

2025 Energy Action Plan

Washington Metropolitan Area Transit Authority



The Washington Metropolitan Area Transit Authority (Metro) is implementing an Energy Action Plan to reduce the Authority’s energy use, contain operating costs, and help the region move forward sustainably.

Every day, Metro reduces the carbon footprint of the National Capital Region by providing public transit to nearly one million riders. In order to provide this public good, Metro consumes a substantial amount of energy.

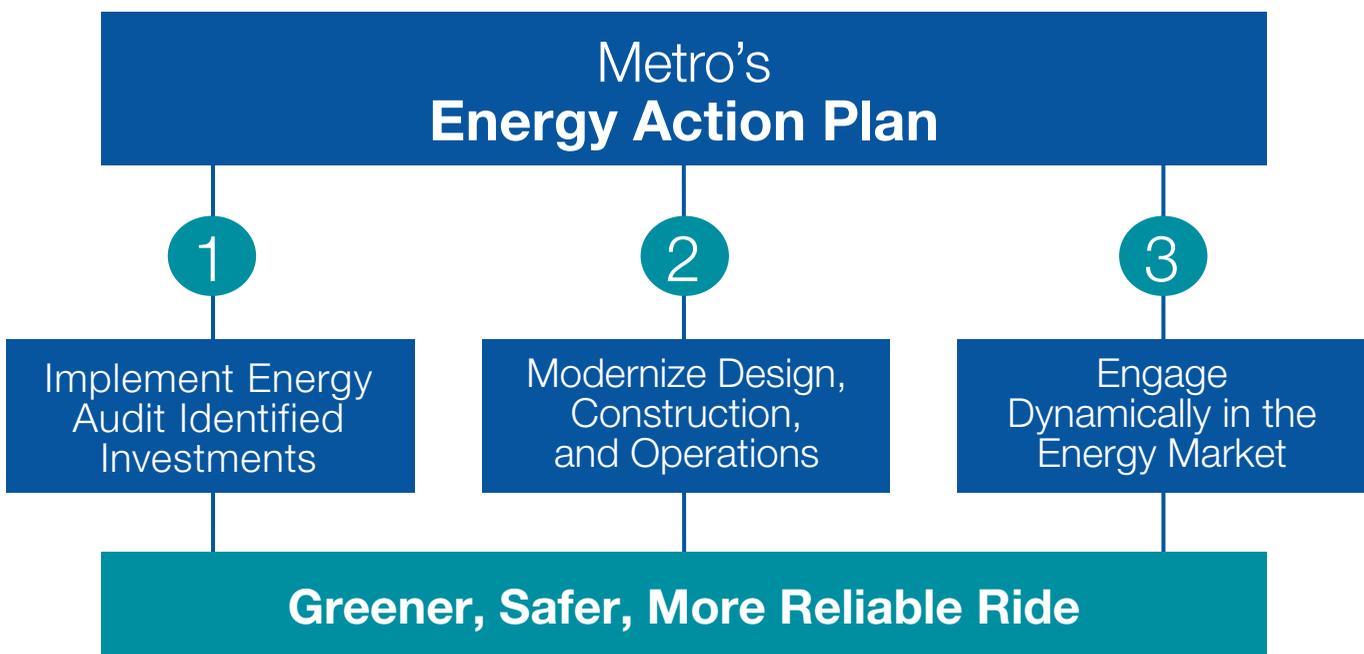
In fact, Metro is one of the region’s largest energy users - annual energy consumption equivalent to 70% of an average U.S. coal fired power plant. Because of the service it provides to the region and the scale of its energy consumption, Metro

has a tremendous opportunity to more actively manage its energy use and purchasing to operate with greater efficiency.

This Energy Action Plan is central to transforming the way Metro does business to realize an efficient and sustainable future. Rebuilding sustainably will not only help Metro reach environmental goals through reduced consumption, but is necessary to help generate long-term cost savings. Metro will invest wisely and demonstrate responsible stewardship of the region’s dedicated funding.

