

# A future of climate change



Troy Mbon, Sustainability Coordinator

City of Portland

11/28/2018



# Sustainability Office

Troy Moon  
Sustainability Coordinator

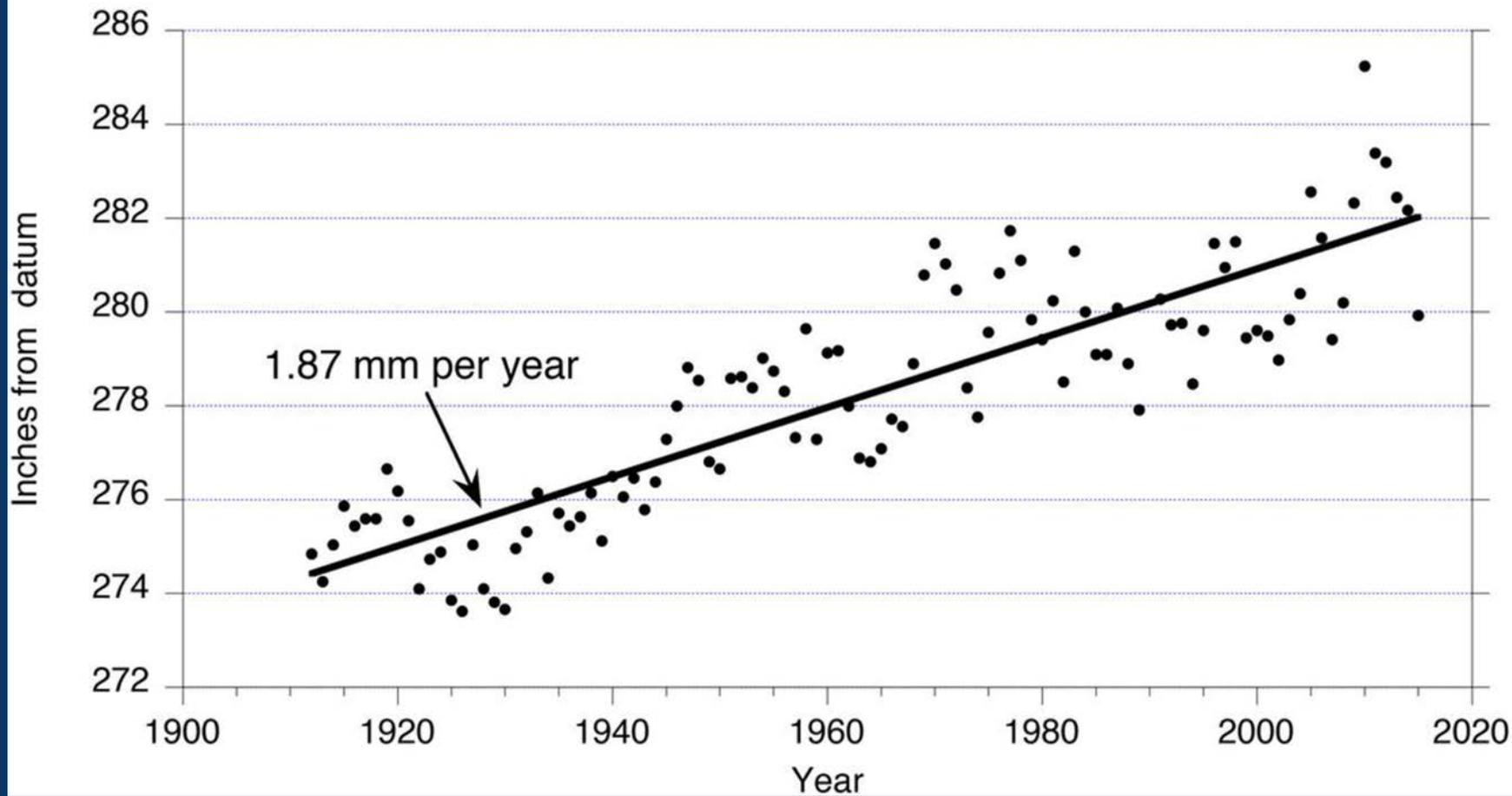
Ashley Krulik  
Sustainability Associate

<http://www.portlandmaine.gov/1890/Sustainability-Office>

@sustainableportlandme (FB and Instagram)

