SUSTAINABLE CLEVELAND MUNICIPAL ACTION PLAN

EXECUTIVE SUMMARY

October 2013

CITY OF CLEVELAND
Mayor Frank G. Jackson

SUSTAINABLE CLEVELAND 2019

EXECUTIVE SUMMARY

Sustainable Cleveland 2019 is an initiative that engages the region to build economic, social and environmental well-being for all (**www.SustainableCleveland.org**). The Sustainable Cleveland Municipal Action Plan (SC-MAP) is focused specifically on municipal operations. SC-MAP, in conjunction with the community-wide Climate Action Plan, enables the City to lead by example while reaping the many known benefits of sustainability derived from increased efficiencies, reduced operating costs, and enhanced services. Implementing the SC-MAP can serve to:

- Lower City energy costs for heating, cooling, and lighting;
- Reduce fleet motor vehicle fuel costs and emissions;
- Reduce waste generation and increase landfill diversion rates, thereby reducing landfill tipping fees and transportation emissions;
- Lower water costs and consumption;
- Improve water quality in Lake Erie and rivers that feed it;
- Increase employee satisfaction, productivity, and health, while lowering utility bills from constructing high-performing buildings and retrofitting existing buildings;
- Unite the City's many sustainability initiatives under one cohesive plan of action to create efficiencies and synergies;
- Engage municipal employees in the City's sustainability efforts; and
- Lead by example for the community and other municipalities.

The City is already practicing sustainability in many areas. The purpose of the SC-MAP is to accelerate progress in a more coordinated manner and help the City achieve even more significant outcomes. A first step in this process was development of a City Green Team in May 2012, consisting of representatives from across City government serving to integrate sustainability into City operations.

From there, the Mayor's Office of Sustainability engaged a consulting team to lead the Green Team through development of this SC-MAP, based largely on national best practice and lessons learned from other municipal sustainability plans. The SC-MAP's framework consists of Focus Areas, Goals, Actions, and Metrics, defined in the sidebar at right.

SC-MAP Framework

Focus Areas: Focus Areas organize the SC-MAP's goals into themes in a consistent manner.

Goals: The Goals embody the desired outcomes that the City intends to achieve for each Focus Area. Where applicable, Goals include numeric targets with time frames for achieving these targets.

Actions: Actions consist of those specific steps that will be taken to meet the Goals. It is at this level where potential costs and benefits, both in financial and resource efficiency terms, are quantified to help scale and prioritize possible actions. For any given Goal, there are generally several supporting Actions.

Performance Indicators: Performance Indicators are numeric criteria used to validate, assess, and measure progress.

City's Baseline Emissions and Costs

In order to identify the best opportunities for accelerating sustainability across City operations, a baseline inventory was conducted to estimate current levels of greenhouse gas emissions (GHG), energy use, water use, and associated utility costs.

In 2010, total emissions for the City were approximately 400,000 Metric Tons of Carbon Dioxide equivalent ($MTCO_2e$), where $MTCO_2e$ represents the standard unit of measurement for greenhouse gas emissions.

400,000 MTCO2e equals about 5% of all emissions generated within Cleveland city proper. This level of emissions equates to all City employees commuting from Cincinnati every day. Conversely, covering the City of Cleveland completely with trees 7 times over would absorb this same level of emissions.

Electricity consumption accounts for approximately 85% of total emissions (**Figure 1**). About 50% of electricity consumption is attributed to the Department of Public Utilities, mainly due to the Division of Water's energy requirements for the treatment and distribution of water throughout the city. Each department's energy, transportation fuel, and water consumption were collected and used for this baseline inventory. Total energy, transportation and water related costs for the City in 2010 were approximately $66 million, shown by source in **Figure 2**. The city pays for sewer related charges and some of its water consumption, but not for solid waste disposal. However, all of water and sewer costs have been included to represent total utility costs if the City were to pay for all of its water consumption.

