



# Cities as Clean Energy Leaders, Innovators and Practitioners

March 15, 2019

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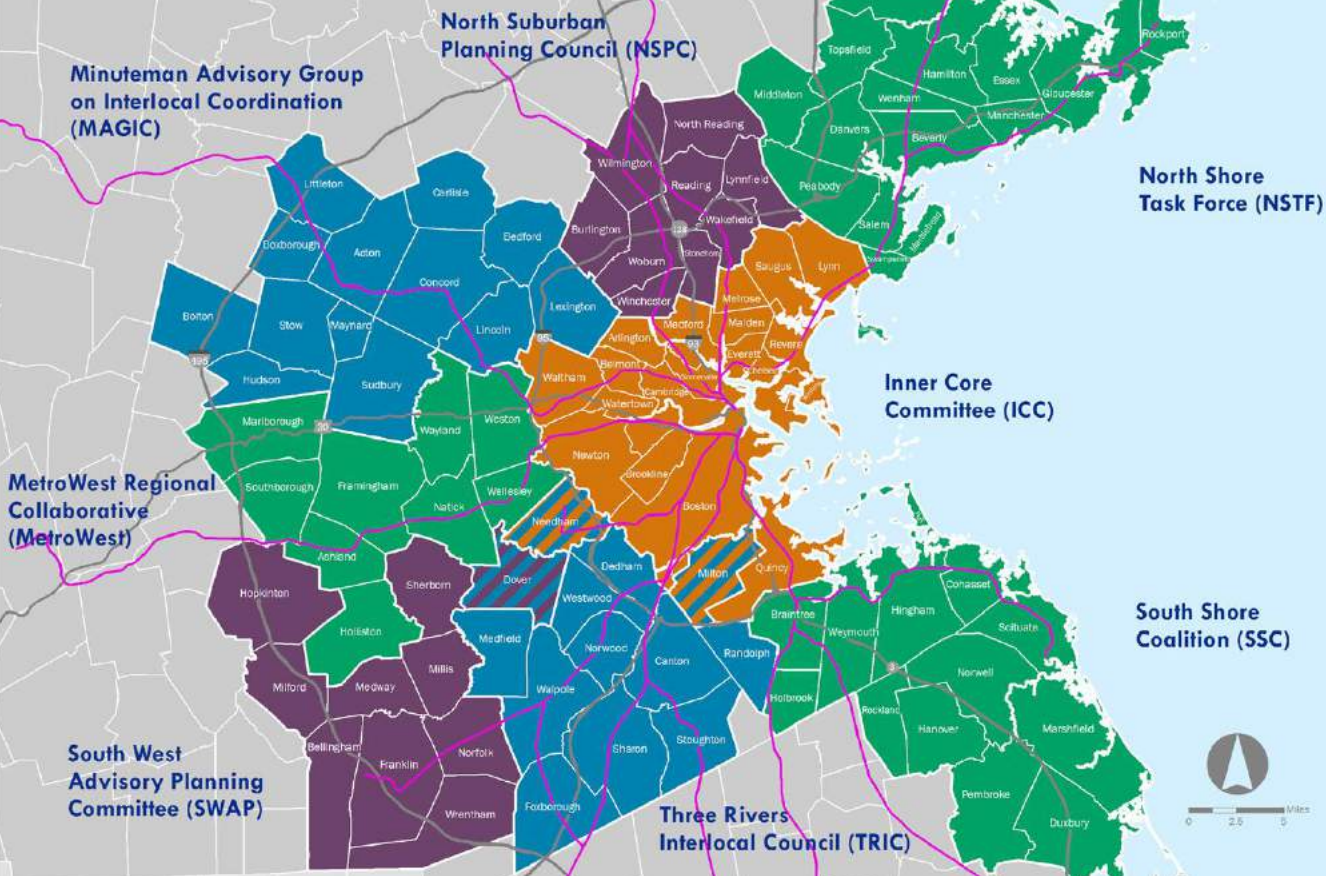
## **BUILDINGENERGY BOSTON**

**MARCH 14-15, 2019 • WESTIN BOSTON WATERFRONT • [NESEA.ORG/BE19](http://NESEA.ORG/BE19)**

Conference + Trade Show of the Northeast Sustainable Energy Association (NESEA)

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# The MAPC Region



**Cammy Peterson**  
**Director of Clean Energy**  
**Metropolitan Area Planning Council**

Dover is in Three Rivers and South West Subregions.  
Milton and Needham are in Inner Core and Three Rivers Subregions.



# Urgency of Now

2018 was 4th hottest year on record for the globe

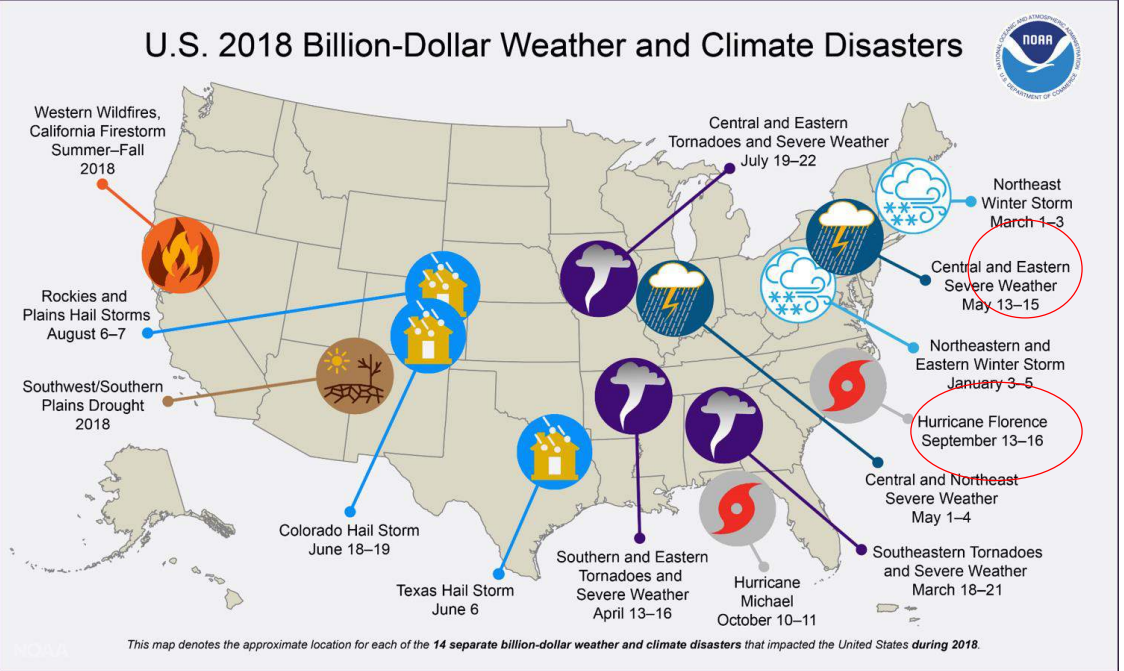
The U.S. experienced 14 billion-dollar weather and climate disasters

Climate Satellites | climate analyses and statistics | global average temperatures

February 6, 2019 —



National Oceanic and Atmospheric Administration  
U.S. Department of Commerce



# 2018 IPCC Report



Greenhouse gas pollution must be reduced by **45 percent** from 2010 levels by 2030, and **100 percent** by 2050 to prevent 1.5°C of global warming.

# Urgency of Now



Collins Cove, Salem during Winter Storm Grayson, January 2018  
Photo by Matt Almeida. Source: [Patch](#)



Woodman's of Essex during Winter Storm Riley, March 2018.  
Source: [Woodman's of Essex](#)

# Cities and Towns as Climate Leaders



Politics & Government

## Somerville Pledges Support Of Paris Accord After Trump Withdrawal

Despite the president withdrawing from the international agreement, "Somerville is still in."