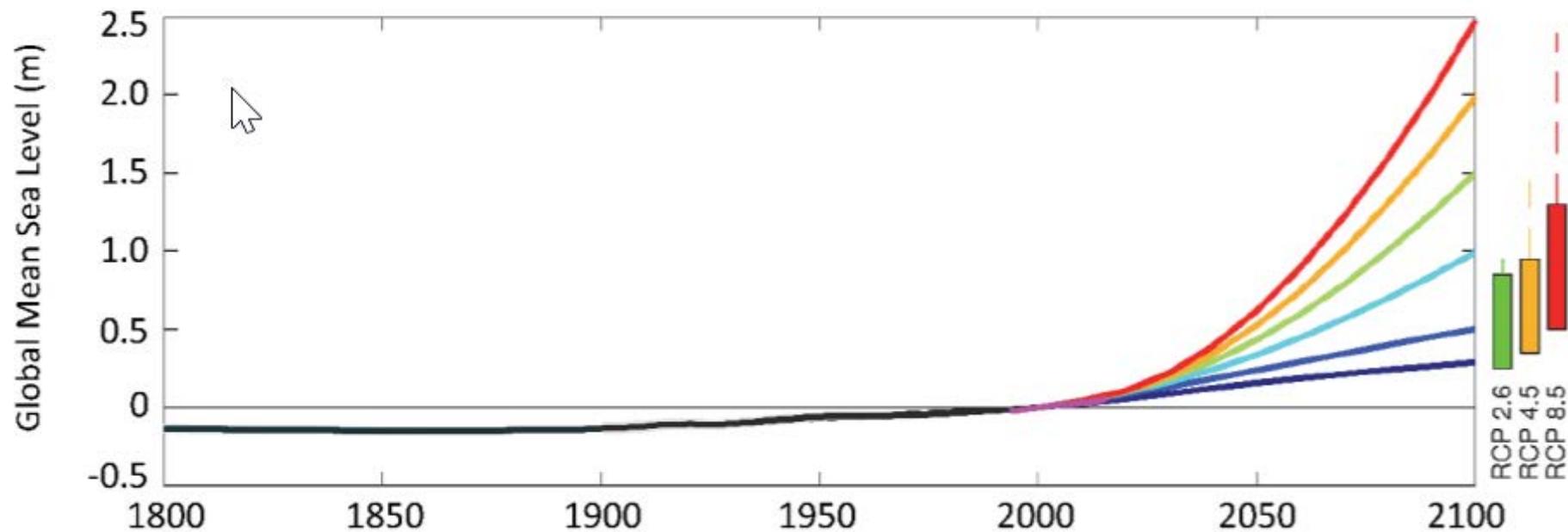


# Portland Maine Tidal Gauge Record: 1912 - 2015



# The pace quickens...

NOAA Global Mean Sea Level (GMSL) Scenarios for 2100



# What it means for Portland...

Reported from the Bayside Adapts study:

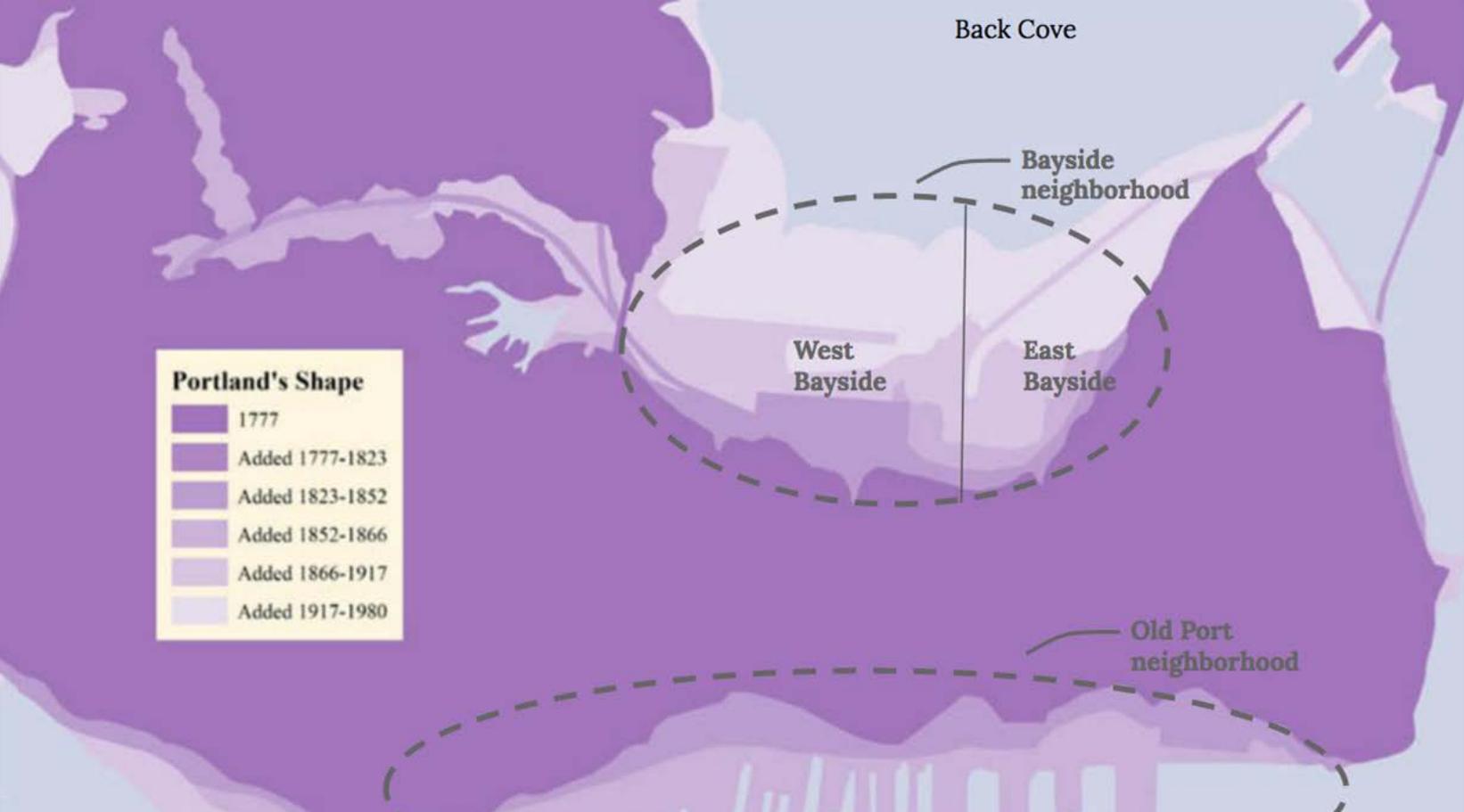
Year 2050		Year 2100	
	Rise in Sea Level		Rise in Sea Level
<b>Commit to Manage</b>	1.5 ft.	<b>Commit to Manage</b>	3.8 ft.
<b>Prepare to Manage</b>	3.4 ft.	<b>Prepare to Manage</b>	8.8 ft.
		<b>Be Aware of</b>	10.8 ft

*\*Source: The 'Rise in Sea Level' values are the Relative Sea Level rise values for the Intermediate, High, and Extreme scenarios for Portland, ME reported by a NOAA publication titled "Global and Regional Sea Level Rise Scenarios for the United States" (Sweet et al, 2017).*

## DAILY HIGH TIDE LEVELS IN 2100



# Back to the future...



It's happening now...

## **Nearly 30,000 CMP customers lose power as intense thunderstorm brings down trees**

The company was working to restore electricity to nearly 14,000 homes and businesses still without power late Thursday night in the wake of the storm that rolled through southern Maine.

## **Rains, flooding deliver super-soaker to remember in Maine**

Parts of Portland turn into ponds as the city endures its sixth-rainiest day ever from a storm that also knocked out power, downed trees and damaged vehicles across the state.



**Portland Police**

@PolicePortland

Following



If there are barricades, yes, the road is closed. If there's a small river forming on a street, don't attempt to drive through it— your civic is not a canoe. Finally, please don't swim in the road. There will be no lifeguards on duty. I think that about covers it.



Frequent street closures due to nuisance flooding during astronomical high tides or storm tides

November 27, 2018



Not just wet feet

# Climate change, not overfishing, is devastating shellfish environments

## Changing climate to put further pressure on New England, federal report predicts

It says 'iconic fisheries' in the Northeast, including lobster, face a bleaker future because of rising acidity levels in the ocean.