Figure 1: Annual GHG Emissions by Source

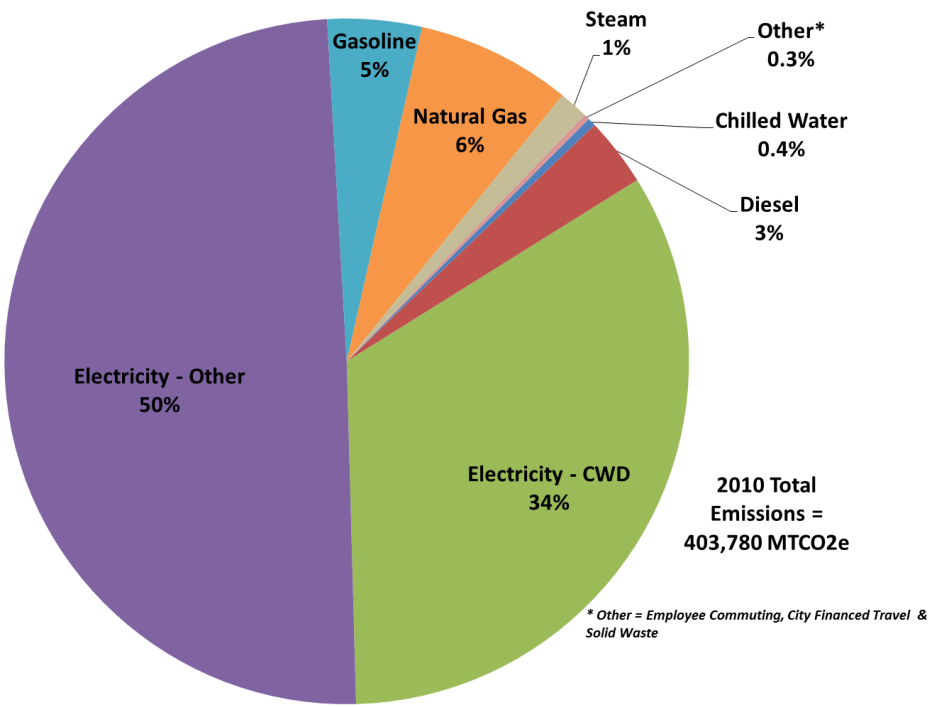
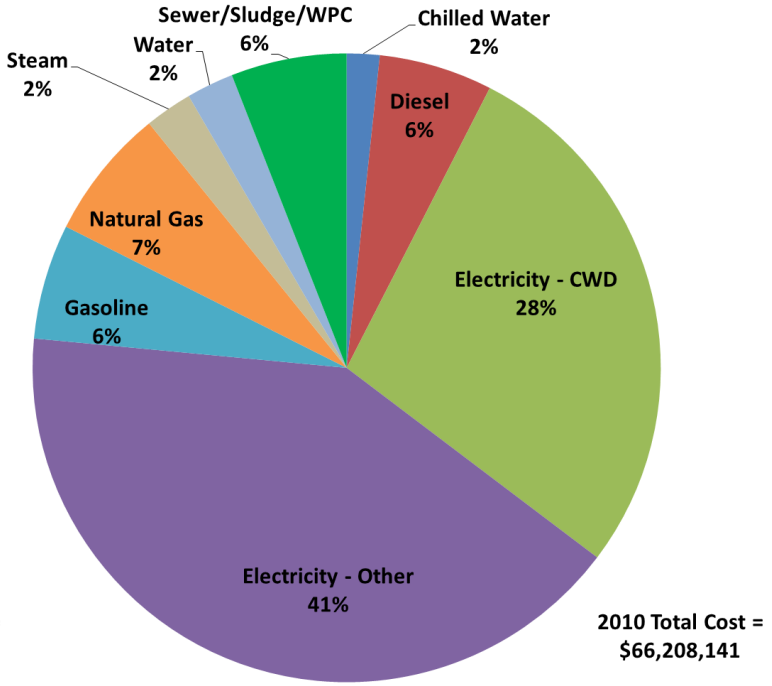


Figure 2: Annual Costs by Utilities



An inventory of existing sustainability practices was developed to round out the quantitative assessment of emissions and utility costs. Existing practices were gathered through a Green Team workshop, employee survey and targeted departmental interviews. Finally, the consultant team assessed how the City operates organizationally, which helped inform the SC-MAP goals and actions. This included a look at governance, organizational structure, strategic planning efforts, human resources management, budget and financial management, and communications channels.

Goals and Actions

The SC-MAP contains an overarching GHG reduction goal (see sidebar to the right) that will be achieved through the implementation of the **25 actions** outlined in the plan. These actions are split into **5 focus areas** and have a total of **12 sub-goals**, all with the aim of reducing the City's GHG emissions and making progress in sustainability. Actions were identified and prioritized based on opportunities for greatest impact, contribution to the SC-MAP goals, cost effectiveness, and visibility or opportunity for the City to lead by example.

