
- Smart meters/ controls
- Micro-grids

BRIDGING INITIATIVES

- Nova Scotia Power's Electric Thermal Storage (ETS) program supports the installation of an ETS system that works with Nova Scotia Power's time-of-day power (TOD) rates. ETS is a specialized electric heater that stores heat during off-peak hours when electricity costs are the lowest, and then releases the stored heat when it is required throughout the day.

WHAT OTHER CITIES ARE DOING

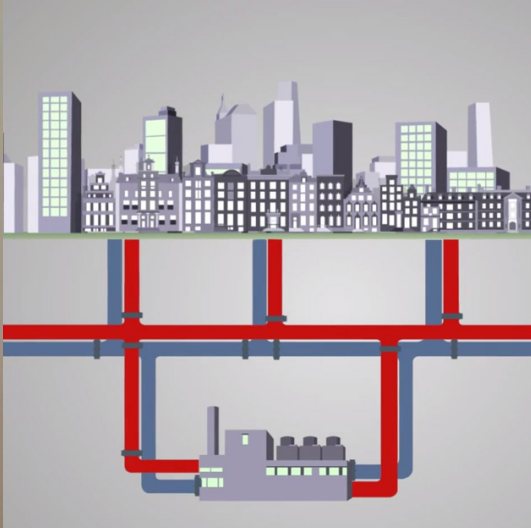
- Houston: CenterPoint Energy Houston Electric's (CPE) Smart Grid project involves deployment of a fully integrated advanced metering system and web portal access to over 2.2 million customers, along with installation of advanced monitoring and distribution automation equipment.
- Chicago: As of 2019, ComEd has installed more than four million smart meters in Illinois to help accelerate customer savings. In February 2016, over 950,000 smart meters had been installed in the Chicago area – By 2019, all Chicago residents and businesses have smart meters.
- NYC: Con Edison and NYSEDA offer financial incentives for both thermal and battery storage, with bonus incentives for projects larger than 500 kW. To demonstrate viability, NYCEDC, in partnership with Con Edison, developed a smart grid demonstration project at the Brooklyn Army Terminal (BAT) in Sunset Park. The smart grid system at BAT integrates three main components: a 100 kW solar photovoltaic (PV) array; building management system (BMS); and A 720 kWh battery for on-site energy storage capable of delivering 100 kW for 4 hours.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS





WASTE

Waste prevention policies and programmes

DESCRIPTION

A holistic waste management strategy focuses on a waste hierarchy that prioritizes waste reduction, then its reuse and recycling/composting and energy recovery, followed by final disposal as a last option. Numerous cities are striving for zero waste goals (i.e. 100% diversion rates). Opportunities include outreach programmes, strict separation policies, incentives/disincentives to promote recycling/organic composting and bans on certain waste streams.

SAMPLE MECHANISMS

- High Level Zero Waste Goal
- Expand City's by-laws and diversion requirements to private waste contractors
- Outreach programmes (awareness and minimisation)
- Incentives for organics treatment
- Incentives for recycling
- Industrial waste bans (eg. styrofoam, chemicals)
- Non-organic waste separation policies
- Organic waste separation policies
- Construction waste: permitting, recycling, waste management plans, deconstruction requirements (to reduce demolition)
- Extended Producer Responsibility (EPR)

BRIDGING INITIATIVES

- At 60%, HRM has achieved one of the highest solid waste diversion rates in Canada. This success is the result of regulation coupled with significant, long-term public education efforts.

WHAT OTHER CITIES ARE DOING

- Los Angeles: Zero Waste LA was established in 2017 to reduce landfill disposal by 1 million tons per year by 2025 and reduce waste by 65% in all 11 of the City's new service zones
- Chicago: As part of Sustainable Chicago 2015's Goal 20, the City partnered with Recyclebank to trial a unique incentive program for recycling. Selected blue carts were retrofitted with an ID chip that reads the weight of the recycled materials collected by that household. Points are earned for every pound of recyclables diverted from the waste stream and can be redeemed for discounts at local and national businesses.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



WASTE

Energy recovery & landfill management

DESCRIPTION

Energy recovery from waste involves the conversion of non-recyclable waste materials into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolysis, anaerobic digestion and landfill gas recovery. This practice is common in Central and Eastern Europe and Scandinavian countries and has shifted the paradigm towards waste and methane gases being seen as valuable commodities to create energy. For landfills, emitted methane can be reduced through the installation of landfill gas capture and combustion technology to convert the methane to carbon dioxide. Combustion with energy recovery can further reduce GHG emissions by displacing fossil fuel sourced energy to generate heat and electricity.