This Action Plan reduces energy consumption and costs by focusing on three pillars: implementation of energy audit identified capital investments; modernized design, construction, and operations; and dynamic engagement in the energy market. Metro commits to go beyond the actions included in this initial Action Plan through ongoing employee and stakeholder engagement to garner innovation and continuous improvement.

Implementing the Energy Action Plan will reduce estimated increases in Metro’s energy costs by approximately \$16 million annually by 2025.



Energy Action Plan Benefits

- Limits energy cost growth to an average of 1.7% annually versus 3.0% without intervention
- Contributes to Metro’s effort to maintain the region’s annual operating subsidy growth to 3 percent or less
- Delivers an average return on investment in less than five years
- Reduces exposure to volatile and uncertain energy pricing
- Manages energy use pro-actively and reduces maintenance requirements
- Advances organizational cultural change and delivers awareness of energy and sustainability
- Provides a greener, safer, more reliable service for the region

Controlling Costs

Energy costs are Metro’s largest non-personnel operating expense. Controlling these costs is paramount to controlling overall operating expenses, reducing exposure to budget risk, and continuing to provide efficient public transit for the region.

In 2017, Metro conducted an Authority-wide energy audit to forecast energy use and costs and identify opportunities for investments and best practices to reduce energy use by 2025.

Business as usual energy costs are expected to increase by 34 percent between 2017 and 2025. This increase is primarily due to increasing energy consumption (e.g. the extension of the Silver Line to Dulles airport and Loudoun County) and increasing utility costs and commodity prices.¹

Just as there is no single driver of energy cost increases, there is no single action to reduce energy consumption. Proactive investments made between now and 2025 are projected to realize approximately \$16 million annually in energy cost savings by 2025. The average return on investment from energy cost savings alone is less than five years.

Implementation of this Energy Action Plan is projected to constrain Metro’s average annual energy cost growth to 1.7% compared to 3.0% annually, as projected under business as usual conditions (see [Figure 1](#)).²

Controlling Energy Cost Growth

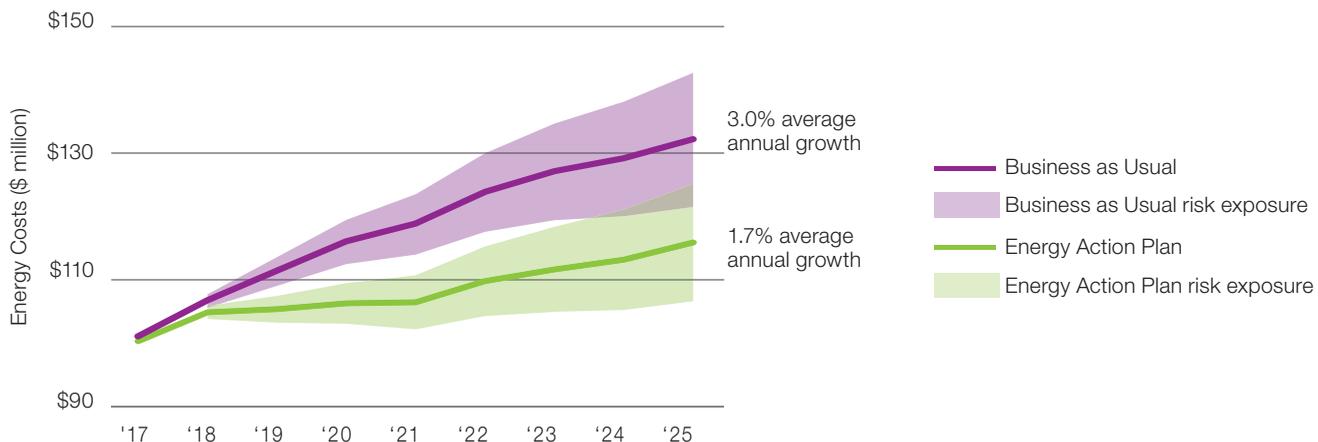


Figure 1. Projected energy costs including risk from future energy commodity price fluctuations (excluding Silver Line Phase II extension)

¹ Commodity price projections are based on the Energy Information Administration’s 2017 Annual Energy Outlook for the transportation sector.