# 4th National Climate Assessment, Vol. 2

<https://nca2018.globalchange.gov/>

- The Gulf of Maine is warming more rapidly than elsewhere
- The northeast should expect 3.6 F degree increase in average temp by 2050
- Vital infrastructure is vulnerable to SLR. Transport, electric, water treatment, fuel
- Poor, elderly, recent arrivals are most vulnerable to upheaval from storms, infrastructure damage



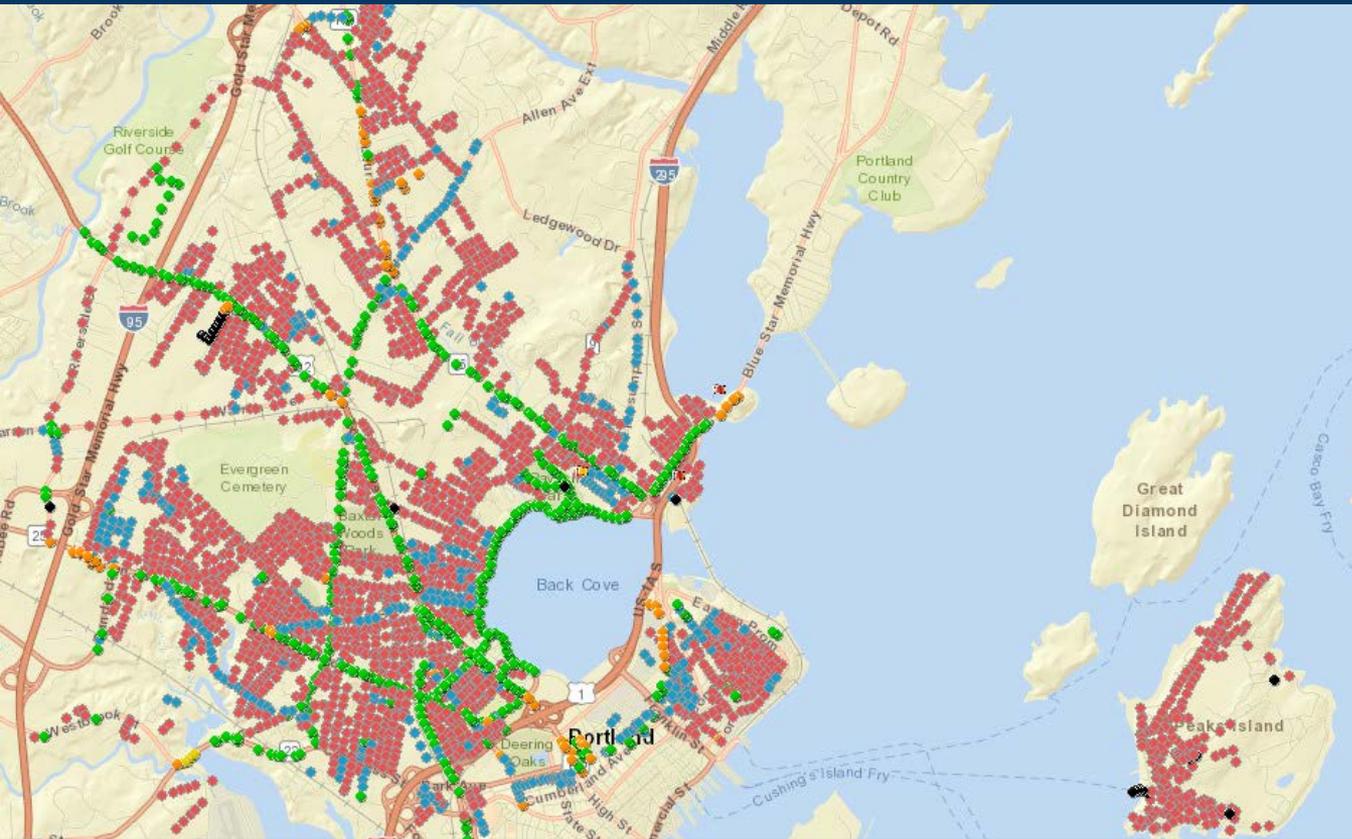
What Are We Doing?





Energy

# LED Street Lights



# LED Street Light Progress

- Replaced ~5200 lights with LED
- Reduced the City's overall electricity consumption by 8% (2.7 M kWh/year)
- 1st city in Maine to implement