SAMPLE MECHANISMS

- Landfill gas to energy (carbon capture, methane capture)
- Landfill planning/engineering/construction
- Price mechanisms to discourage landfill (e.g. landfill levy)

BRIDGING INITIATIVES

- At HRM's former (decommissioned) Sackville-Highway 101 Landfill site, genset systems are used to convert landfill gas that's harvested from below ground into electricity that is sent to the electric grid.

WHAT OTHER CITIES ARE DOING

- NYC: Fresh Kills Landfill generates enough methane gas each day to heat over 30,000 homes per year.
- Edmonton: The Edmonton Waste Management Centre includes the largest composting facility in Canada and a Materials Recovery Facility that recycles 40,000 tonnes of waste a year. A waste to biofuels facility, opened in 2014, turns household garbage into biofuels and biochemicals, which will enable an increase in diversion rate from 60 to 90% by 2016.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



WATER & WASTEWATER

Energy recovery

DESCRIPTION

Wastewater can be harvested to provide energy through harnessing the waste thermal energy through a large heat pump to provide space heating and domestic hot water to buildings in the nearby area; or to create electricity, and also sometimes heat, by harnessing the biogas created by the breakdown of organic matter or by incinerating the sludge at the waste facility.

SAMPLE MECHANISMS

- Methane/biogas recovery for reuse
- Wastewater to energy initiatives

BRIDGING INITIATIVES

- Halifax Water's plans to construct a district energy network using waste heat from its wastewater treatment plant as part of the Cogswell Redevelopment.

WHAT OTHER CITIES ARE DOING

- Vancouver: The South East False Creek Facility is meeting 78% of heating and domestic hot water energy use for 3.5 million sf of the surrounding neighbourhood by recovering heat from wastewater.
- Oslo: In February 2010, a biogas plant was opened at the Bekkelaget wastewater treatment plant. Here, biogas is produced from sewage sludge and upgraded for use as transport fuel, and is already being used to fuel more than 100 heavy vehicles, mainly refuse trucks and 36 buses.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



WATER & WASTEWATER

Water recycling and reclamation

DESCRIPTION

A reduction in overall water consumption by cities and residents has the potential to significantly impact the energy and emissions footprint of water, as well as ensuring sufficient water supply during warmer and/or dry periods. Using less water results in reductions in the amount of energy that is required to clean and pump water and wastewater around a city. Improving the efficiencies of water treatment and pumping also provides additional reduction potentials.

SAMPLE MECHANISMS

- Wastewater and water pumping efficiencies
- Automatic leak detection
- Building-level greywater and blackwater recycling requirements
- Education or campaigns to promote water efficiency
- Mandatory / standards for connection for reclaimed water (purple pipe infrastructure)
- Real-time water supply risk monitoring
- Water recycling or reclamation

BRIDGING INITIATIVES

- Halifax Water's Halifax Water was the first utility in North America to adopt the International Water Association [IWA] methodology for managing leakage in the distribution system. Efforts save \$650,000 per year in treatment chemical and electricity costs and have reduced water main breaks by 20%, saving \$500,000 in repair costs annually. The program has won several national awards and Halifax Water staff are in demand to share expertise with industry and other utilities.