² When holding revenue constant, the 3% operating subsidy commitment equates to 1.67% annually.

Metro's Energy Action Plan

1



Implement Energy Audit Identified Investments

- Rail car energy capture and reuse
- Efficient switch heaters, third rail heaters and controls for heaters and transformers
- Pocket tracks and turn backs for more efficient train operations
- Energy efficient train operation
- Efficiency retrofits to existing railcars and incentives for new railcars
- Composite third rail
- Comprehensive energy efficient lighting upgrades (facilities, stations, and rail tunnels)
- Upgrades to aging systems and equipment with remote operation/diagnostics
- Sub meters to monitor and manage energy use
- Pilot and evaluate roll-out of electric buses
- All door boarding for buses
- Cashless/mobile fare payment
- Traffic signal priority and dedicated bus lanes

2



Modernize Design, Construction, and Operations

- Life-cycle cost based decision making
- Education, awareness, and innovation
- Facilities master plan
- Modernized design standards for efficiency
- Condition-based maintenance
- Regular energy audits and continuous commissioning
- Energy efficient operating procedures
- Best Practice consultation with peer agencies and other industries

3



Engage Dynamically in the Energy Market

- Renewable energy
- Demand management
- Utility rebates
- Distributed generation
- Green bonds

Greener, Safer, More Reliable Ride

Energy Action Plan

This Action Plan will be executed through 2025 and beyond via adoption of best practices and on-going implementation of efficiency as Metro rebuilds its infrastructure.

Advancing and modernizing how Metro manages energy (purchasing and consumption) will control costs and support Metro’s commitment to keep the region’s annual operating subsidy growth to 3 percent or less. This Action Plan will also reduce operating cost risk exposure, promote a strategic approach to energy and asset management, reduce maintenance requirements, deliver awareness and advance organizational cultural change, all while continuing to improve service for the region and lowering its carbon footprint.

This Action Plan represents an initial portfolio of investments and practices that include the commitment to continually strive for efficiency and modernization. Stakeholder and employee engagement is crucial to identify innovation and promote improvement across Metro.

Many initiatives within the Energy Action Plan are underway and progressing for Metro to achieve energy use reduction targets by 2025.

Already Moving

Metro has begun implementing the following initiatives:

- **Lighting** - Upgrading interior of all stations and facilities to energy efficient light emitting diode (LED) lighting
- **Regenerative Braking** - Integrating wayside braking energy recovery into traction power upgrades
- **Chillers** - Accelerating replacement of outdated station chillers with efficient frictionless technology
- **Sustainability Lab** - Identifying and promoting innovative investments
- **Bus Efficiency** - Investing in new fare payment systems and developing an electric bus deployment strategy
- **Leadership in Energy and Environmental Design (LEED)** - Designing all new and “significantly renovated” facilities to LEED Platinum standards

