



Presentation to

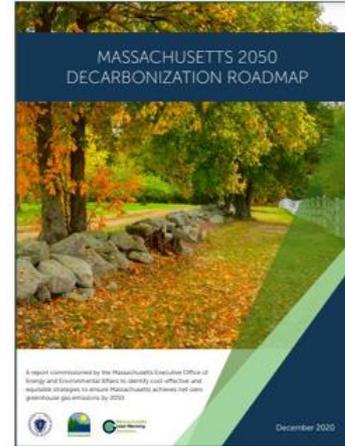
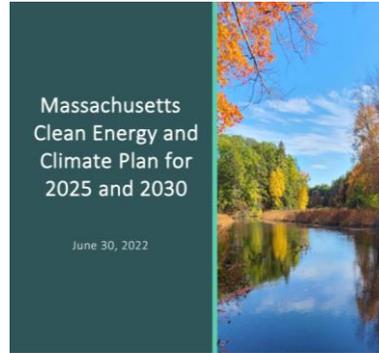
MWRA Advisory Board
Energy and Sustainability Program Overview

November 16, 2023



Energy Management Drivers

- State Climate Goals
- Executive Orders
- Environmental agency
- Fiscal responsibility



EXECUTIVE ORDER
No. 438: State Sustainability Program

DATE: 07/23/2002
ISSUER: Jane Swift
MASS REGISTER: No. 954
AMENDING: Confirming support of Executive Order 350
SUPERSEDED BY: Executive Order 484

WHEREAS, the citizens of the Commonwealth have a right to clean air and water, and a responsibility to protect the environment;

WHEREAS, the Clean Air Act and the Clean Water Act require the Commonwealth to comply with environmental standards;

EXECUTIVE ORDER
No. 484: Leading by example - clean energy efficient buildings

DATE: 04/18/2007
ISSUER: Deval Patrick
MASS REGISTER: No. 1077
REVOKED AND SUPERSEDED BY: Executive Order 594

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WHEREAS, buildings are significant users of energy, accounting for 39% of U.S. energy, 70% of U.S. electricity, and 39% of global greenhouse gas emissions;

EXECUTIVE ORDER
No. 594: Leading By Example: Decarbonizing and Minimizing Environmental Impacts of State Government

DATE: 04/22/2021
ISSUER: Governor Charlie Baker
MASS REGISTER: No. 1443
REVOKING AND SUPERSEDING: Executive Order 484

WHEREAS, climate change is one of the most critical issues of our time and its potential impacts present a serious threat to the Commonwealth's residents, communities, and economy;

WHEREAS, according to a 2018 report from the Intergovernmental Panel on Climate Change (IPCC), global greenhouse gas emissions must decline by about 45 percent from 2010 levels by 2030 and reach net zero around 2050 to keep global temperatures from rising more than 1.5 degrees Celsius;



Greenhouse Gas Emissions Inventory Update
2006-2021
Massachusetts Water Resources Authority

June 2023



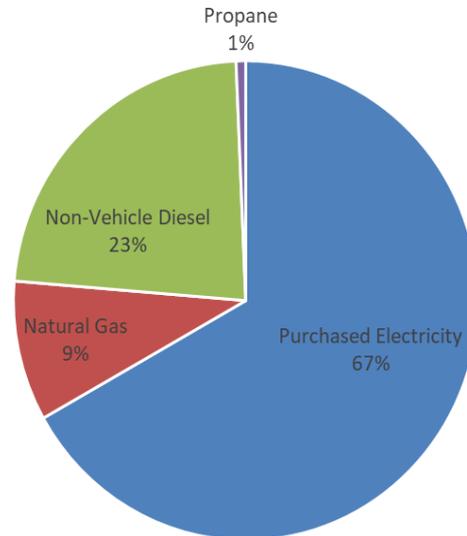
Energy Intensive Operations

Total Energy Used in FY22

- **Electricity**
 - 158,700 MWh
 - \$29.4 million
- **Fuel Oil**
 - 1.26 million gal
 - \$3.5 million
- **Natural Gas**
 - 700,000 therms
 - \$984,000