SC-MAP GOAL

Greenhouse gas emissions reduction below 2010 baseline:

- 2016: 10%
- 2020: 20%
- 2030: 45%

Table 1: SC-MAP Goals and Actions

Goals	Actions	Descriptions	Leads
Design, Construction, and Maintenance			
Goal 1: Sustainable Building policy implemented across all departments • 2013: LEED Silver for New Construction and Major Renovations • 2016: LEED Gold • 2020: BBC goals • 2030: Cleveland 2030 District targets	DCM-1: Green Building for New Construction and Major Renovations	Adopt and implement a Sustainable Building Policy.	Capital Projects, DPM, Sustainability
	DCM-2: Capital Improvement Project Sustainability Review	Incorporate sustainability and a systems thinking approach into the planning, decision-making, and design process for capital improvement projects, expanding upon the City's current efforts in sustainable building.	Capital Projects, Operations, Sustainability
	DCM-3: Preventative Maintenance	Establish a City-wide preventative maintenance program to better evaluate replacement/maintenance options.	DPM, Enterprise Funds
Energy			
Goal 1: Total energy reduction below 2010 baseline	E-1: Energy Efficiency in Existing Buildings	Significantly reduce energy consumption, demand and cost across all City departments through energy efficiency.	Sustainability, DPU, DPC, DPW, Finance

Goals	Actions	Descriptions	Leads
• 2016: 5% • 2020: 10% • 2030: 20% **Goal 2:** Building energy reduction below 2010 baseline • 2016: 10% • 2020: 20% • 2030: 50% **Goal 3:** Percent of City total energy use by on-site renewable energy • 2016: 1% • 2020: 2% • 2030: 5% **Goal 4:** Meet CPP's Advanced Energy Portfolio Standard (AEPS) goals • 2015: 15% • 2020: 20% • 2025: 25%	E-2: Energy Conservation in Existing Buildings	Reduce energy use in City buildings through no- and low-cost conservation measures.	Sustainability
	E-3: Building Automation System	Install new Building Automation Systems (BAS) for City buildings with high energy use or complex systems, and fully utilize existing systems.	Div. of Architecture, DPM
	E-4: Re-Commissioning Tune-Up	Establish a building re-commissioning and tune-up program.	DPM
	E-5: Cleveland Division of Water (CWD) System Pumping and Treatment Optimization	Finalize and implement an Energy Management Plan to reduce energy consumption and costs for CWD.	CWD Energy Task Force
	E-6: Streetlight Upgrades	Replace streetlights with LED lights, thereby saving the City money through reduced energy and maintenance costs.	CPP
	E-7: Renewable Energy	Install a variety of renewable energy systems at City facilities and on City lands.	Sustainability, DPU, DPC, DPW
	E-8: Cleveland Public Power's Advanced Energy Portfolio Standard	Increase the amount of advanced and renewable energy in the electricity supply portfolio that serves City facilities.	CPP
	E-9: Smart Savings	Maximize cost savings for the City by utilizing various strategies, including energy demand curtailment, utility bill analysis, rate negotiation, etc.	Sustainability S, DPU, DPW
Transportation			
Goal 1: Reduced fleet fuel emissions	T-1: Green Employee Commuting	Reduce employee commuting vehicle miles travelled (VMT) through the increased use of tele-working and alternative transportation	Sustainability

Goals	Actions	Descriptions	Leads
• 2016: 10% • 2020: 15% • 2030: 25% **Goal 2:** Reduced commuter emissions • 2016: 5% • 2020: 10% • 2030: 20%		modes, such as the public transit system (RTA and downtown trolley system), carpooling (e.g., NOACA Ride Share Program), biking, and walking.	
	T-2: Green Business Travel	Reduce municipal fleet VMT both for regular vehicle routes and for occasional staff travel.	All Divisions with service vehicles, IT&S
	T-3: Vehicle Replacement and Repower	Establish policy to ensure all new vehicle purchases and retrofits are more efficient conventional, hybrid, electric or alternative fuel vehicles, such as compressed natural gas.	All Divisions with service vehicles, P&S, OoS
	T-4: Anti-Idling Enforcement	Enforce the City's anti-idling policy using appropriate technology, education, and training.	DPW, MVM, IT&S
Water			
Goal 1: Total water use reduction below 2010 baseline • 2016: 10% • 2020: 20% • 2030: 50% **Goal 2:** Impervious area runoff captured • 2016: 80,000 • 2020: 240,000 • 2030: 840,000	W-1: Water Efficiency	Improve water efficiency through assessments and upgrades in City facilities.	DPM, DPR, DPU, DPC
	W-2: Water Conservation	Reduce water use through a variety of water conservation measures.	Sustainability, DPM
	W-3: Water Reuse and Recycling	Use captured rainwater to supply irrigation and cooling tower water use.	DPM, WPC, NEORSD
	W-4: Cleveland Division of Water System Loss Minimization and Meter Installation	Significantly reduce water distribution system losses to save water, reduce energy and other costs associated with water delivery, and improve the health of Lake Erie.	CWD
	W-5: On-Site Stormwater Management	Improve stormwater management on City property to take advantage of credits offered by the Northeast Ohio Regional Sewer District (NEORSD).	WPC, SMWG