By Alex Newman (Patch Staff) - Updated June 2, 2017 3:03 pm ET

0 Like 73 Share

# Metro Mayors reaffirm commitment to Paris Climate Accord

Updated Jun 27, 2017 at 4:39 PM



# Cities and Towns as Clean Energy Leaders

SANTA BARBARA BECOMES 30TH U.S. CITY TO COMMIT TO 100% RENEWABLE ENERGY

First City On California's Central Coast To Commit To 100% Clean Energy

Tuesday, June 6, 2017

## Abita Springs aims to run on 100% renewable energy by 2030

BY SARA PAGONES | SPAGONES@THEADVOCATE.COM MAY 6, 2017 - 4:00 PM (1)



## Orlando Becomes 40th City to Commit to 100% Renewable Energy

By Sierra Club Aug. 09, 2017 08:39AM EST

## Getting to Net Zero: Cambridge, MA

Thursday Mar 26, 2015 - 4:20 PM EDT



## Madison approves 100 percent clean energy goals, up to \$250,000 for consultant

ABIGAIL BECKER | The Capital Times | abecker@madison.com | @abecker\_4 Mar 22, 2017

## Lexington Town Meeting votes to adopt a net zero carbon emissions policy

Posted Apr 21, 2016 at 8:48 PM



*Heating and cooling*

*Peak Demand Management*



*Net Zero*

*Building Codes*

*Clean Transportation*

*Green Municipal Aggregation*





# Smarter Cars: EVs & AVs



Source: Wikimedia Commons



Source: Wikimedia Commons

# Alternatives to Cars

A Complete Street is one that provides safe and accessible options for all travel modes – walking, biking, transit and vehicles – for people of all ages and abilities.

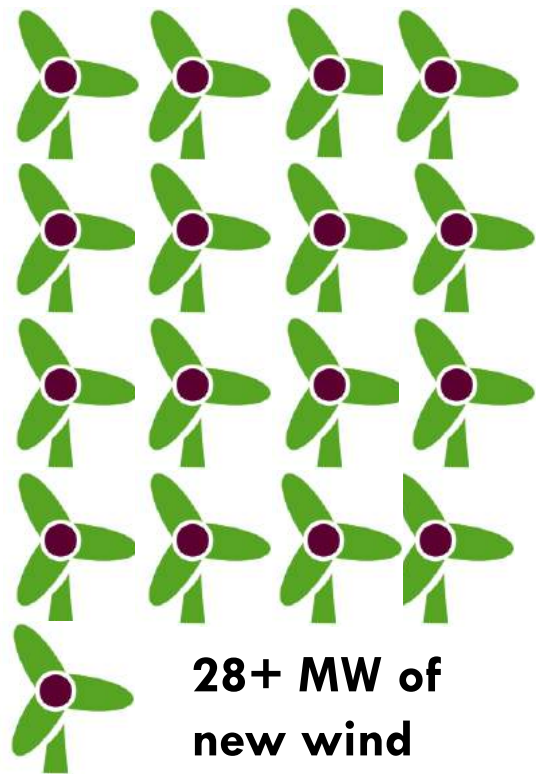


Source: Smart Growth America

# Green Municipal Aggregation

The MAPC strategy effectively increases the state's minimum requirement for new renewable energy, helping to build even more renewable generation in our region.

- Arlington
- Bedford
- Brookline
- Dedham
- Gloucester
- Hamilton
- Medford
- Melrose
- Millis
- Rockland
- Scituate
- Somerville
- Stoneham
- Sudbury
- Waltham
- Winchester



**28+ MW of new wind**

# Low-Carbon Buildings



Wayland  
MASSACHUSETTS

MARCH 26, 2018

*MOVER:* Ellen Tohn

**MOTION – 2018 ATM**

**ARTICLE 22: RESOLUTION: ENERGY AND CARBON SAVINGS IN MUNICIPAL BUILDING CONSTRUCTION**

I MOVE YOU SIR:

MOVED:

Whereas Wayland was recognized as a Massachusetts Green Community in 2011 and has a commitment to reduce municipal carbon-based energy use and encourage reduction of residential and commercial carbon-based fuel use.

Whereas, Wayland recognizes that global warming is a threat to our world, impacting the ability of current and future generations to lead healthy, productive and enriching lives.

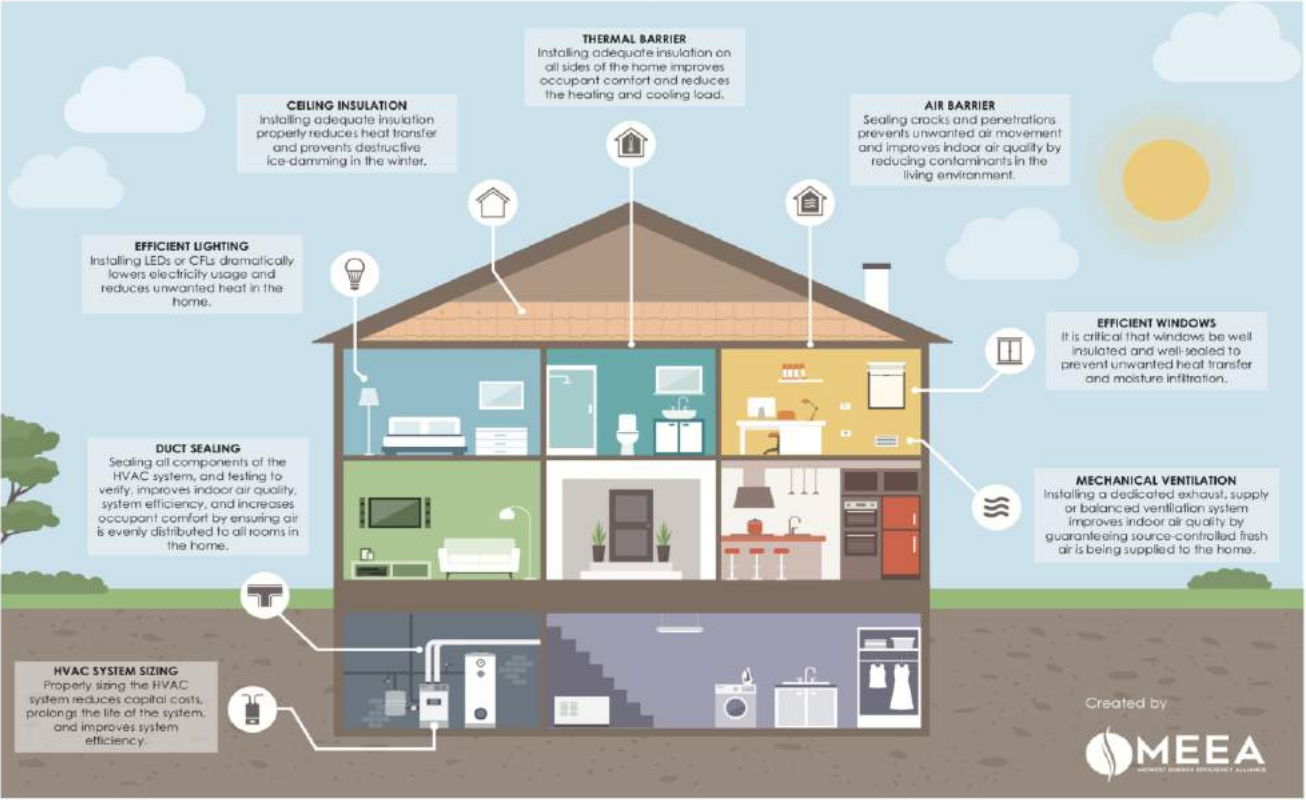
Whereas, buildings can be designed to reduce their energy and carbon use, lower their lifetime energy operating costs, and improve their energy resiliency by incorporating cost effective energy efficient design, building system controls, and on-site renewable energy generation and energy storage.

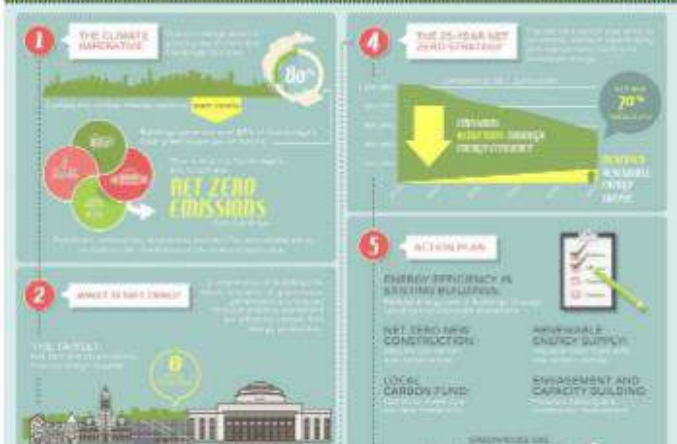
Whereas, our municipal buildings are a significant contributor to municipal carbon-based energy costs. New construction and substantial renovation of municipal buildings are significant expenditures and create structures that will endure for decades.

Therefore, be it resolved that Wayland shall seek cost-effective design and construction of all new municipal building construction and substantial renovation projects to minimize carbon-based energy use through cost-effective energy efficient design, building system controls, and on-site renewable energy generation and energy storage.