# Solar Initiatives

Riverside Golf Course electric golf cart charging

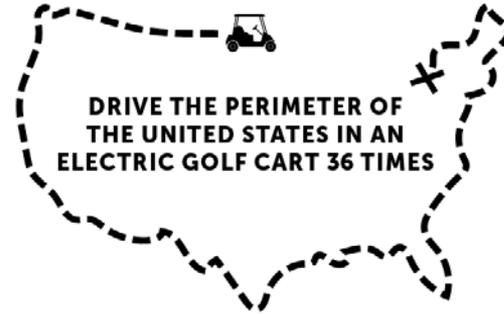


**OUR GOLF CARTS ARE POWERED BY  
76 SOLAR PANELS  
WHICH GENERATE ENOUGH ELECTRICITY TO:**



**BREW 1,390,666  
CUPS OF COFFEE  
IN A YEAR**

**CHARGE 2,976  
PHONES EVERY  
DAY FOR A YEAR**



**LIGHT A HOME  
WITH LED  
LIGHTBULBS  
FOR 43 YEARS**

**COOK 78,225  
BOWLS OF  
CLAM CHOWDER  
IN A YEAR**



**RIVERSIDE**  
— GOLF COURSE —

 **REVISION ENERGY**

# Solar Initiatives

## Ocean Avenue Solar Landfill

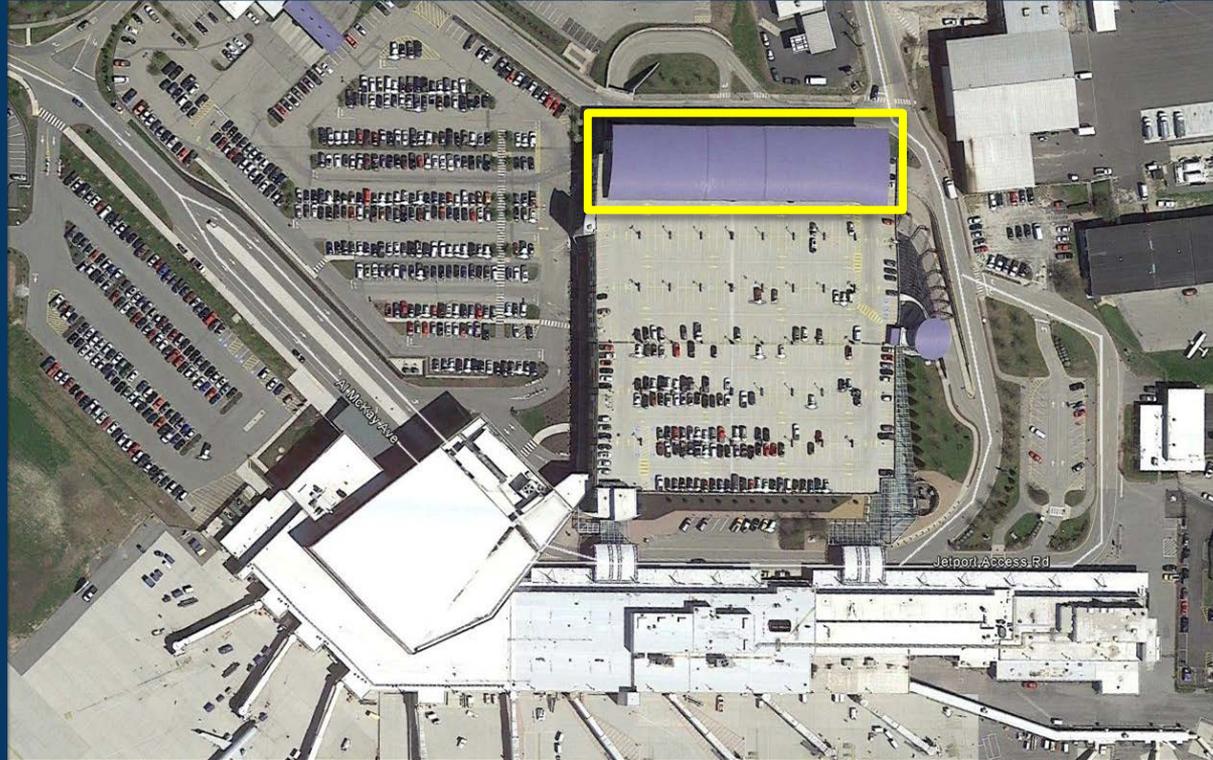
- 1 MW array
- Will produce 1.2 million kWh per year
- About the same as City Hall / Merrill Auditorium uses annually



# Solar Initiatives

## Jetport

- Array covers 29,300 sq ft
- Will generate 575,000kWhr annually - half of the facility's load.
- Largest roof mounted PV array in Maine



# Energy Benchmarking Ordinance

Report total energy and water consumed annually:

- All commercial buildings over 20,000 sq ft
- All residential buildings with 50+ units
- All municipal buildings over 5,000 sq ft