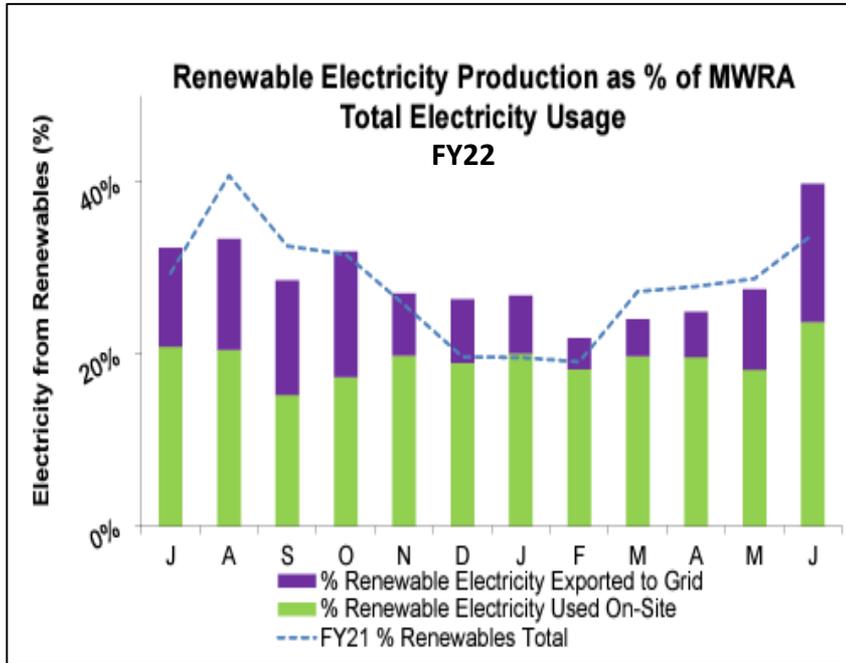
This is the equivalent of over 16,000 homes' energy use for one year.

MWRA FY22 Energy Consumption by Fuel Type



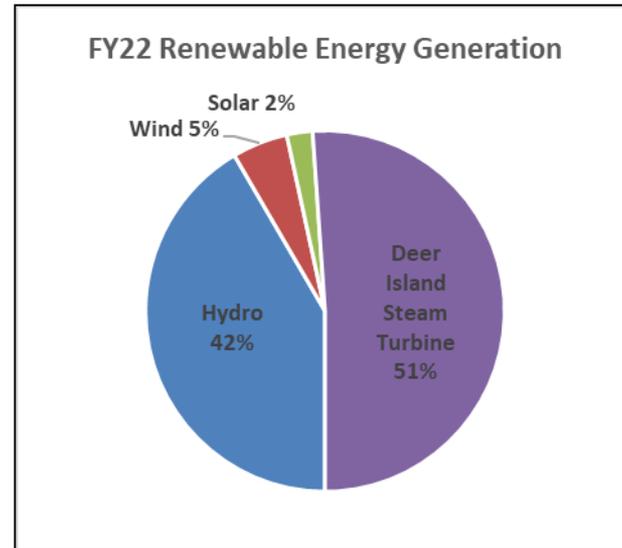


Renewable Energy



Renewable Energy Statistics

Using biomass, wind, solar, and hydroelectric, MWRA generated about 57 million kWh in FY22, at a value of nearly **\$8 million** in avoided purchased energy costs.





Hydroelectric Power





Wind Power





Solar Power





Energy Efficiency





Road Towards Net Zero

- Building Electrification
- Clean Transportation
- Combined Heat and Power Optimization
- Greenhouse Gas Emissions Tracking and Reduction Goals
- Innovation and Resiliency



Building Electrification



Wachusett Aqueduct Pump Station
Geothermal Heat Pump *During Construction*



Wachusett Aqueduct Pump Station *After Construction*

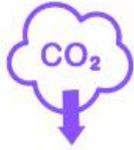


Spot Pond Heat Pumps



Clean Transportation

What are the benefits of electric vehicles?



Fewer
GHG Emissions



Better
Air Quality



Less
Maintenance



Lower
Fuel Costs

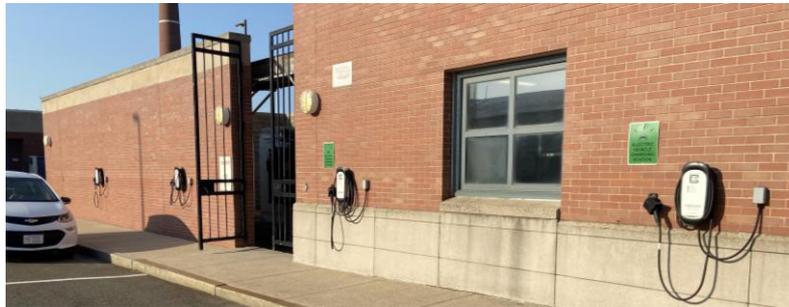


Fun
To Drive!