# Clean Energy Codes for Climate

## How the Energy Code Improves a Home

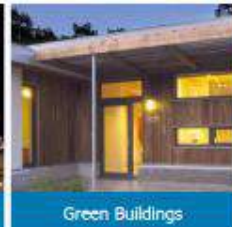




# Seattle Climate Action

April 2018

**City of Seattle**  
 Mayor Jenny A. Durkan



**LIFE IN BALANCE**

**COMMON CARES**  
 IN AN  
**UNCOMMON COMMUNITY**

# CARBON-FREE BY 2050

In 2016, Mayor Walsh recommitted Boston to reducing the pollution that causes climate change, and announced a new goal for climate action: Boston will become carbon-free by the year 2050.

#SOTCF

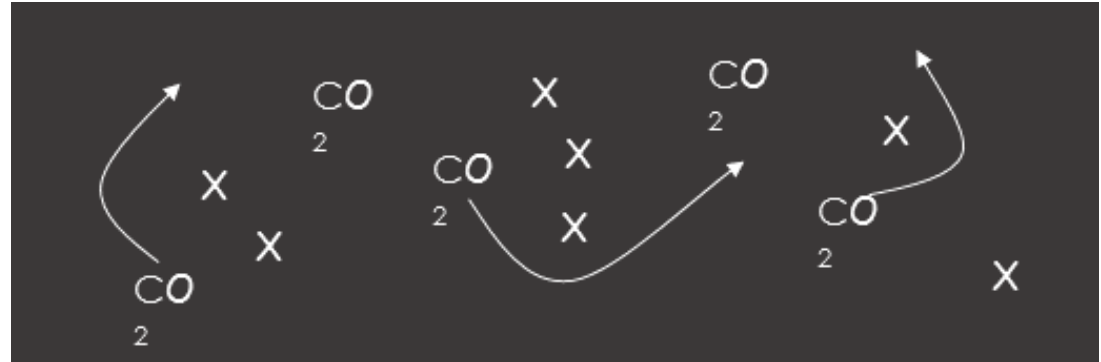
**SOMERVILLE CLIMATE FORWARD**  
 Somerville's Community Climate Change Plan  
 NOVEMBER 2018

**CITY OF SOMERVILLE**  
 OFFICE OF SUSTAINABILITY & ENVIRONMENT  
 MAYOR JOSEPH A. CURTATORE

# Net Zero Framework: Holistic Climate Planning

## Multi-Benefit Strategies

- Energy
- Economic
- Environmental
- Public Health
- Equity
- Quality of Life



## Municipal Playbook



# Meet Our Panel

## Oliver Sellers-Garcia



Director of Sustainability  
City of Somerville

## Marie-Claude Francoeur



Quebec Delegate to New England  
Gouvernement du Quebec

## Patrick Roche



Assistant Director of Clean Energy  
Metropolitan Area Planning Council



# Cities as Clean Energy Leaders, Innovators and Practitioners

Oliver Sellers-Garcia

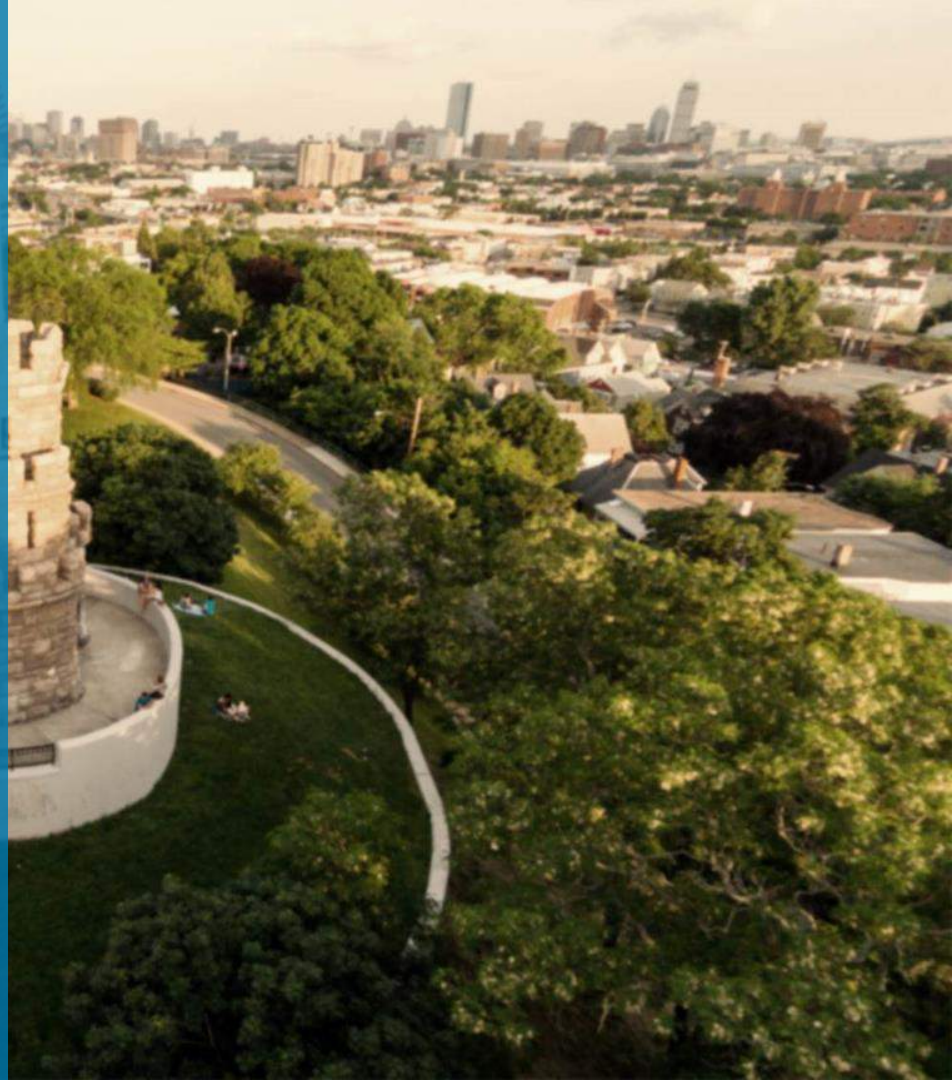
Director, Office of Sustainability & Environment, City of Somerville

NESEA BuildingEnergy, March 15 2019



# How is Somerville reducing building sector GHG emissions?

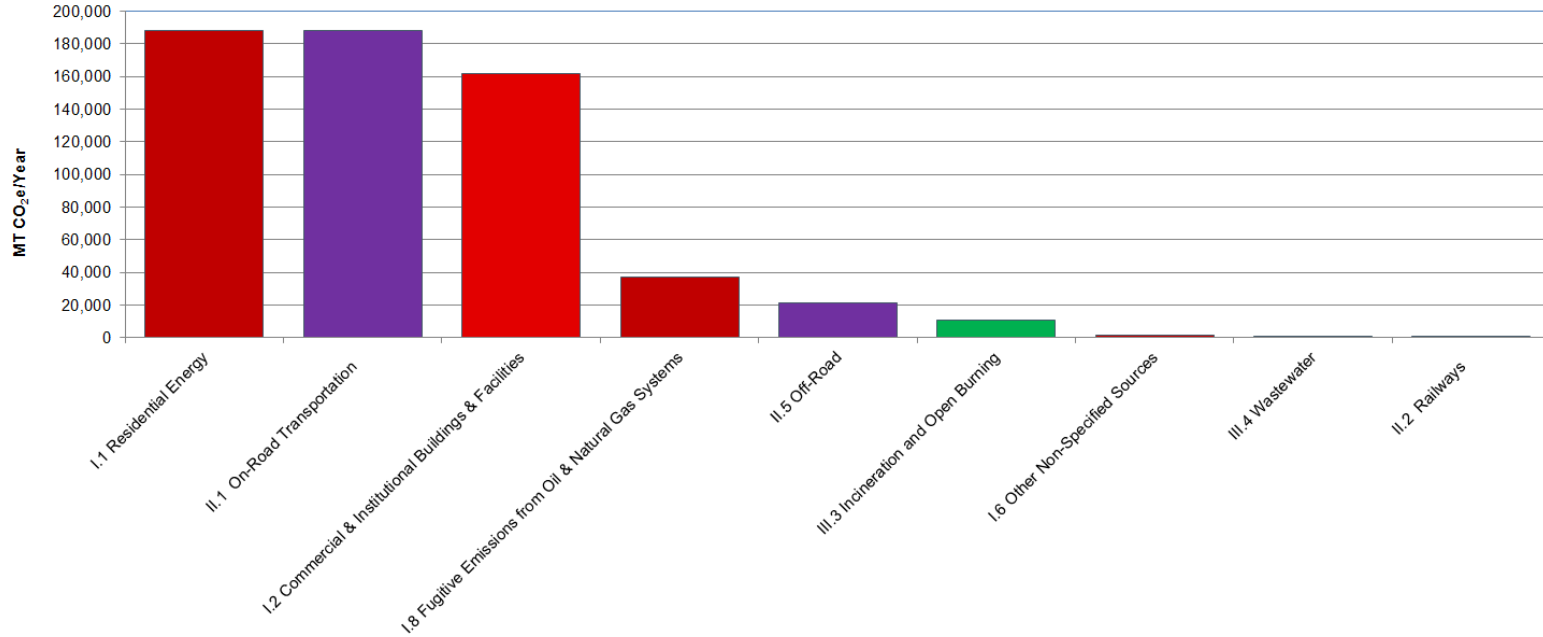
- Planning
- Programs
- Service delivery
- Regulation?