WHAT OTHER CITIES ARE DOING

- Copenhagen: To increase water efficiency, the City has made significant efforts in the minimisation of water loss in the city's infrastructure through leak detection technology, regulation of water pressure and other mitigation measures. Water losses in Copenhagen are around 6-7%, whereas the figure in other cities is as high as 40 to 50%.
- New South Wales, Australia: The BASIX program implemented requires all new residential buildings and renovations to complete an assessment using the BASIX online tool. Residential development must be designed and built to use 40% less drinking-quality water and produce 25% less greenhouse gas emissions than average NSW homes of the same type.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS





GREEN & BLUE INFRASTRUCTURE

Managing stormwater and reducing heat island

DESCRIPTION

Due to urbanization (which drastically increases impervious surfaces and decreases vegetation), cities are prone to the heat island effect. Urbanization also contributes to flooding risk in cities, as less rainwater is able to infiltrate into the ground, increasing runoff. Green and blue infrastructure, which includes all natural or human-made elements that provide or perform some form of ecological or hydrological function, plays a significant role in reducing both heat and flooding impacts, primarily through increasing infiltration and reducing runoff, reducing the heat island effect, and providing shading and areas for reprieve. It also contributes social and environmental benefits, including improving air quality, providing space for recreation, physical activity and social interaction, improving water quality, reducing noise pollution, reducing energy demand for cooling, providing habitat and enhancing biodiversity, growing food, and generally beautifying a city. Many aspects of green and blue infrastructure are no-regret measures that can significantly enhance communities.

SAMPLE MECHANISMS

- Constructing green roofs on existing buildings
- Requiring green roofs for new buildings
- Low impact development design
- Expanding urban tree canopy
- Protecting and maintaining existing natural assets
- Integrating bioswales, ponds and watercourses in built up areas (including parks, trees, shrubs, urban forests, green roofs and walls, gardens, bioswales, natural channels, watercourses, ponds, and constructed wetlands)
- Green streets and corridors
- Requirement to retain a proportion of each development site as green space (including minimum green space requirements in new developments)
- Create urban gardens (e.g. rooftop gardens, alleys, etc.)
- Reclaim space for urban parks

BRIDGING INITIATIVES

- In the summer of 2018, Halifax Regional Council adopted the Halifax Green Network Plan, a ground-breaking priority plan that contemplates the many ecosystem services provided by the Municipality's natural and green infrastructure.
- HRM's 2014 Urban Forest Master Plan details the social, economic and ecological values of HRM's urban trees.
- HRM's coastal protection bylaws in all coastal areas, which limit new residential buildings in coastal zones to a minimum height of 3.8 m above CGVD 28.



POTENTIAL CO-BENEFITS



GREEN & BLUE INFRASTRUCTURE

WHAT OTHER CITIES ARE DOING

- Berlin: To adapt to a changing climate, Berlin is striving to become a “sponge city” through increasing permeable pavement/surfaces and green space throughout the city to absorb rainwater rather than cause flooding, and increase evaporation to cool the urban environment.
- NYC: In 2007, NYC launched the ambitious MillionTreesNYC initiative, with a goal to plant and care for one million trees in New York City by 2017. In 2015, thanks to help from the New York Restoration Project (NYRP), additional partners, our many volunteers, and nearly 50,000 New Yorkers who helped plant trees in parks, on neighborhood streets, and in their own backyards, NYC planted its millionth tree.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement





FOOD & AGRICULTURE

Encourage sustainable food production and consumption

DESCRIPTION

Food consumption and production trends and patterns are among the main causes of pressure on the environment. Additionally, a changing climate has impacts for the reliability of future food supply. Fundamental changes in the way food is produced, processed, transported and consumed are indispensable for achieving sustainable development. Cities can help reduce the environmental impact of food, while increasing self-sufficiency and resilience, by encouraging local/community agriculture, educating the public on low-carbon food benefits and setting similarly focused food procurement guidelines.

SAMPLE MECHANISMS

- Assessment of city food shed
- Community gardens or allotments / food sources locally
- Community supported agriculture
- Education or community events focused on climate smart food
- Food policy councils
- Municipal food purchasing/ procurement guidelines
- Rooftop or vertical farming

BRIDGING INITIATIVES

- In 2014, HRM's issued an Administrative Order on community gardens that permits the operation of community gardens within the Municipality and provides direction for the establishment and operation of such gardens.
- The Halifax Mobile Food Market initiative, operated in collaboration with the Halifax Food Policy Alliance has been serving Halifax communities since May 2016, focuses on making healthy, affordable, high quality food available in communities with limited access to healthy food.