Goals	Actions	Descriptions	Leads
Materials Management and Purchasing			
Goal 1: Reduced annual gross/net operational solid waste per employee (baseline TBD) • 2016: 5% • 2020: 10% • 2030: 20% **Goal 2:** Waste diversion rate (baseline TBD) • 2016: TBD • 2020: TBD • 2030: 90% diversion for all City operations (certified zero waste) **Goal 3:** Percent by cost of all purchases for goods that include sustainability aspects • 2016: 25% • 2020: 50% • 2030: 75%	M-1: Overall Waste Reduction	Reduce waste generated in City facilities.	IT&S, P&S, P&R, DWC
	M-2: Increased Recycling in City Buildings	Create a more robust recycling program to increase the rate of recyclable waste diverted from the landfill.	Sustainability, DWC, DPM
	M-3: Compost Program for City Buildings	Compost organic waste from City facilities to reduce waste sent to the landfill.	Sustainability, DWC, DPM, DPR
	M-4: Sustainable Purchasing	Develop and implement a comprehensive sustainable purchasing policy across City operations.	P&S, Sustainability

Estimated Cost-Benefit from Actions

Actions in the Energy, Transportation, and Water focus areas include a quantitative analysis of the estimated implementation costs, cost savings and resource savings from each action. Figure 3 presents the marginal reduction cost curve for each action included in the SC-MAP, as it relates to GHG emissions reduction.

Although four actions are above the x-axis, this is a result of when they are being implemented and when those savings accrue within the 2030 planning horizon. Of course, many of the actions have other significant benefits that are not quantified here. For example, the potential savings of the transportation-related actions are less than those for energy, but reducing diesel emissions has a significant impact on air pollution and human health.

Table 2 summarizes the estimated outcomes of implementation of all of the actions in the SC-MAP in terms of resource (energy, fuel, water) savings, GHG reductions, cost savings, and estimated capital costs. These outcomes are presented for the near-term and long-term. The two 'Annual Savings in 2030' columns represent the long-term impact of implementing each action. Cumulative costs and savings are not included here. The average annual implementation cost for 2013-2016 is $5.4 million or approximately 8% of the City's total energy, water and transportation costs in 2010.

Average Annual Near-Term (2013-2016)

- Resource Savings (per year): The type of resource savings depends on the action being pursued. Actions can result in decreased consumption of electricity (MWh), natural gas (MCF), gasoline and diesel (kgal), or water (MCF). Based on the expected resource savings, the resultant reduction in greenhouse gas emissions is also presented (MT CO2e).
- Cost Savings ($/year): Calculated based on the estimated resources savings for each action. More indirect savings such as reduced maintenance and increased wellness are not included in the analysis.
- Cost ($/year): Includes capital, implementation, and replacement costs. Ongoing operations and maintenance is not included.

Annual Savings in 2030

- Resource Savings: The cumulative resource savings of all actions implemented, presented on an annual basis for 2030.
- Net Cost Savings ($): The cumulative cost savings of all actions implemented, minus implementation cost, presented on an annual basis for 2030.

A separate spreadsheet contains more details on each calculation.

