BUILDINGENERGY BOSTON

Net Zero Montpelier: A Municipal Case Study

August 4, 2020 · 11:00 am

Presenter:

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Montpelier Energy Advisory Committee

MUNICIPAL

buildings, fleet, operations

PLANNING

master plan, energy plan, zoning rewrite

Montpelier Energy Advisory Committee

TRANSPORTATION

alternative transit, EVs, bike/ped

RESIDENTIAL

homeowner and landlord outreach

History of Net Zero Montpelier

Button Up

Municipal Building Energy Audits

EVT Net Zero Workshop Series

Shared Use Path Completed

Established Revolving Loan Fund

Streelight LED Conversion

On-Demand Micro Transit Pilot

Remaining Municipal Buildings Converted to Renewable Heat

Energy Advisory Committee Founded

Georgetown Energy Prize Competition

Retro Commissioning

Path to Zero Plan Completed

Energy Fair at National Life

Net Zero Goal Reached!

2010

Home Energy Challenge

Pilot Home Energy Visits

CFL Distribution

2015

Climate Action Champions

LED Distribution

District Heat System Completed

Net Zero Home Tours

Established Municipal Energy Tracking

1 MW Municipal Solar Array Online

Car Share Pilot

Net Zero Transit Center Completed

Window Dressers

2020

Organics to Energy Project at WRRF

Weatherize Montpelier

Home Energy Labeling Ordinance Enacted

2025

Light-Duty Municipal Fleet Converted to EVs

2030

GMP Offers 100% Renewable Electricity

NET ZERO MONTPELIER

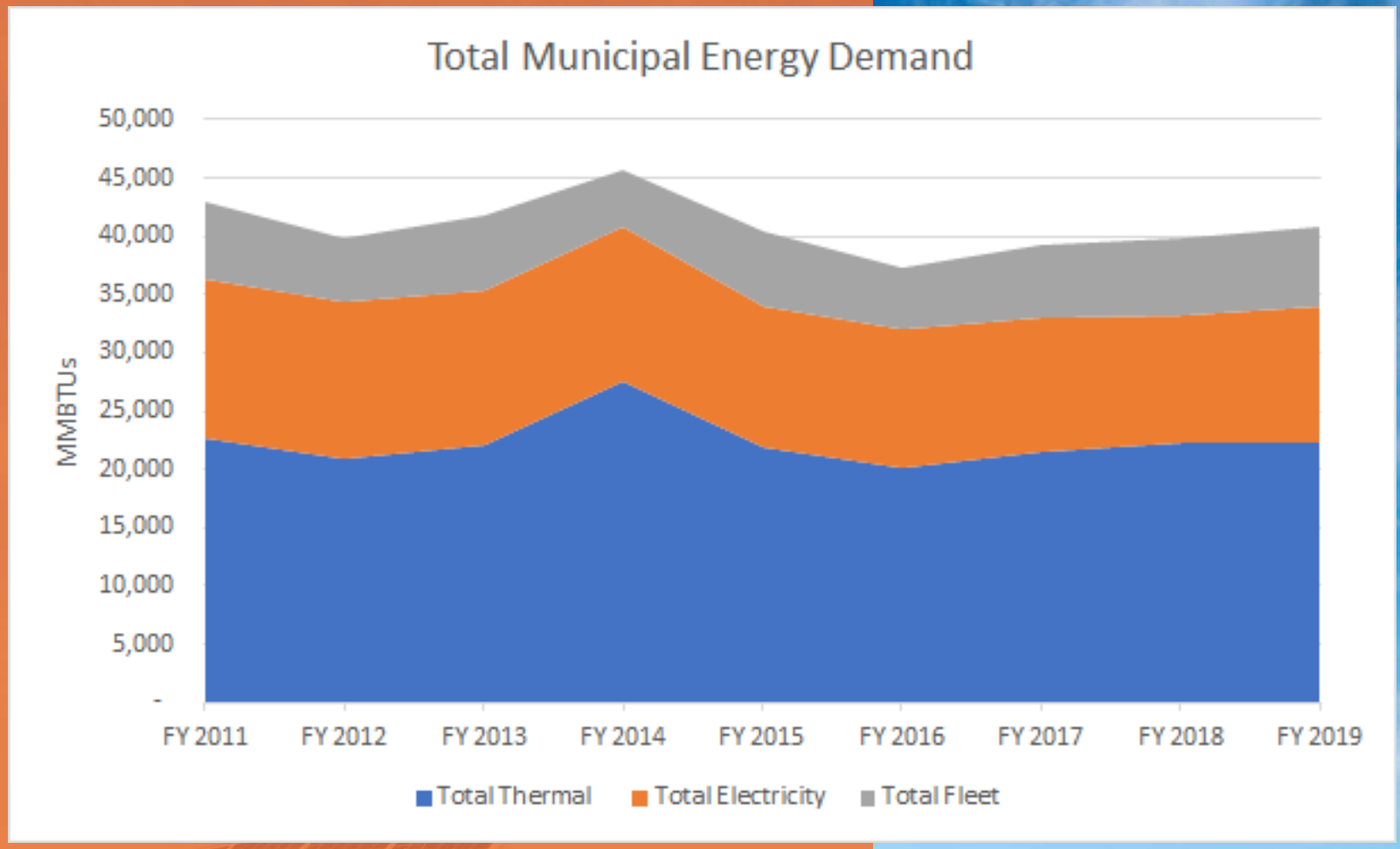
Montpelier Energy Advisory Committee

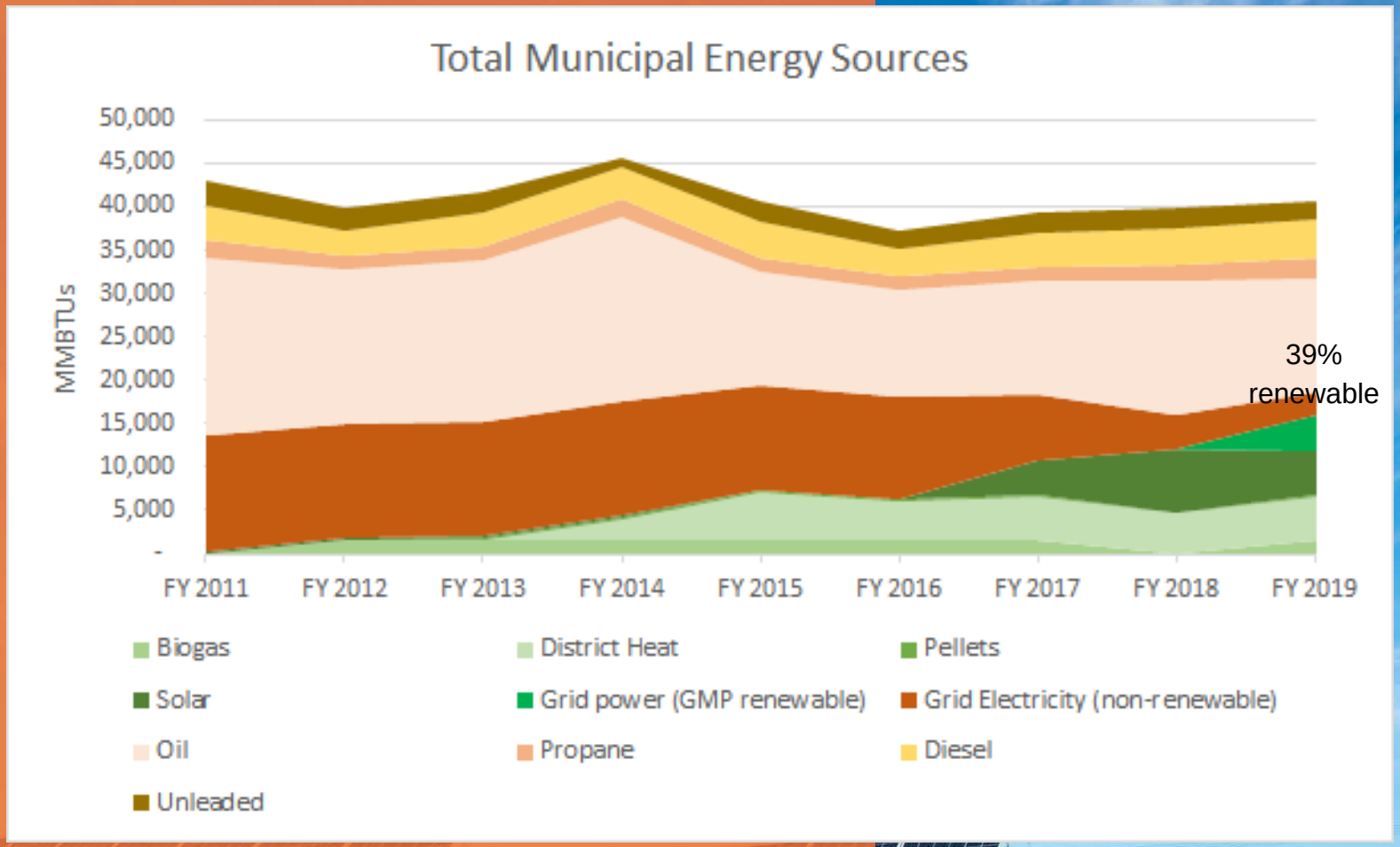
Montpelier defines the City's Net Zero Goal as:

1. Montpelier is committed to becoming the first capital city to eliminate fossil fuel use by converting to 100% renewable energy.

2. By 2030, 100% of the energy used for municipal government operations (thermal, electrical, and transportation) will be renewable or offset.

3. By 2050, fossil fuel use will be eliminated entirely and 100% of energy needs (municipal, residential, and commercial) will be met renewably.


Total Municipal Energy Demand
MMBTUs
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
Total Thermal
Total Electricity
Total Fleet


Total Municipal Energy Sources
MMBTUs
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
39%
renewable
Biogas
District Heat
Pellets
Solar
Grid power (GMP renewable)
Grid Electricity (non-renewable)
Oil
Propane
Diesel
Unleaded

STRATEGIES

RENEWABLE GENERATION

- 1 MW Municipal Solar
- District Heat
- Organics to Energy

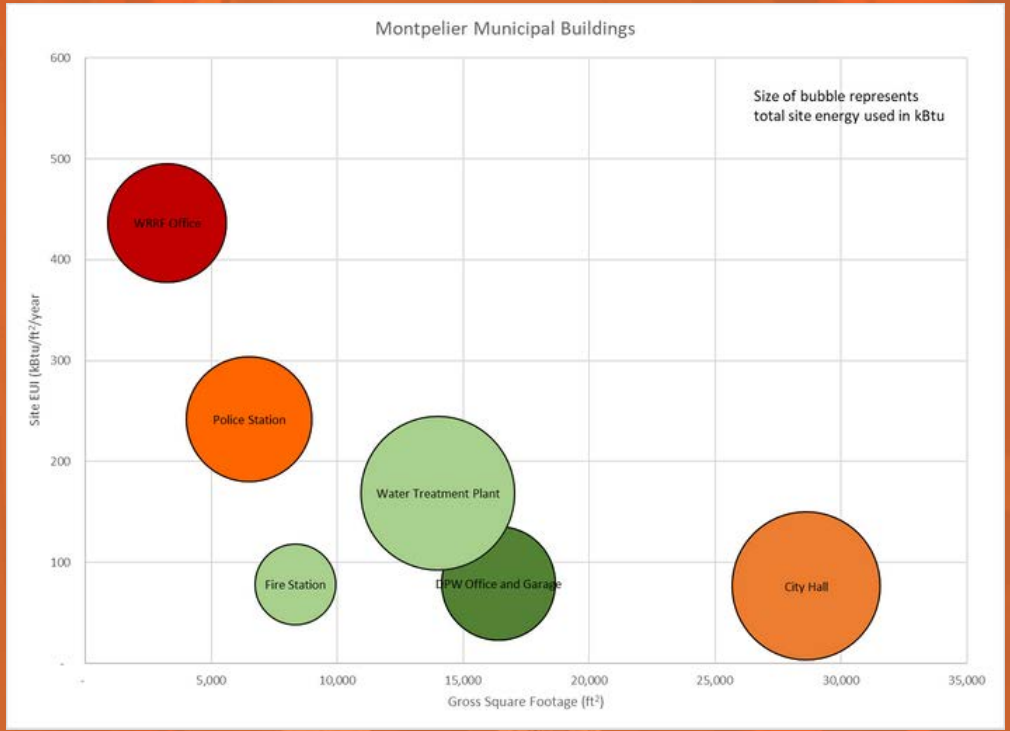
ENERGY EFFICIENCY

- Building Energy Audits
- Retrocommissioning
- Revolving Loan Fund

Building Energy Audits

Level 2 Audits
Completed in 2017:

City Hall
Fire Station
Police Station
Water Treatment Plant
Water Resource Recovery Facility
Public Works Office and Garage



Portfolio Benchmarking Snapshot (FY17)

RETRO COMMISSIONING

Rx PROJECTS COMPLETED

1. Police Station HVAC
2. Water Treatment Plant
3. Fire Station Snowmelt Controls
4. District Heat Summer Loop

Retrocommissioning is a process to improve the efficiency of an existing building's equipment and systems.

Resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life as equipment has aged, or as building usage has changed.

REVOLVING LOAN FUND

The purpose of the Fund is to capture and track savings from municipal sustainability projects and to utilize part of those savings for subsequent projects.

PROJECTS COMPLETED

1. Capacitor at Water Treatment Plant
2. Insulation on district heat pipes to Fire Station
3. Replaced controls on snowmelt system at Fire Station
4. Replaced storm windows at DPW
5. Replaced house lights in City Hall theater with LEDs
6. Weatherstripping City Hall Windows
7. Repairs to overhead doors

PROJECT TRACKING

GRITS
Green Revolving Investment Tracking System

City of Montpelier

TOTAL PROJECTS FUNDED (COMPLETED / IN-PROGRESS)	TOTAL INVESTED TO DATE *	MEDIAN PAYBACK PERIOD	MEDIAN ANNUAL FINANCIAL SAVINGS
5 / 2	$ 20,842	0.81 years	$ 2,700

MEDIAN ANNUAL ENERGY SAVINGS	TOTAL FINANCIAL SAVINGS TO DATE	TOTAL ENERGY SAVINGS TO DATE	TOTAL EMISSIONS ABATED TO DATE
216.00 mmbtu	$ 19,646	877 mmbtu	84 $MTCO_2e$

Efficiency data powered by GRITS

* Includes investments to in-progress projects without savings to date
Last updated 08/04/2020

				Actual or Projected			Annual Savings		
PROJECT ▲	STATUS	INSTALL COMPLETE DATE	TYPE	COST	ANNUAL ROI	PAYBACK (YRS)	EMISSIONS (MTCO2E)	ENERGY (MMBTU)	WATER (GAL)
Capacitor	Completed	04/03/2017	○ Metering/Energy Data Monitoring and Control Systems	$ 2,700	78.6%	1.1	0	0	0
City Hall Theatre House Lights	Completed	01/11/2019	○ Lighting	$ 4,748	2.7%	7.9	2	15	0
City Hall Window Air Sealing	In-Progress	06/30/2020	○ Building Envelope	$ 7,176	-5.0%	0.0	0	0	0
DPW Office Interior Storm Windows 1	Completed	11/23/2018	○ Building Envelope	$ 909	-5.0%	0.0	0	0	0
Fire Station Snowmelt Controls 1	Completed	04/30/2019	○ Metering/Energy Data Monitoring and Control Systems	$ 3,509	142.1%	0.7	39	410	0
Fire Station Snowmelt Loop Insulation 2	Completed	01/16/2019	○ Building Heating, Ventilation, Air Conditioning (HVAC)	$ 2,181	119.8%	0.8	21	216	0

BUILDING THE FUND

Cost savings from all funded projects will accrue to the Fund according to the following formula:

1) Until the project's cost have been recovered, all savings will accrue to the Fund.

2) After the initial "payback" has been achieved, 50% of the savings will accrue to the Fund for an additional 2 years.

3) After this period, all further avoided cost savings will accrue to the City.

4) Additional funds can be added to the Fund at any time from public or private sources, subject to the same restrictions.

DISTRICT HEAT

- Municipal utility that purchases heat from the woodchip fired plant operated by the State of VT
- 20 buildings downtown including City Hall, Fire Station, Police Station and Elementary School. 411,000 square feet of space.
- 11 non-municipal customers, including churches, library, courthouse, and some privately owned commercial buildings
- Customers pay a monthly capacity charge plus a per MMBTU charge. Costs have increased significantly since the system came online in 2014
- During the summer the loop has been heated by oil fired boilers in City Hall, using more than 10,000 gallons of oil/year

MUNICIPAL SOLAR

- 500 MW in Montpelier
- 500 MW in Sharon
- Power Purchase Agreement saves City and School District $40-50,000/year
- Produces 1,500,000 kWh/year
- Offsets 44% of City and School District electricity usage