WHAT OTHER CITIES ARE DOING

- Seoul: The City is providing technological support and education programs for rooftop gardens and greenings including the establishment of a city support center for agriculture, city farming school, city agriculture white paper, and a vegetable garden model development, among other initiatives.
- Victoria, BC: The Love Food Hate Waste initiative aims to raise awareness of avoidable food waste from Victorian households. The LFHW challenge is a voluntary call to action to Victorians to reduce food waste; it provides a lengthy list of vegetarian meal prep ideas and tips on how to preserve food.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



LAND USE

Low carbon zones & eco-districts

DESCRIPTION

Low carbon zones are specialized zones that aim to lower the carbon footprint of the industrial and related operations within the zone and provide a testing ground for pilot projects and policies for reducing the environmental footprint of industrial operations. Eco-districts, whether existing or new developments, take a masterplan approach to sustainability where key resources (such as energy, waste and water) are best optimized, instead of at a building scale.

SAMPLE MECHANISMS

- Zoning land to encourage low carbon industries
- Supporting sustainable infrastructure parks
- Eco-district development strategies/framework

WHAT OTHER CITIES ARE DOING

- London: RE:CONNECT - This programme consists of ten low carbon zones in London, each of which has signed-up to deliver a 20% reduction in CO2 emissions by 2012.
- Stockholm: Sustainable Järva is an investment in ecologically, socially and economically sustainable development in the districts surrounding Järvafältet. With new technology, information and education, Järva intends to become a model for the sustainable rehabilitation of areas that formed part of Sweden's Million Homes Programme.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



LAND USE

Compact Cities

DESCRIPTION

The continued growth of urban populations calls for a response that optimizes land resources and reduces the carbon footprint on a per resident basis. The compact city or city of short distances is an urban planning and design concept that promotes relatively high residential density with mixed land uses and connected with transit.

SAMPLE MECHANISMS

- Mixed use development/live-work targets
- Promote or have minimum density requirements
- Strategic refurbishment/reuse of unused buildings for new purposes

BRIDGING INITIATIVES

- HRM's Integrated Mobility Plan encourages significant densification within the regional centre out to 2031, as a means to reduce overall vehicle kilometres travelled and improve active transportation infrastructure.

WHAT OTHER CITIES ARE DOING

- San Diego: The City of Villages growth strategy which directs growth into compact, mixed-use, walkable centers linked by transit, which reduces the need to travel and makes alternative modes of transportation easier to use.
- Washington, D.C.: The 115-acre "SW Ecodistrict" planned for 2030, includes office, residential, and cultural space. The area will be heated, cooled, and powered with a district energy system using cogeneration. A number of other sustainable design measures will be implemented.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



LAND USE

Transport Oriented Development

DESCRIPTION

Transit or Transport-Oriented Developments (TODs) are high activity intensity development nodes characterised by excellent walkability and cycle access, and anchored by higher order transit (typically a train or major bus station or interchange). They are an integrated land use and transport outcome facilitated by appropriate policy and financial/development incentivisation. They are also environments where private vehicle and freight vehicle traffic are limited by design, regulation and restrictions on parking.

SAMPLE MECHANISMS

- Prioritising development in areas well connected by transit
- Creating pedestrian plazas
- Minimum affordable housing targets near transit hubs
- Prioritise access and circulation for pedestrians, cyclists and transit users
- Minimise roadway capacity and severance (i.e. barrier) effect for pedestrians and cyclists
- Define and apply station typology framework to prioritise modal interchange and/ or land development

BRIDGING INITIATIVES

- HRM is working with Halifax Transit to focus growth in areas that fall within the current and future (planned) transit boundaries.