Figure 3: Marginal Cost Curve for SC-MAP Actions

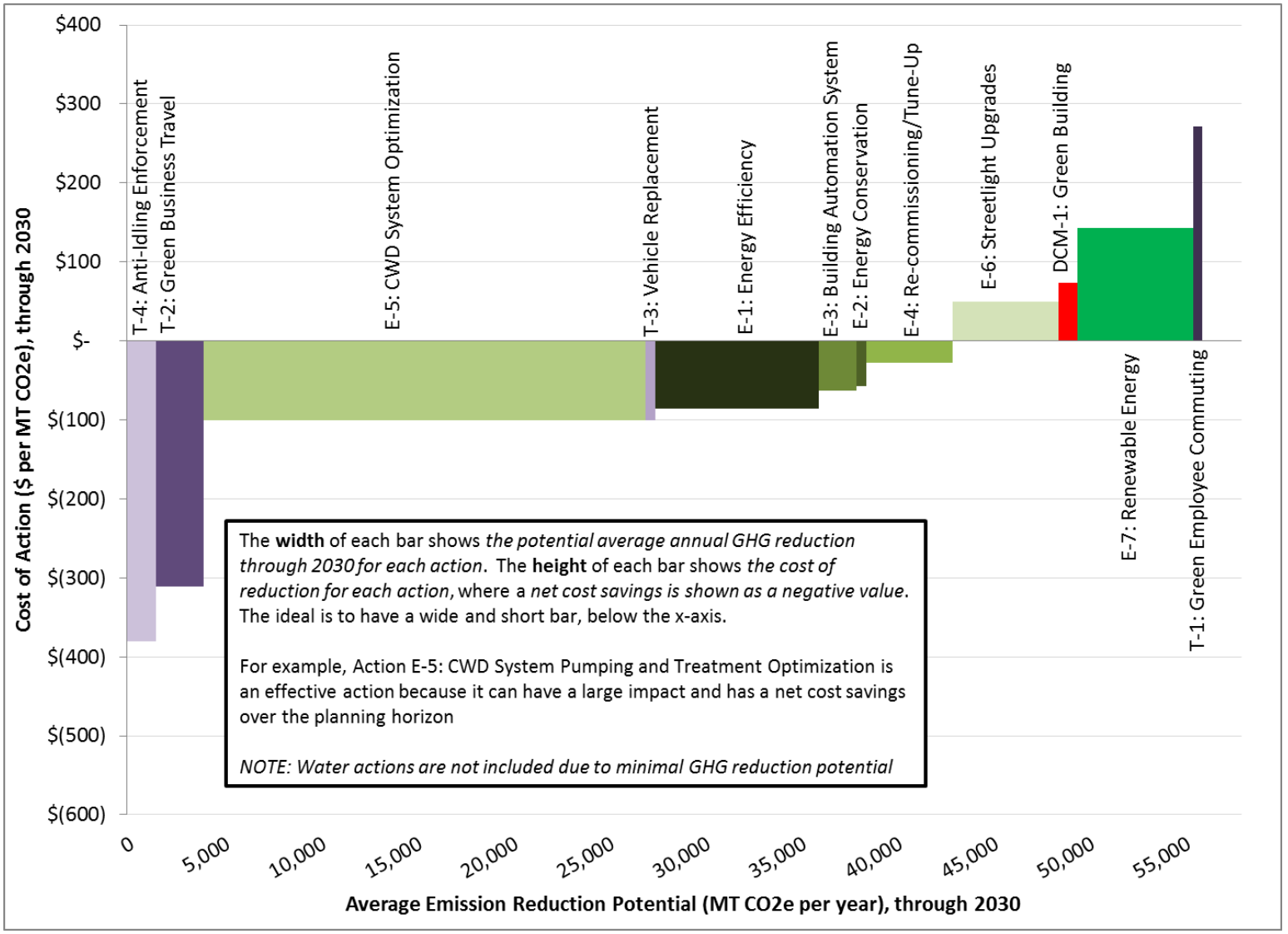


Table 2: SC-MAP Costs and Benefits

Action	Average Annual Near-Term (2013- 2016)			Annual Savings in 2030	
	Resource Savings (per yr)	Cost Savings ($/yr)	Cost ($/yr)	Resource Savings	Net Cost Savings ($)
Design, Construction, and Maintenance					
DCM-1: Green Building for New Construction and Major Renovations	350 MWh 1,400 MCF 320 MT CO2e	$46,000	$200,000	1,800 MWh 7,100 MCF 1,300 MT CO2e	$35,000
DCM-2: Capital Improvement Project Sustainability Review	*Not analyzed in the 2013 SC-MAP*				
DCM-3: Preventative Maintenance	*Not analyzed in the 2013 SC-MAP*				
DCM Subtotal	**350 MWh 1,400 MCF (H_2O) 320 MT CO2e**	**$46,000**	**$200,000**	**1,800 MWh 7,100 MCF (H_2O) 1,300 MT CO2e**	**$35,000**
Energy					
E-1: Energy Efficiency in Existing Buildings	1,400 MWh 7,200 MCF 1,600 $MTCO_2e$	$240,000	$580,000	14,000 MWh 74,000 MCF 14,000 $MTCO_2e$	$2.1 million
E-2: Energy Conservation in Existing Buildings	1,400 MWh 1,200 $MTCO_2e$	$180,000	$100,000	900 MWh 600 $MTCO_2e$	$10,000
E-3: Building Automation System	1,000 MWh 2,800 MCF 1,000 $MTCO_2e$	$160,000	$760,000	2,900 MWh 15,000 MCF 2,800 $MTCO_2e$	$430,000
E-4: Re-Commissioning Tune-Up	1,100 MWh 7,200 MCF 1,300 $MTCO_2e$	$200,000	$640,000	6,500 MWh 42,000 MCF 6,700 $MTCO_2e$	$650,000
E-5: Cleveland Division of Water System Pumping and Treatment Optimization	21,000 MWh 18,000 MT CO_2e	$1.8 million	$830,000	38,000 MWh 26,000 MT CO_2e	$3.3 million
E-6: Streetlight Upgrades	1,200 MWh 1,000 $MTCO_2e$	$100,000	$440,000	20,000 MWh 13,000 $MTCO_2e$	$300,000
E-7: Renewable Energy	430 MWh	$56,000	$490,000	19,000 MWh	($460,000)