Energy Action Plan Efficiency Investments

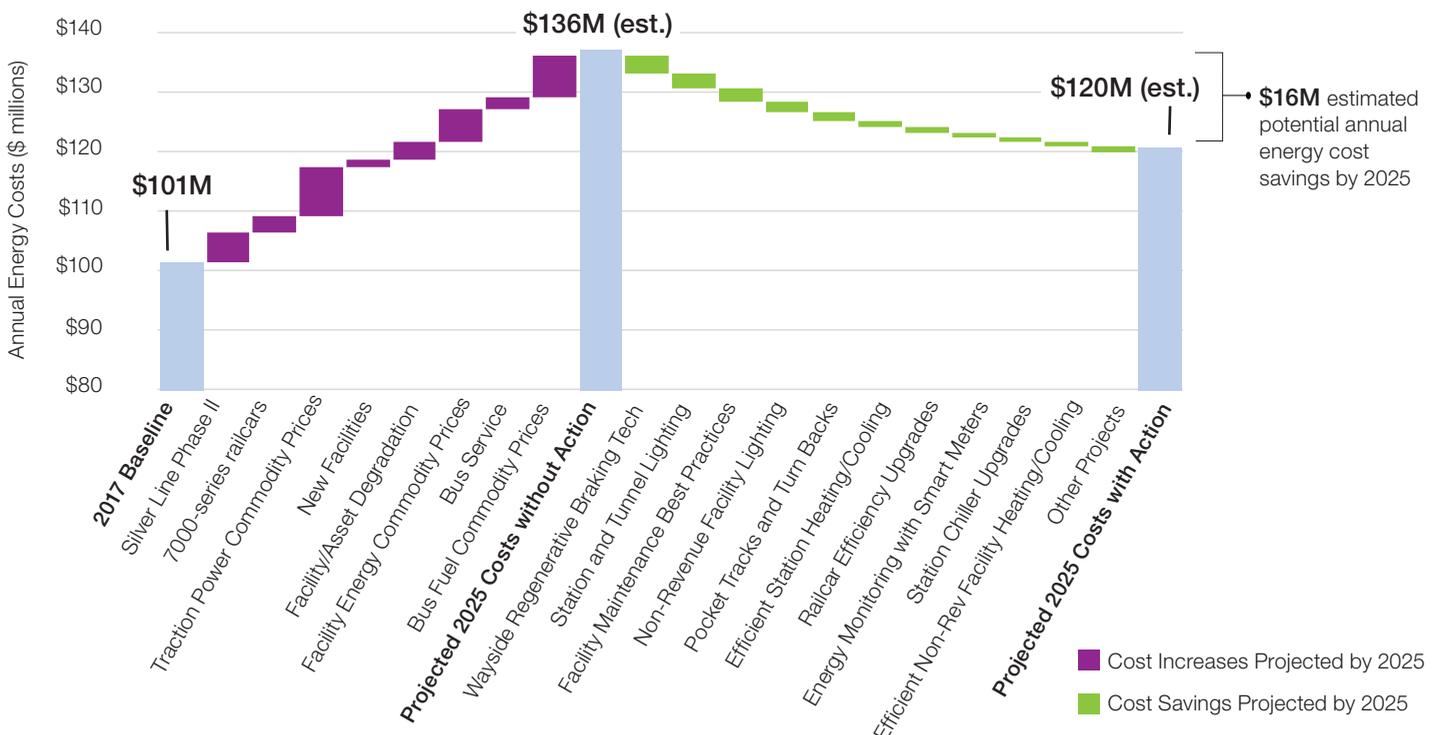


Figure 2. Estimated 2025 business as usual energy costs and savings from energy audit identified capital investments.

1 Efficiency Investments

The energy audit identified a portfolio of investments to improve efficiency of equipment across Metro. These investments are integrated into Metro’s Capital Improvement Program. Metro will build on these investments by continuing to identify and evaluate new and emerging technologies. As additional investments are identified they will be added to the program of capital projects to institutionalize efficiency within rebuilding efforts.