Electric Vehicle Charging Infrastructure



Existing EV Chargers



Proposed Chargers at Chelsea Facility



Combined Heat and Power Optimization

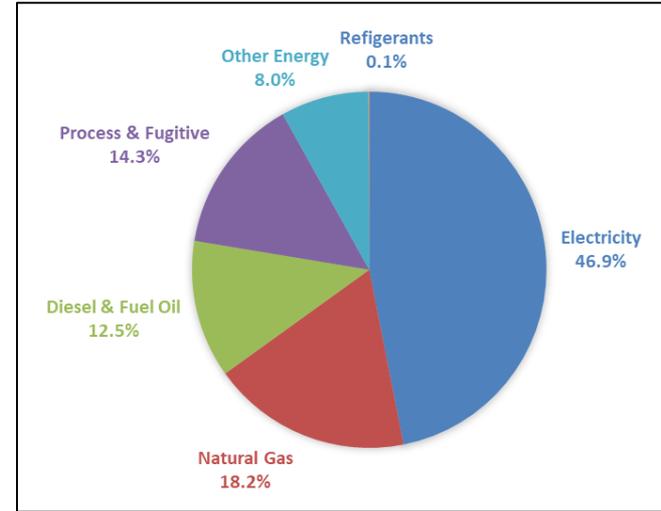
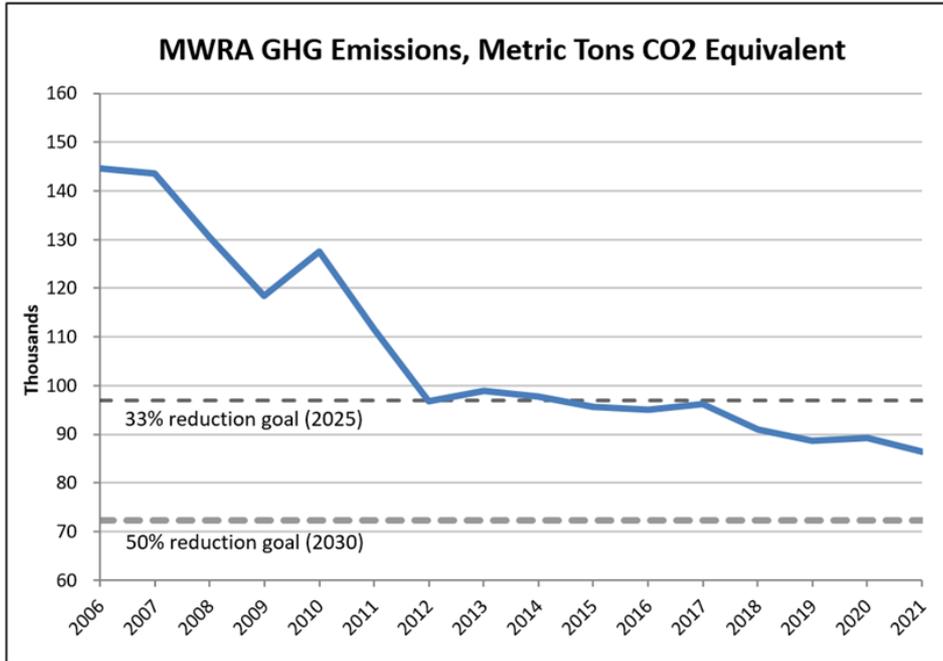


	Existing CHP	Proposed CHP
Electricity from Combined Heat and Power (CHP)	21%	48%
Combined Heat and Power (CHP) Efficiency	52%	68%
Energy from On-site Resources	~60%	~75%

Energy Performance Metrics for Existing and New CHP



Greenhouse Gas Emissions



FY22 MWRA Green House Gas Emissions Sources



Incorporate Social Cost of Carbon into Project Analysis

- Factor in Life-cycle Cost Analyses (LCCA) for Capital Projects
 - Include relevant costs and potential revenue streams to inform decisions
- Estimate of the **economic damage** caused by **emitting** a ton of carbon dioxide
- Use a social cost of carbon of \$125/ton CO₂e as a sensitivity assessment in MWRA's life cycle cost analyses