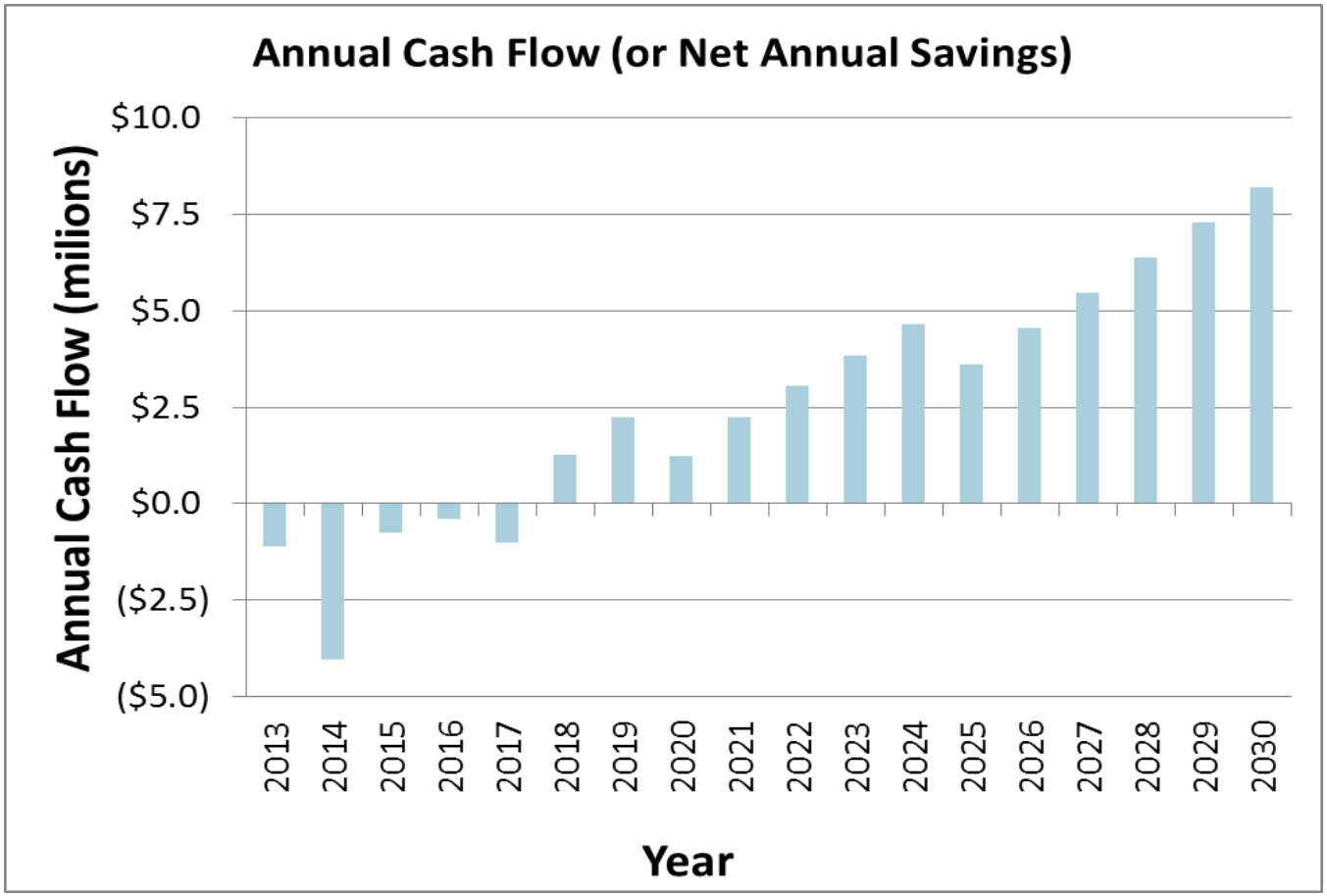
Action	Average Annual Near-Term (2013- 2016)			Annual Savings in 2030	
	Resource Savings (per yr)	Cost Savings ($/yr)	Cost ($/yr)	Resource Savings	Net Cost Savings ($)
	92 MCF 360 $MTCO_2e$			5,800 MCF 13,000 $MTCO_2e$	
E-8: Cleveland Public Power's Advanced Energy Portfolio	17,000 MT CO_2e	N/A	N/A	98,000 MT CO_2e	N/A
E-9: Smart Savings	TBD	TBD	TBD	TBD	TBD
Energy Subtotal	**27,530 MWh 17,292 MCF 41,460 $MTCO_2e$**	**$2.7 million**	**$3.8 million**	**101,000 MWh 136,800 MCF 174,000 $MTCO_2e$**	**$6.3 million**
Transportation					
T-1: Green Employee Commuting	21,000 gal 180 $MTCO_2e$	N/A	$50,000	130,000 gal 1,100 $MTCO_2e$	($310,000)
T-2: Green Business Travel	84,000 gal 790 $MTCO_2e$	$330,000	$560,000	360,000 gal 3,400 $MTCO_2e$	$1.4 million
T-3: Vehicle Replacement and Repower	47,000 gal 190 $MTCO_2e$	$99,000	$270,000	340,000 gal 1,200 $MTCO_2e$	$490,000
T-4: Anti-idling Enforcement	61,000 gal 590 $MTCO_2e$	$240,000	$220,000	170,000 gal 1,700 $MTCO_2e$	$780,000
Transportation Subtotal	**213,000 gal 1,750 $MTCO_2e$**	**$669,000**	**$1.1 million**	**1,000,000 gal 7,400 $MTCO_2e$**	**$2.35 million**
Water					
W-1: Water Efficiency	290 MCF 5 MT CO_2e	N/A	$25,000	5,400 MCF 70 MT CO_2e	($51,000)
W-2: Water Conservation	1,500 MCF 23 MT CO_2e	N/A	$51,000	5,700 MCF 70 MT CO_2e	($14,000)
W-3: Water Reuse and Recycling	6 MCF	N/A	$210,000	0 MCF 1 MT CO_2e	($250,000)
W-4: Cleveland Division of Water System	260 Mgal			2,600 Mgal	