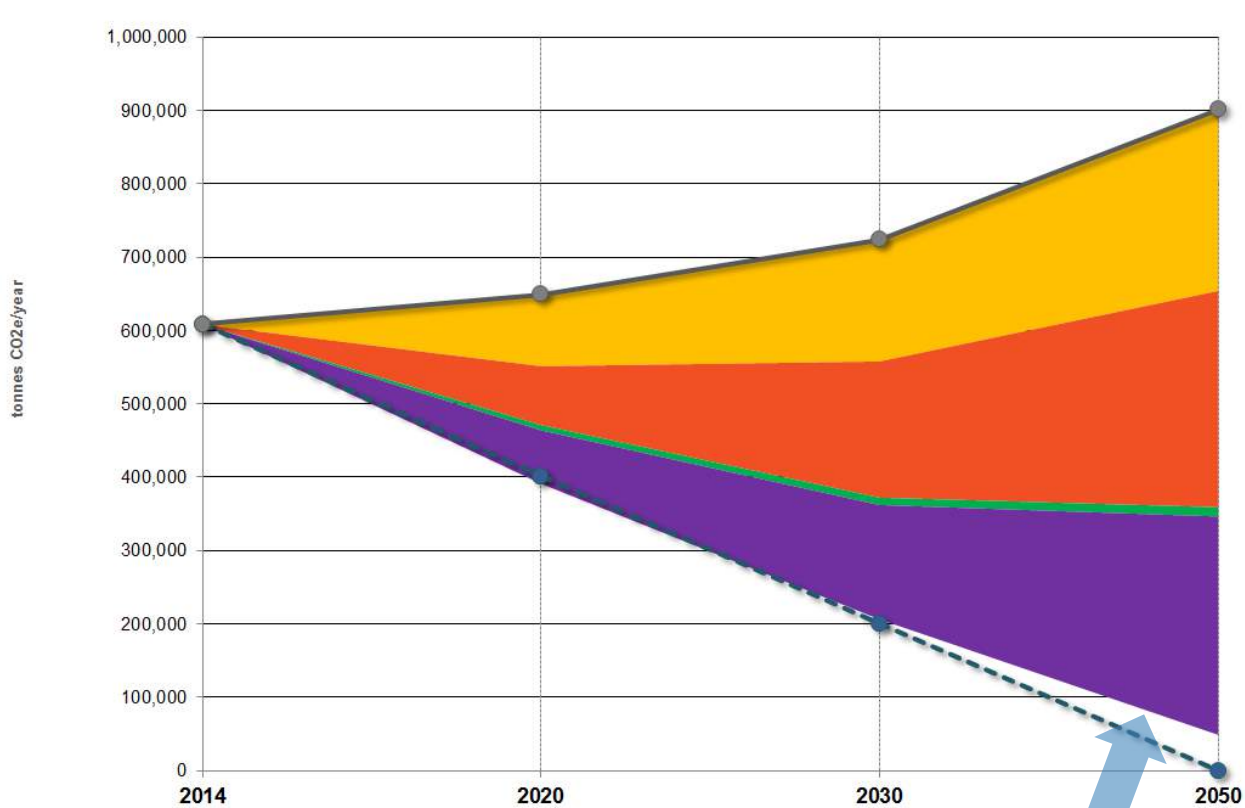


# Somerville's climate change planning timeline



# Emissions by subsector

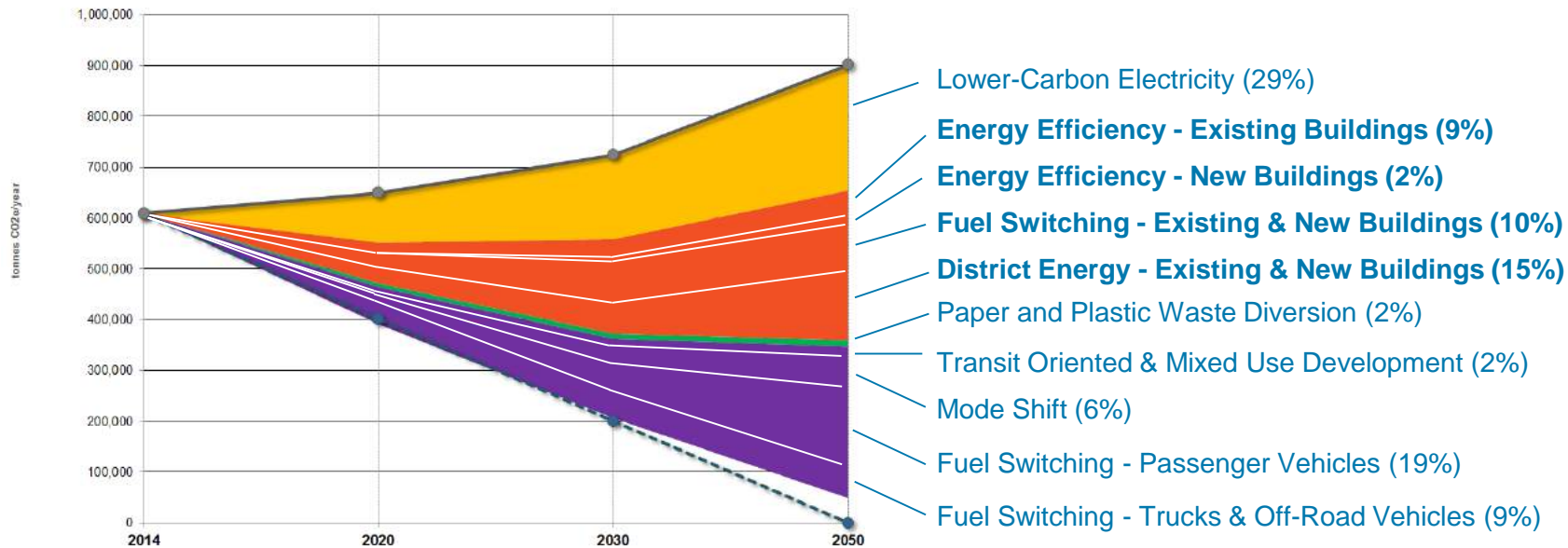






tonnes CO2e/year	Emissions Metric
<b>2014 Base Year Emissions Level</b>	
608,123	Base Year
<b>2020 Emissions Levels</b>	
649,379	Baseline Forecast
34%	Target (% below 2014 base year level)
401,361	Allowable Emissions
391,127	Achieved w/ Actions
-10,234	Achievement Gap
<b>2030 Emissions Levels</b>	
724,452	Baseline Forecast
67%	Target (% below 2014 base year level)
200,680	Allowable Emissions
206,110	Achieved w/ Actions
5,430	Achievement Gap
<b>2050 Emissions Levels</b>	
901,639	Baseline Forecast
100%	Target (% below 2014 base year level)
0	Allowable Emissions
48,686	Achieved w/ Actions
48,686	Achievement Gap

Possible reduction pathway

Remaining emissions



**Legend:**

-  Electricity Generation
-  Baseline Forecast
-  Private Building Energy
-  Target Trajectory
-  Solid Waste
-  Transportation