WHAT OTHER CITIES ARE DOING

- San Francisco: By concentrating new development along existing transit corridors, San Francisco has decreased GHG emissions and vehicle miles traveled.
- Perth: In 2004, the State Government of Western Australia enacted Network City, which was an urban growth policy targeting 60% of new growth on land currently zoned as urban, with a focus on established centres served by higher quality transit services. In 2009, this was replaced with State Planning Policy 4.1: Activity Centres for Perth and Peel with revised requirements including a reduction in infill to 53% of the total.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



FINANCE & ECONOMIC DEVELOPMENT

Instruments to fund low carbon & climate resilient projects

DESCRIPTION

To create new economic opportunities and spur investment in the green economy, new funding strategies, from the public and private sector, are needed. These strategies can include public initiatives such as revolving funds with low interest for entire projects, funds for early stage projects (thereby attracting further private sector investment for design and construction), loan guarantees, community bonds and tax rebates. Private sector strategies have included the creation of specially tailored Energy Service Agreements where initial costs are paid back through energy savings on the building utility bills.

SAMPLE MECHANISMS

- Establish a revolving fund for low carbon or green projects (public entity)
- Provide loan guarantees or insurance packages for energy efficiency projects
- Property tax exemption for energy efficiency projects

BRIDGING INITIATIVES

- Low Carbon Cities Canada (LC3) is a partnership between seven local centres and the Federation of Canadian Municipalities. A contribution of \$18-million for has been announed for EfficiencyOne to establish the urban climate centre in Halifax. LC3 is an initiative that will enable and accelerate urban carbon-reduction solutions.

WHAT OTHER CITIES ARE DOING

- Philadelphia: The Philadelphia Industrial Development Corporation aims to create a low-interest revolving loan fund using federal Energy Efficient Block Grant monies. Landlords will then be able to finance energy efficient improvements to a tenant's space with repayment coming from a portion of the savings.
- United Kingdom: The Green Investment Bank was created by the UK Government and capitalised with public funds. They then use this finance to back green projects on commercial terms and mobilise other private sector capital into the UK's green economy.
- NYC: In 2019, NYC launched a Commercial Property Assessed Clean Energy (C-PACE) program to finance clean energy and energy efficiency retrofits and upgrades at more favorable terms, allowing New York City building owners to access finance for such projects through an assessment placed on their property tax bills. Paired with a building energy performance mandate, the PACE program has the potential to finance \$100 million annually in energy efficiency and clean energy projects.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



FINANCE & ECONOMIC DEVELOPMENT

Developing the green economy

DESCRIPTION

The green economy is defined as an economy that aims for sustainable development without degrading the environment. It has been framed as an important tool for achieving sustainable development by the UN. Support for this economy, and its related new businesses, is a foundational pillar to meeting carbon reduction goals. Support measures can include green enterprise zones, start-up labs, and specific tax incentives and grants.

SAMPLE MECHANISMS

- Define the growth and startup of green businesses as a key objective of the City's economic development service
- Establishment of green enterprise zones/labs
- Tax incentives/grants/subsidies for green businesses
- Green procurement
- Competitions and challenges

BRIDGING INITIATIVES

- HRM's green catering policy and the HRM fleet vehicle 'right-sizing' filter.

WHAT OTHER CITIES ARE DOING

- London: The Green Enterprise District, covering six boroughs in east London, will promote clusters of low-carbon businesses and will draw in large-scale investment for innovative low-carbon technologies ranging from energy generation to low-carbon transport.
- Boston: The City is supporting small businesses going green through introducing a matchmaking service for small businesses that allows them to be paired with sustainability services.
- Buenos Aires: In 2013, the Green Economy Centre worked on a green job registry, aiming to promote the green job market in the City. During 2014 a course on provision of electricity through solar photovoltaic took place, with the aim of generating new green experts; opened to the community, it's curricula included the sizing of the installation, security criteria, and basic knowledge of solar energy, among others.

IMPLEMENTATION LEVER

Policy / Incentive / Program / Procurement



POTENTIAL CO-BENEFITS



ACTIONS

CATALOGUE

HalifACT 2050
ACTING ON CLIMATE TOGETHER

Prepared by:

SSG