Action	Average Annual Near-Term (2013- 2016)			Annual Savings in 2030	
	Resource Savings (per yr)	Cost Savings ($/yr)	Cost ($/yr)	Resource Savings	Net Cost Savings ($)
Loss Minimization and Meter Installation*	630 MWh 540 MT CO_2e	N/A	TBD	6,300 MWh 4,300 MT CO_2e	TBD
W-5: On-Site Stormwater Management	N/A	$1,000	$12,000	N/A	($190,000)
Water Subtotal *	**1796 MCF 630 MWh 568 MT CO_2e**	**$1,000**	**$298,000**	**11,100 MCF 6,300 MWh 4,441 MT CO_2e**	**($505,000)**
Materials Management and Purchasing					
M-1: Overall Waste Reduction	*Not analyzed in the 2013 SC-MAP*				
M-2: Increased Recycling in City Buildings	*Not analyzed in the 2013 SC-MAP*				
M-3: Compost Program for City Buildings	*Not analyzed in the 2013 SC-MAP*				
M-4: Sustainable Purchasing	*Not analyzed in the 2013 SC-MAP*				
Materials Subtotal	*Not analyzed in the 2013 SC-MAP*				
TOTALS	**29,000 MWh 17,300 MCF (NG) 210,000 gal 3,200 MCF (H_2O) 44,000 $MTCO_2e$**	**$3.4 million**	**$5.4 million**	**110,000 MWh 140,000 MCF (NG) 1,000,000 gal 11,000 MCF (H_2O) 190,000 $MTCO_2e$**	**$8.2 million**

* Addressing loss minimization throughout the CWD delivery system will result in water savings. This estimated savings is not shown here, although it represents savings for the entire CWD service area and not just City municipal operations. Cost information is not available for this implementation, hence savings are not documented.