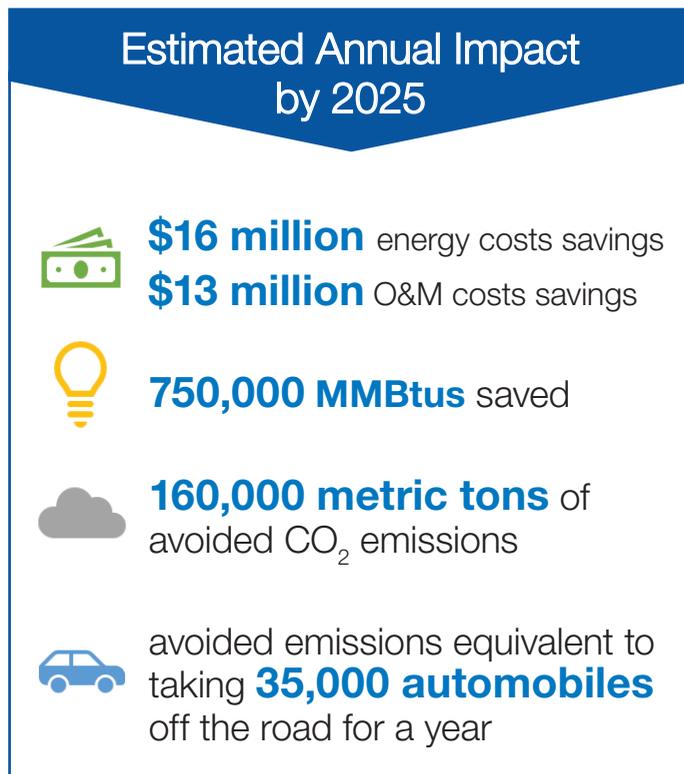
2 Modern Design & Operations

In addition to equipment investments, Metro is upgrading its design, construction, and operational practices. Metro will adopt best practices, including full life-cycle cost analysis and energy efficient standard operating procedures, to reduce projected increases in energy use and costs. In parallel, Metro will launch an educational campaign to engage staff and stakeholders and promote a cultural shift in efficiency and innovation.

3 Energy Market Engagement

The third component of this Plan is increased engagement in the energy market including energy purchasing and demand management. Metro will also pursue opportunities for renewable energy and work with utilities to take advantage of utility rebates to maximize efficiency investments.

Each component of this Action Plan, along with employee engagement, will transform Metro’s organizational culture while reducing energy use and costs by 2025. By implementing this Action Plan, Metro strengthens its contribution to avoided regional CO₂ emissions; promoting livable communities and furthering regional sustainability initiatives (see Figure 3).



Metro Reduces Pollution

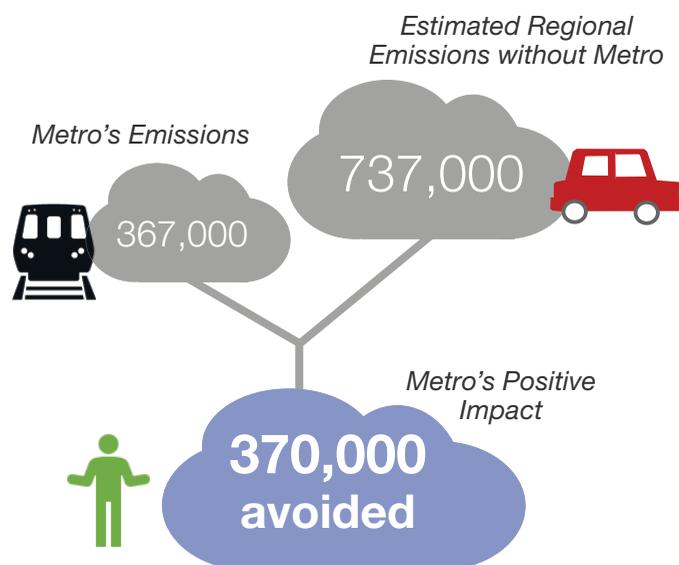


Figure 3. Estimated net avoided tailpipe emissions in metric tons of CO₂ (FY18)

Energy Audit Findings

Metro’s energy consumption is comprised of electricity, natural gas, diesel, and gasoline. Consumption can be divided into two functions - service and support (see Figure 4).

The Authority-wide energy audit analyzed sample passenger stations, support facilities, traction power substations, bus garages, and rail yards to forecast energy use and costs and identify opportunities for reductions by 2025.

Between 2017 and 2025, Metro’s energy consumption is expected to increase by 14 percent. This increase is primarily due to increased energy consumption associated with the Silver Line extension to Dulles airport and replacement of legacy railcars with modern 7000-series railcars.

Metro’s annual energy costs are projected to increase by 34 percent, or \$35 million, between 2017 and 2025, with business as usual conditions. This cost growth is a combination of projected increases in consumption and escalation of commodity prices⁴ between now and 2025 (see Figure 5).