## Carbon neutrality pathway core strategies

# Carbon reduction core strategies

Strategy	Emissions Reduction Potential (MT CO <sub>2</sub> e/Year)			% of 2050 reductions
	2020	2030	2050	
★ Lower-Carbon Electricity (CCA & RPS)	98,000	167,000	248,000	29%
★ Building Energy Efficiency	23,000	49,000	77,000	9%
★ Building Energy Fuel Switching	31,000	81,000	88,400	10%
★ District Energy	26,000	55,000	131,000	15%
Paper and Plastic Waste Diversion	7,000	10,000	13,000	2%
Transit Oriented/Mixed Use Development	3,000	8,000	20,000	2%
Passenger Mode Shift (from SOV to transit and walk/bike)	8,000	42,000	54,000	6%
★ Vehicle Fuel Switching (passenger - fossil fuels to electric)	16,000	56,000	161,000	19%
Vehicle Fuel Switching (trucks - diesel to biodiesel)	30,000	34,000	42,000	5%
Vehicle Fuel Switching (off-road - diesel to biodiesel)	3,000	8,000	20,000	2%

# Somerville Climate Forward



- Somerville's first Climate Action Plan
- Released November 2018
- 13-top priority actions
- [www.somervillema.gov/climateforward](http://www.somervillema.gov/climateforward)



# We need net-zero, resilient buildings

## BUILDINGS

1	Net-zero and resilient new buildings standards
	Explore the feasibility of a local net-zero energy based or net-zero emissions based performance standard.
	Adopt flood and extreme heat resilience standards for new construction.

2	Improved energy performance in existing buildings
	Enable a rental energy disclosure requirement through the creation of a rental licensing program.
	Continue and expand thermal electrification programs (HeatSmart/CoolSmart).

# Programs



# Programs: Electrifying heating in existing buildings



- Educate and jump start adoption (like Solarize)
- July-December 2017
- 2 City-approved installers
- 15% discount + state incentives
- 246 site visits completed
- 61 contracts signed
- Residents value City's endorsement Cooling was main driver for early adopters
- Pricing is more confusing than other EE products
- Installers see value in participation
- Opportunity to combine with HUD-funded, low-income housing rehab program

# Service Delivery



Credit: Jonas Kahn

# Somerville Community Choice Electricity

- Municipal electricity aggregation
  - \$0.10538/kWh
  - Includes 5% additional MA Class I RECs
  - July 2017-January 2020
- 94% participation
- \$4.9 million saved through June 2019
- \$145 average savings per residential account
- REC purchases through Nov. 2018 equal to 11 MW solar

Regulation?



# Can we require net-zero carbon?

- Zoning
  - LEED requirements
  - EV charging minimums
  - Net-zero density bonus
  - Point-based vegetation standards
- High performing new buildings
  - How much can you do with incentives?
  - Lots of great regulation examples from other states, but...
  - State building code preemption
  - Home rule petition?
  - Accelerating inequality?



# Thank you



## Any questions?

Oliver Sellers-Garcia

Director, Office of Sustainability & Environment

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(617) 625-6600 x2016

[www.somervillema.gov/sustainaville](http://www.somervillema.gov/sustainaville)

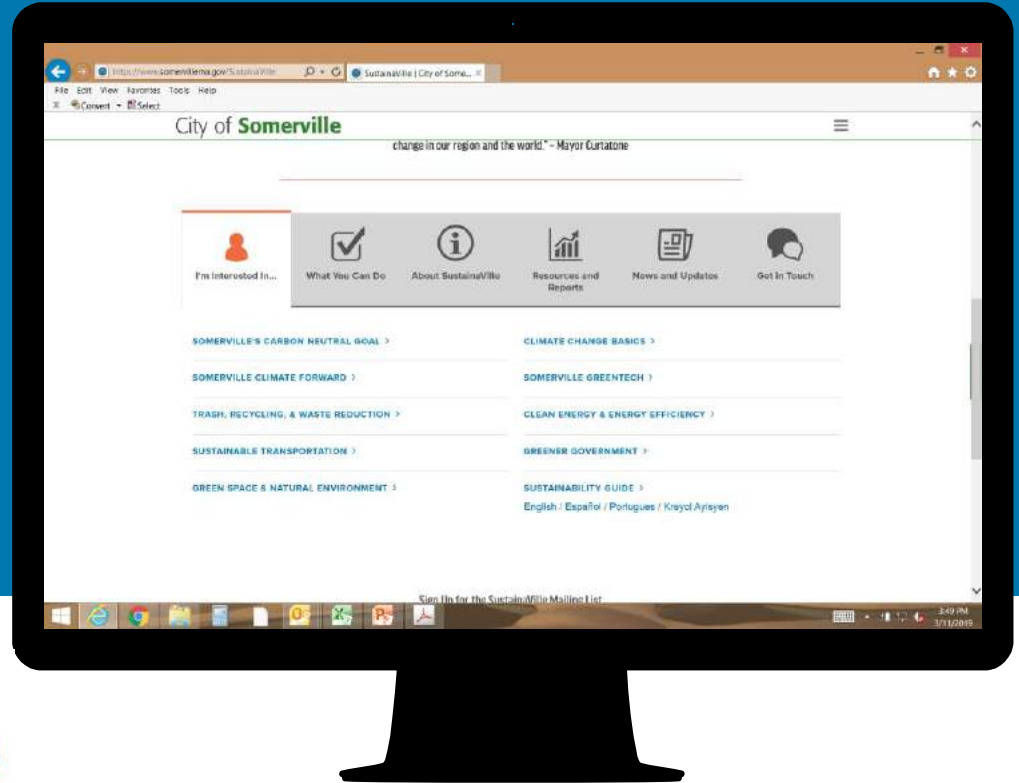


# SustainaVille

www.somervillema.gov/sustainaville

Online portal for

- Taking action
- Learning about City activities
- Getting involved
- Downloading reports and resources



# Credits

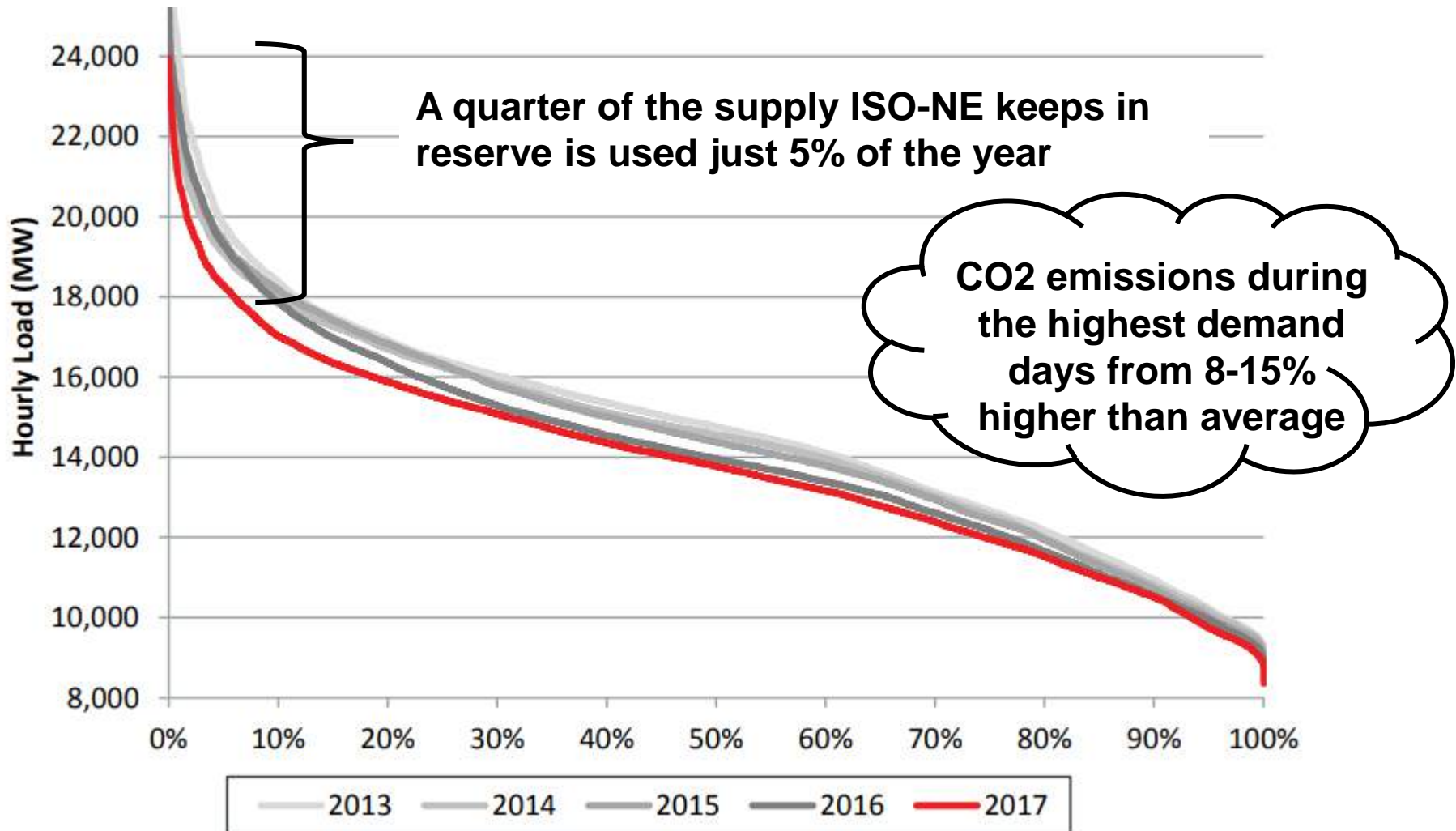
- Presentation template by [SlidesCarnival](#)