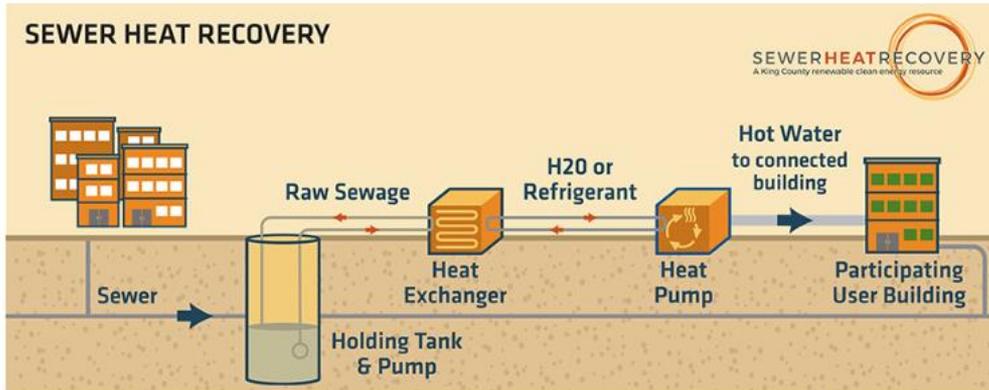
Calculating the Social Cost of Carbon

- SCC relies on complex specialized models to:
 - Predict future emissions and economic growth
 - Model future climate impacts
 - Assess the economic impact of these climatic changes
 - Convert future damages into their present day value
- Take **climate change** into consideration in **financial decision-making** – localizing a global problem



Resiliency and Innovation

- Battery Storage
- Heat Recovery



Battery Pilot Projects - Chelsea Admin Building and Brattle Court Pump Station

Wastewater Heat Recovery schematic (image from King County)



Funding Sources

- Clean Transportation
 - MassEVIP
 - Utility EV Make Ready
 - MOR-EV Trucks
- Energy Efficiency
 - Mass Save
 - MassDEP GAP Clean Energy Results
- Renewable Energy
 - Renewable Portfolio Standard
 - Energy Policy Act of 2005
- Capacity and Demand Management
- Power Sales
- Federal
 - Investment and Jobs Act
 - Inflation Reduction Act

EVERSOURCE

MASSACHUSETTS ELECTRIC VEHICLE CHARGING REBATE
COMMERCIAL APPLICATION

Eversource is offering this Electric Vehicle (EV) Charging Program to provide support for up to 100% of the infrastructure costs needed to bring electric service to sites where Level 2 and Direct Current Fast Charge (DCFC) stations to be installed. This application is for all business customers of Eversource's electric service who purchase and install EV charging stations at workplaces, public destinations, and multifamily buildings.

OFFERED BY: Massachusetts Department of Environmental Protection

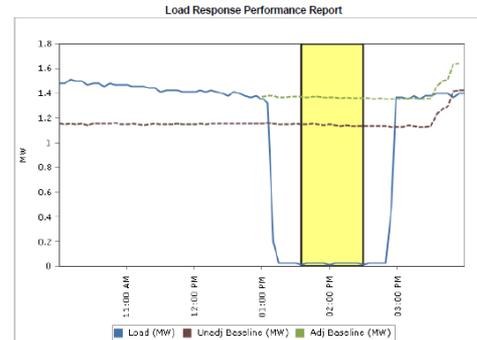
Apply for MassEVIP Fleets Incentives

This program helps eligible public entities acquire electric vehicles for their fleets.

Incentives are available on a first-come, first-served basis until all available funding is spent.

RPS Class I Renewable Generation Units
Updated June 1, 2022
Massachusetts Department of Energy Resources

Type	MA RPS Number	NEPOOL GIS ID	Plant - Unit Name	Fuel / Resource / Technology	Nameplate Capacity (MW)
AD	1015-02	NON38983	Deer Island Treatment Plant STG	Anaerobic Digester	18.000
AD	1015-02	NON38984	MWRA BP STG	Anaerobic Digester	1.100
HY	1154-10	NON39003	Deer Island Hydro	Hydroelectric	2.000
HY	1180-11	NON38939	MWRA Loring Rd Hydro 1 Weston	Hydroelectric	0.200
SL	1200-11	NON38938	MWRA Carroll PV Marlborough Solar 1	Photovoltaic	0.496
WD	1152-10	NON38970	MWRA Charlestown Wind	Wind	1.500
WD	1152-10	NON39005	MWRA Deer Island Wind 1	Wind	3.300
WD	1152-10	NON39006	MWRA Deer Island Wind 2	Wind	1.200





Next Steps

- Roadmap and Goal Setting
- Integrate Roadmaps into Existing Plans and Protocols
- Pilot Projects to Full Scale
- Identify and Acknowledge Implementation Challenges
- Investing Equitably in the Future