2025 Energy Savings Opportunity

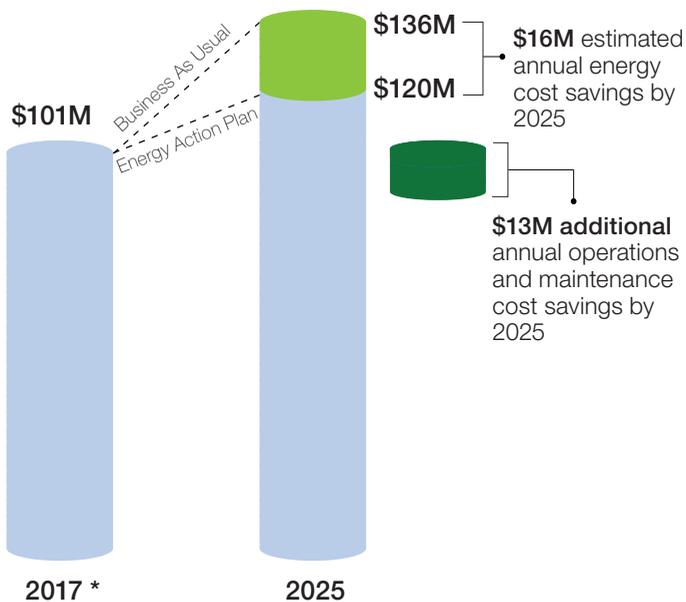


Figure 5. Business as usual projected 2025 energy costs and estimated energy cost savings

* Energy costs are based on 2015 baseline

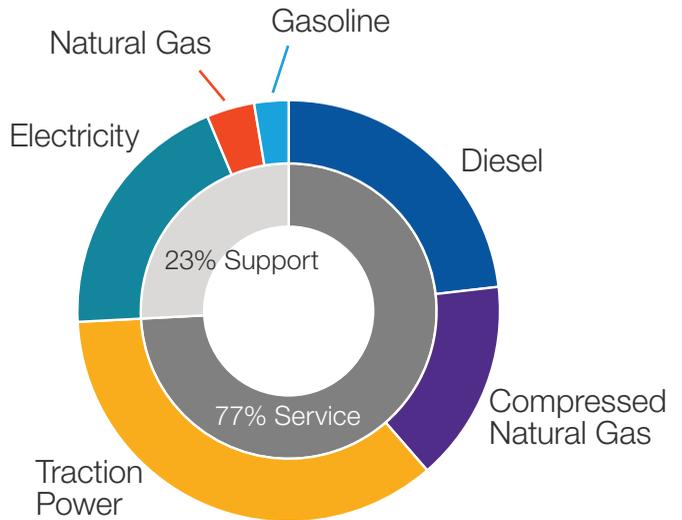


Figure 4. 2017 energy consumption by energy type and function

Projected 2025 cost growth is concentrated within traction power and facilities. The energy audit identified efficiency investments to address these rising costs.

Planned facility investments provide the greatest annual energy cost savings, totaling \$9.2 million by 2025, compared to continuing with business as usual.

In addition, planned traction power investments provide total annual energy cost savings of \$6.9 million by 2025. When combined with operations and maintenance cost savings,⁵ planned traction power investments provide the greatest total annual cost savings of \$17.6 million by 2025, compared to business as usual.

Metro is investing in all-door boarding and new fare payment systems, coordinating with jurisdictions on dedicated bus lanes and traffic signal timing, and developing an electric bus deployment strategy to increase efficiency and improve passenger experience and travel times.

Full implementation of the Energy Action Plan is projected to result in a 12 percent reduction in annual energy costs by 2025, compared to business as usual estimates. This Action Plan is a key component of transforming the way Metro does business and recognizing the value of energy efficiency both for Metro’s bottom line and the region.

⁴ Commodity price projections are based on the Energy Information Administration’s 2017 Annual Energy Outlook for the transportation sector.

⁵ Operations and maintenance (O&M) cost savings include non-energy cost savings associated with reduction in materials and/or labor requirements.



2019

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