# Managing Peak Demand & Capacity Costs

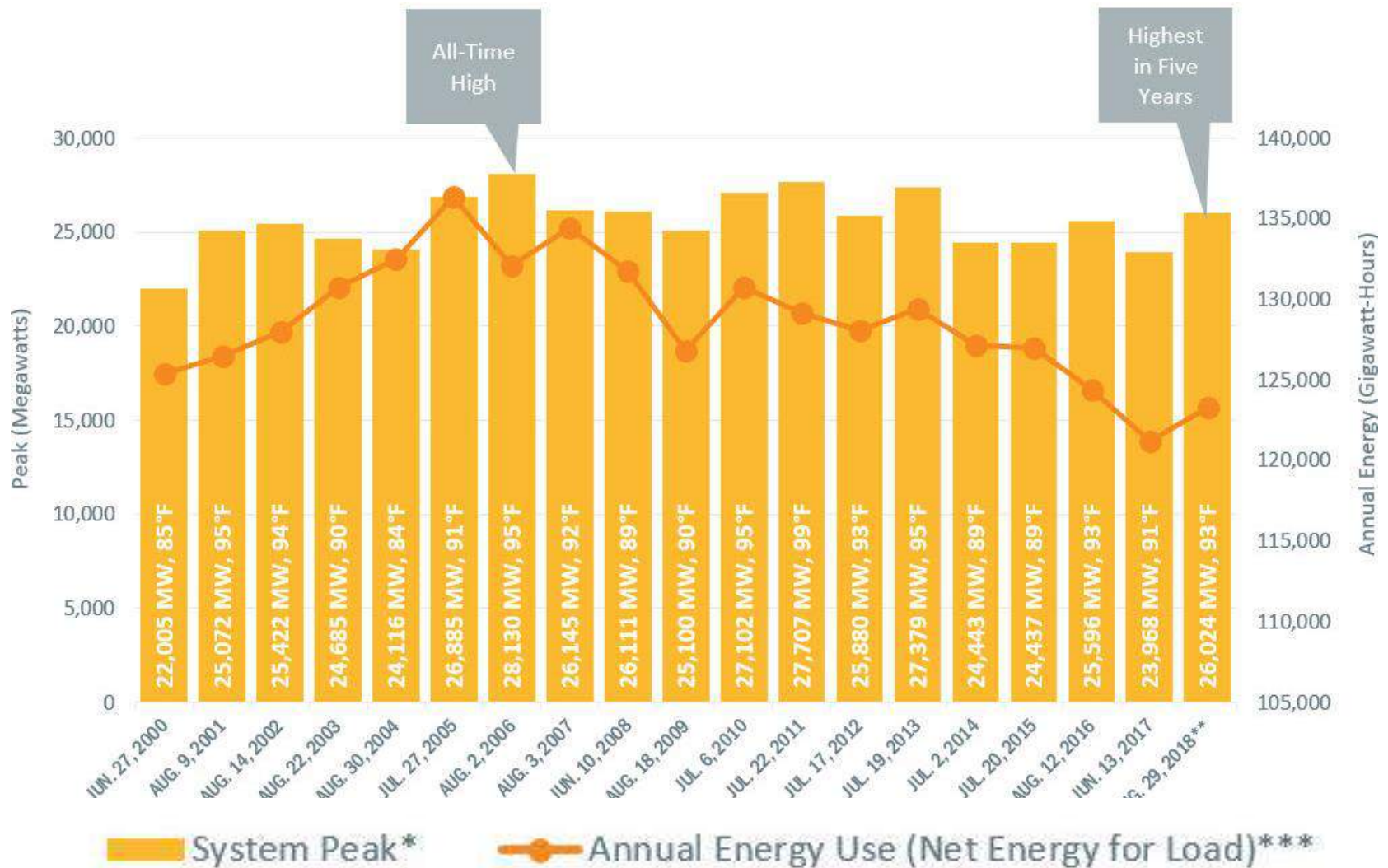
March 15, 2018



# Load Duration Curve in ISO-NE



# Peak Demand vs. Net Energy Use



Source: ISO-NE Electricity Use Stats

# MAPC's Peak Demand Management Program



- Initiated in 2015
- Grew out of municipal concerns about escalating capacity costs
- MAPC identifies likely thresholds for annual peak
- MAPC sends daily notifications to alert municipalities of potential peak
- Municipalities implement DR measures



# Utility Program Pilots

nationalgrid

- National Grid piloted a demand response notification program in 2017 and 2018

EVERSOURCE

- Eversource piloted demand response notification program, along with thermal storage, battery storage and smart thermostat

# New Utility Program & Clean Peak Standard

Utilities now rolling out common DR notification-based program as part of the new 3-Year EE plan



## CLEAN PEAK STANDARD

- Passed into law August 2018
- DOER currently determining minimum percentages
- Will increase 0.25% per year



# Stacking the Benefits



**Avoided** Capacity Costs

Payments from Utility Programs

Payments from ISO-NE - Forward Capacity Market

Potential Revenue through Clean Peak Standard

# **Municipal Case Studies**

# Program Participation

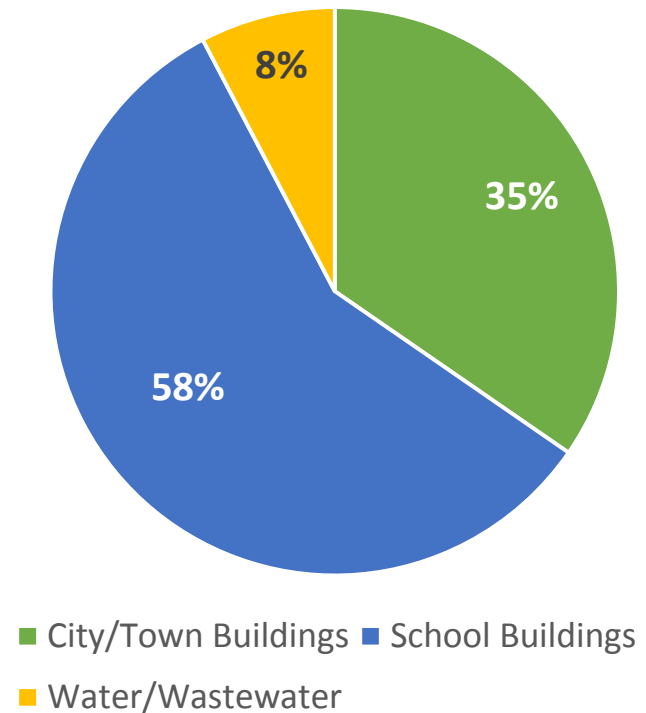
- 58 municipalities receiving daily alerts
- At least 18 actively implementing demand response measures
- Typically 5-7 events per summer
- Many have opted into utility and/or ISO-NE programs