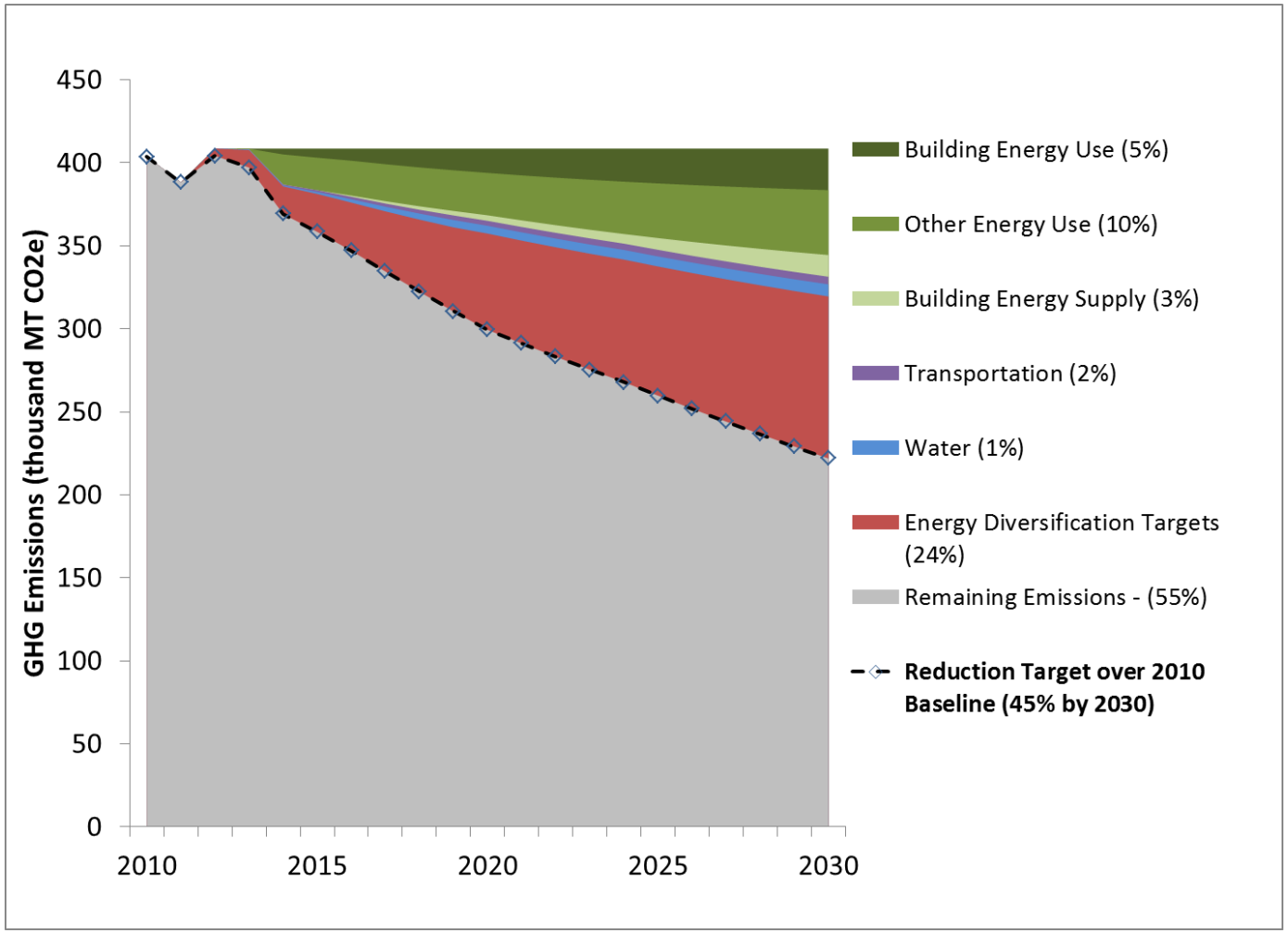
Figure 4 presents the annual net cash flow for all actions included in the SC-MAP. In the first five years of plan implementation upfront investment will be required to implement projects and begin to realize cost savings. A large portion (over 40%) of the investment required by 2014 is for CWD energy management, which has already been identified in the 2012 Capital Improvement Plan. After 2017, on an annual basis, cost savings from previously implemented projects will exceed the capital required for additional project implementation.

Figure 4: Annual Cash Flow through 2030



In addition to resource and cost savings, the SC-MAP's 25 actions also combine to reduce the overall carbon footprint of City operations. **Figure 5** shows the GHG emission reductions expected as a result of these actions. The percentages shown represent the reduction below the 2030 business-as-usual forecast for each action. The total percent reduction for all actions is estimated at **45% below the 2010 baseline by 2030**.

Figure 5: GHG Emissions Reductions



Implementation and Continuous Improvement

For each action, the SC-MAP includes a description, performance indicators for monitoring progress, lead department(s), related actions, and first steps for implementation in 2013-2014. The Mayor's Office of Sustainability is available to support on implementation of each action. While not explicitly included under each action, departments not serving as lead will often play a supporting role. This SC-MAP is the first iteration of what will be a living document, subject to a continuous "Plan-Do-Check-Act" review and revision process as actions are implemented, progress is monitored and measured, and new actions are developed. In addition, the plan outlines strategies for training, funding and communicating progress.

Extending to the Community

Through the SC-MAP, the City recognizes the need to lead by example in promoting sustainability, but creating a truly sustainable economy in Cleveland requires the entire community. This is why the City of Cleveland is leading a process to create a community-wide Climate Action Plan (CAP) to not only reduce greenhouse gas (GHG) emissions and energy use, but also make Cleveland more resilient by preparing for existing and predicted changes in the climate. The CAP will be distinct from the SC-MAP in that it will focus on issues and activities in the community beyond the City's own municipal operations and footprint. The City is engaging experts and community leaders from across Northeast Ohio, and the public as a whole, to create this path forward.