MONTPELIER ENERGY ADVISORY COMMITTEE

WWW.NETZEROMONTPELIER.ORG

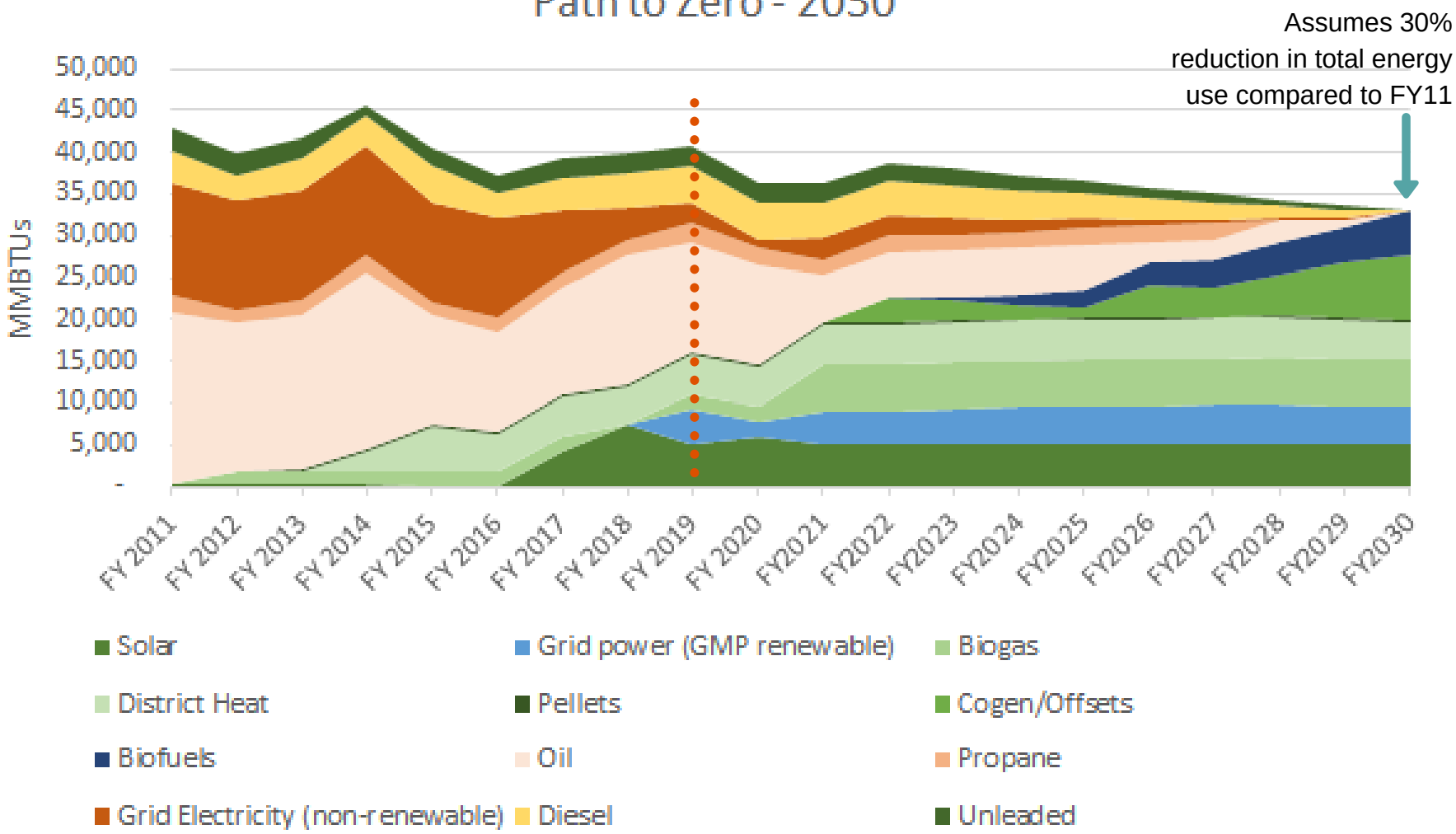
ORGANICS TO ENERGY WASTEWATER TREATMENT

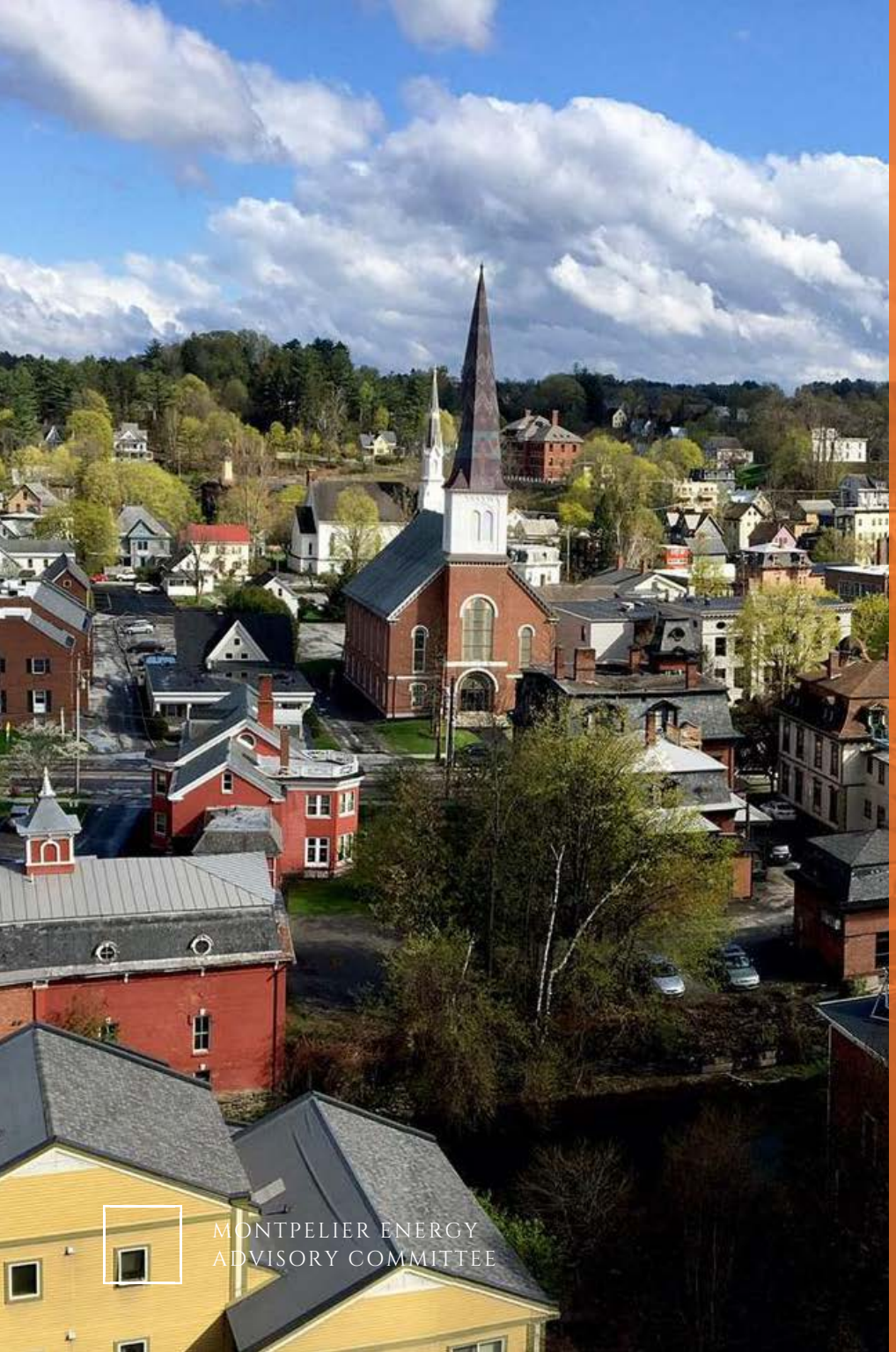
- $16.75 million project underway to repair aging infrastructure and upgrade equipment to allow for additional liquid waste inputs and biogas production
- Biogas will be used to heat the digesters and buildings at the wastewater treatment plant
- Excess biogas will be burned in a 400kW turbine to create electricity and sold to Green Mountain Power (estimated 3 million kWh/year)
- Project will make the wastewater treatment plant a net positive energy producer and cash positive

TRANSPORTATION

- On-Demand Micro Transit pilot program starting in 2021
- Shared use path through downtown completed in 2019
- Complete Streets plan for walkability and bikeability
- DPW assessed viability of switch to biofuels for municipal fleet, but they are holding out for "renewable diesel" to come on the market
- Electrification of lawn equipment underway
- Grant funding to install 20 EV charging stations

Path to Zero - 2030





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