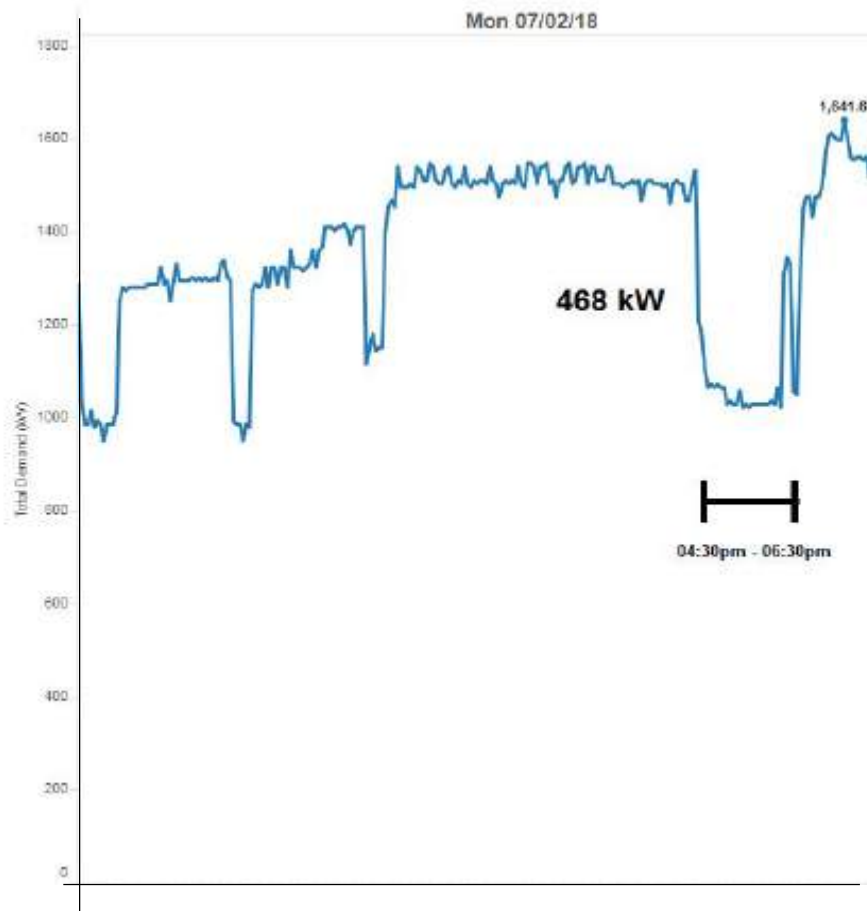


# Program Impact

- Multiple building types participate
- Average 300 kW of demand reduced per event
- Estimate 6.7 MW of demand reduced per event from program participants

Building Type Implementing DR



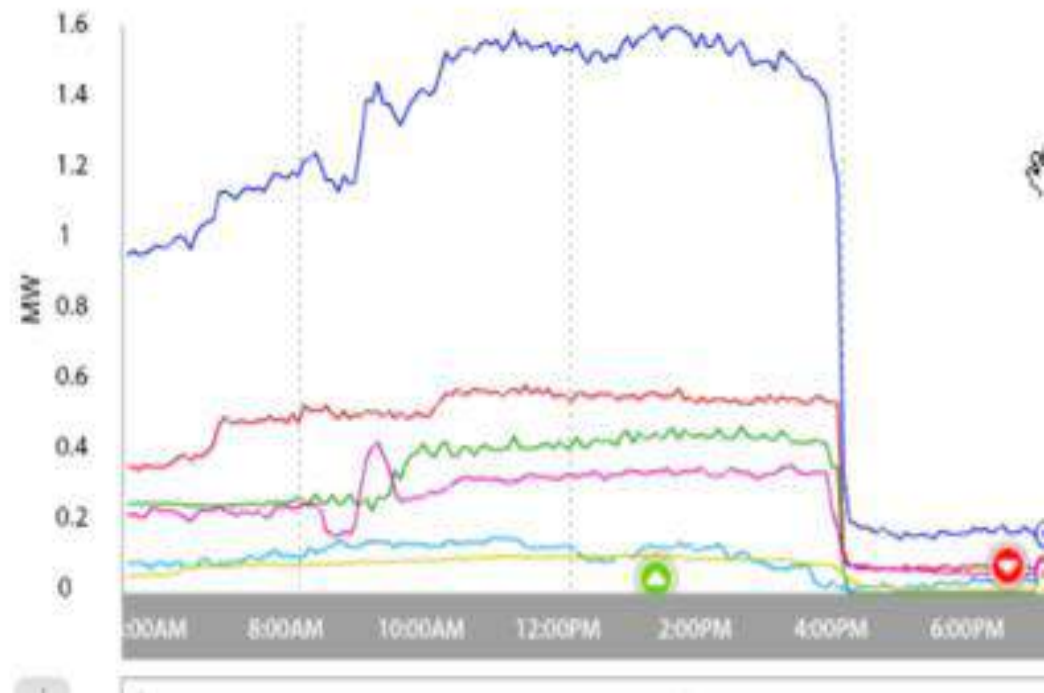


Copley Library Demand

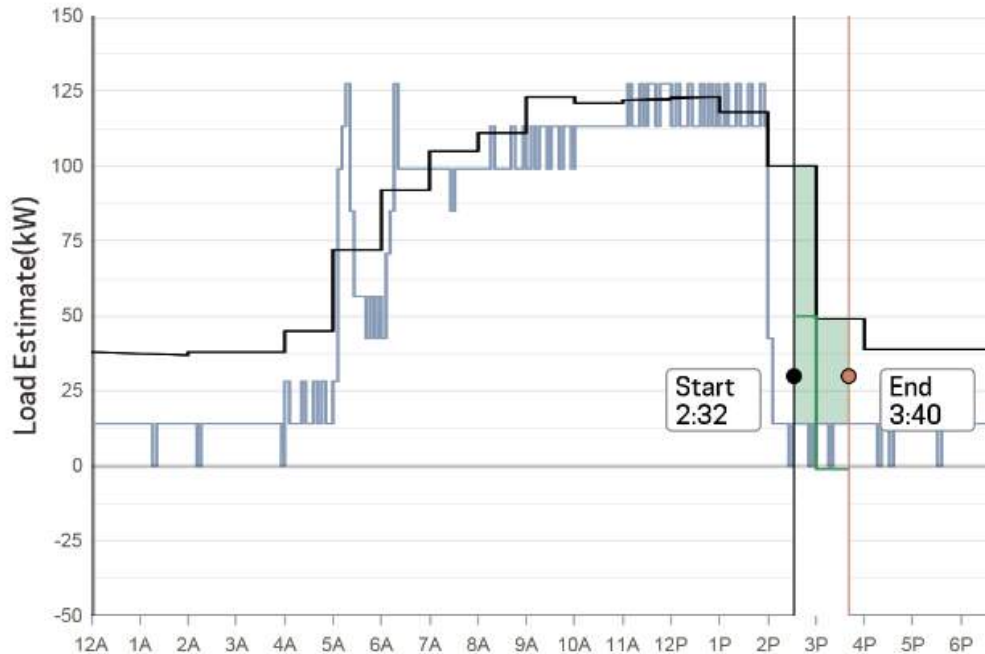
- Implementing DR at Copley Library and multiple schools
- Reductions are achieved through even split of BMS system and manual adjustments
- Reducing demand ~25% at Copley Library
- Expecting \$112k capacity charge savings in 2019

# Acton-Boxborough School

- Typically reduce A/C and ventilation loads during peak
- Using both BMS and manual reductions
- Achieving >75% demand reductions at multi-school complex
- Enrolled in Eversource's DR program with EnerNOC and ISO-NE's program



Acton-Boxborough Schools Complex



- Implementing at High School & Middle School
- Expecting ~\$40k capacity charge savings in 2019
- Enrolled in both National Grid's DR program with C-Power and ISO-NE's program

- Used 2017 DR funds to purchase solar charging bench for High School



# Cambridge & Newburyport

- Include water treatment plant in DR efforts
- Temporarily turn plant off, starting ~1-hour before peak hour

# City of Lynn

- Implementing at High School & Middle School
- Enrolled in both National Grid's DR program with C-Power and ISO-NE's program



# Thanks

**Patrick Roche**

**Assistant Director of Clean Energy**

**[proche@mapc.org](mailto:proche@mapc.org) | 617-933-0790**



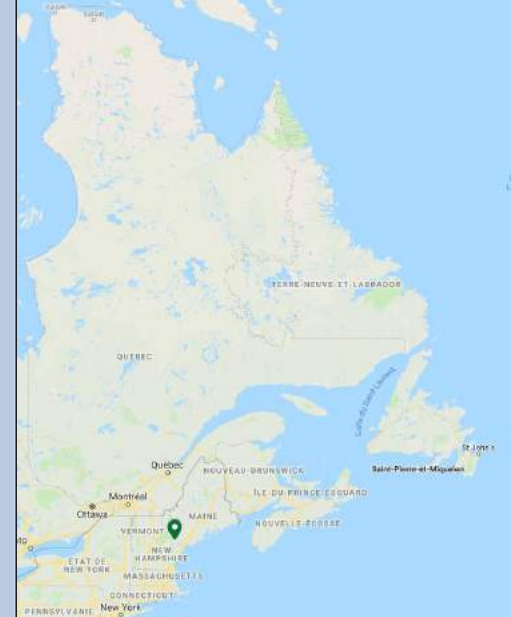
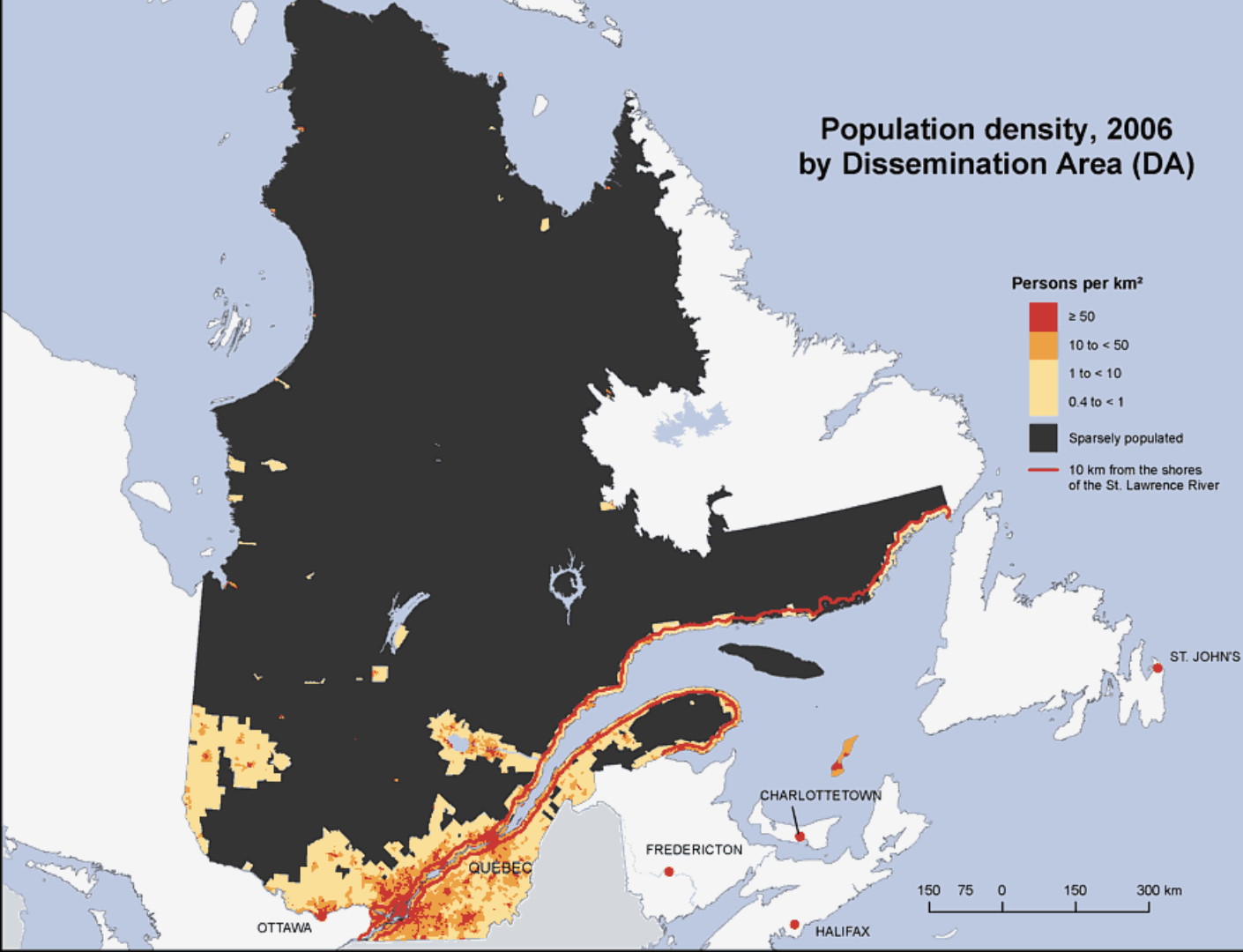
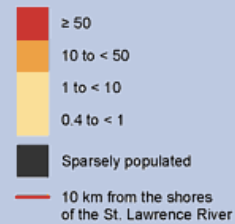
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Marie-Claude Francoeur  
Québec Delegate to New England  
Friday, March 15, 2019

## Population density, 2006 by Dissemination Area (DA)

Persons per km<sup>2</sup>

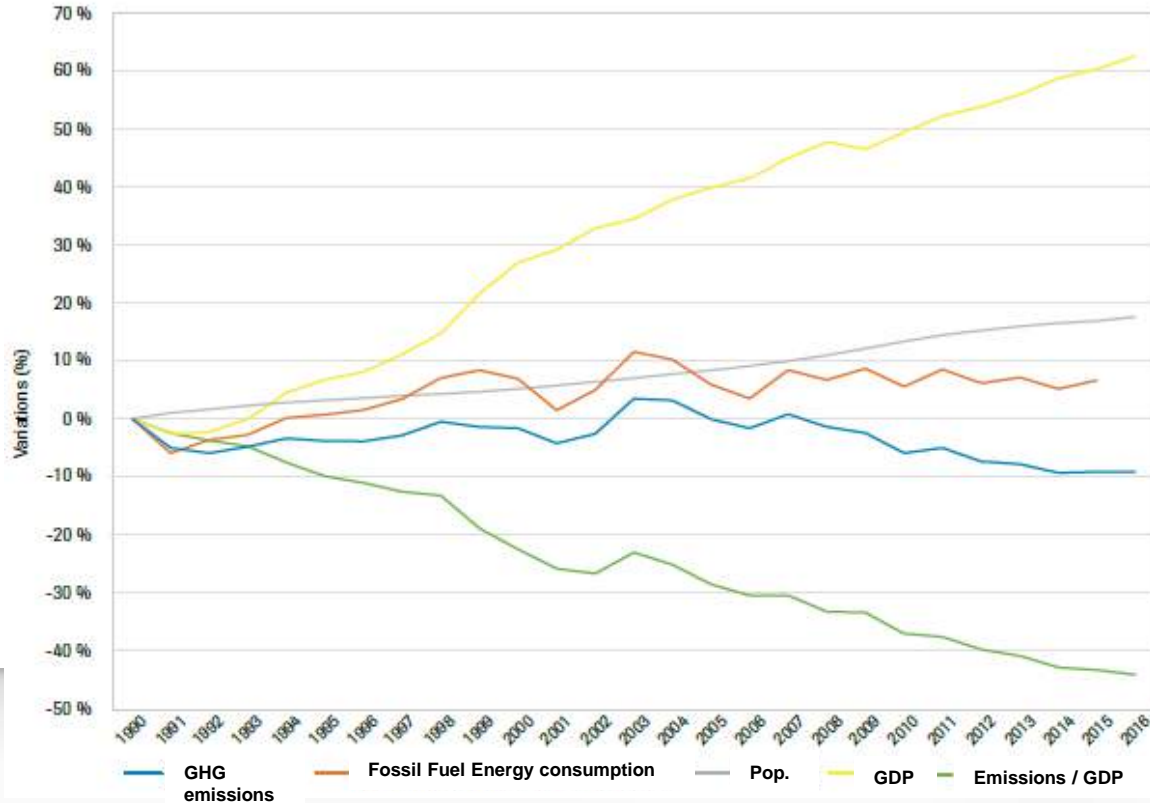


# Québec's Municipalities

Population Range	Number of Municipalities	Total Population	% of Québec population
Less than 2,000 pop	716	602,494	7.18%
2,000 – 9,999 pop	289	1,191,161	14.2%
10,000 – 24,999 pop	58	918,575	10.9%
25,000 – 99,999 pop	35	1,611,339	19.2%
More than 100,000 pop	10	3,994,932	47.6%
<b>Total</b>	<b>1108</b>	<b>8,318,501</b>	

Montréal	1 777 058	Sherbrooke	165 859
Québec	543 095	Lévis	146 183
Laval	433 990	Saguenay	144 888
Gatineau	284 373	Trois-Rivières	137 026
Longueuil	246 899	Terrebonne	115 561

# Variation in Québec GHG Emissions, Fossil Energy Consumption, Population and GDP: 1990-2016



# MERCI!

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# Discussion

# Thank you!

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