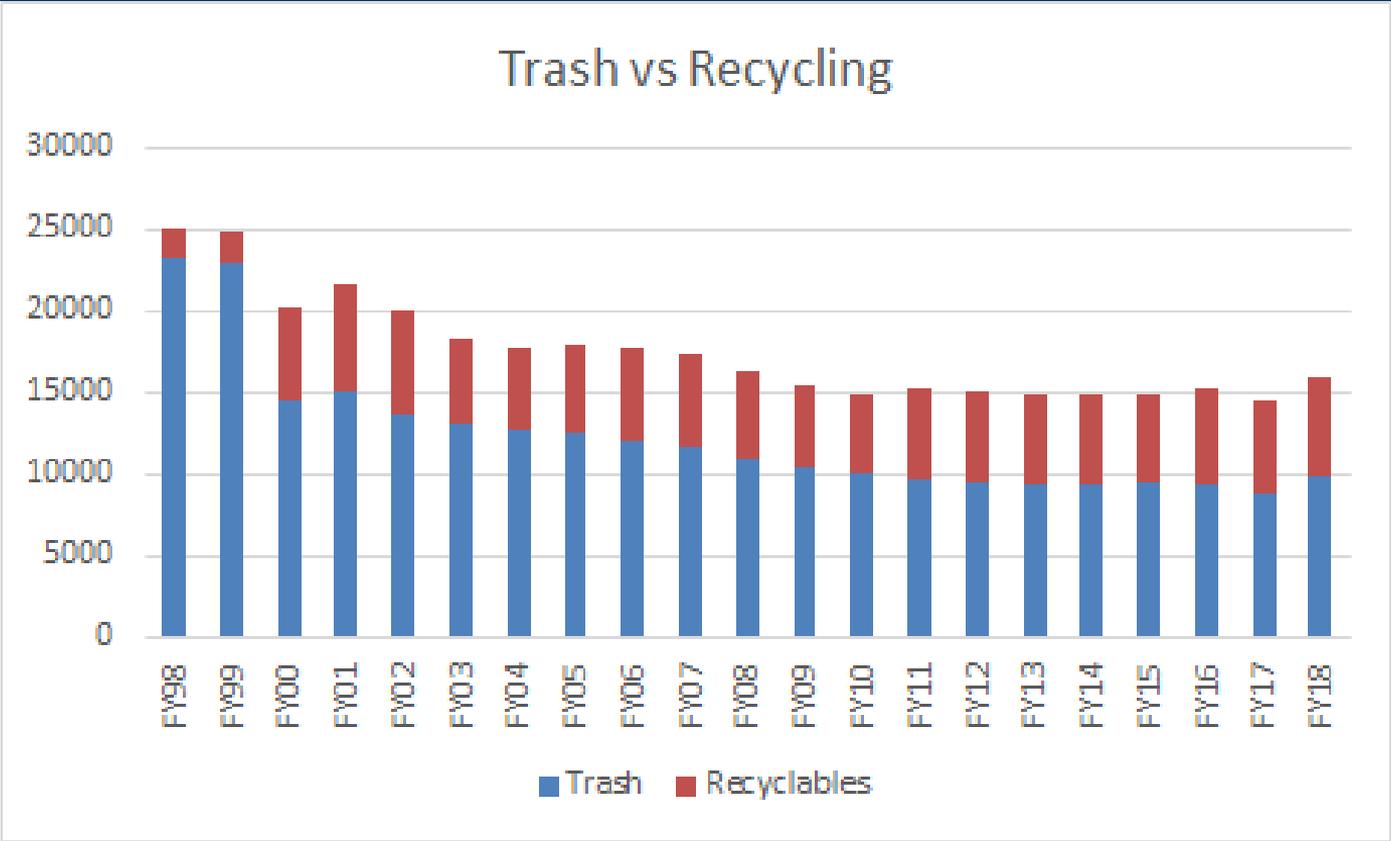
Working with utilities and partners to remove barriers to data access.





# Waste Reduction & Recycling

# 60% reduction in waste disposal since 20 years



Back in the day...



The bad old days...



# Wheeled Recycling Carts



More than  
22,000 carts  
distributed to  
residents

Dramatically  
reduced litter

NO



YES



## Green Packaging Ordinance

- Ban on polystyrene foam packaging
- Fee on most single use shopping bags (plastic and paper)
- Encourage reuse and recycling of packaging

# Plastic bag bans and fees catching on in Maine

Portland's ordinance went into effect on April 15, and other communities are poised to follow.

According to Hannaford spokesman, 80% of Portland customers bring bags.

Sales of reusable bags up 350%



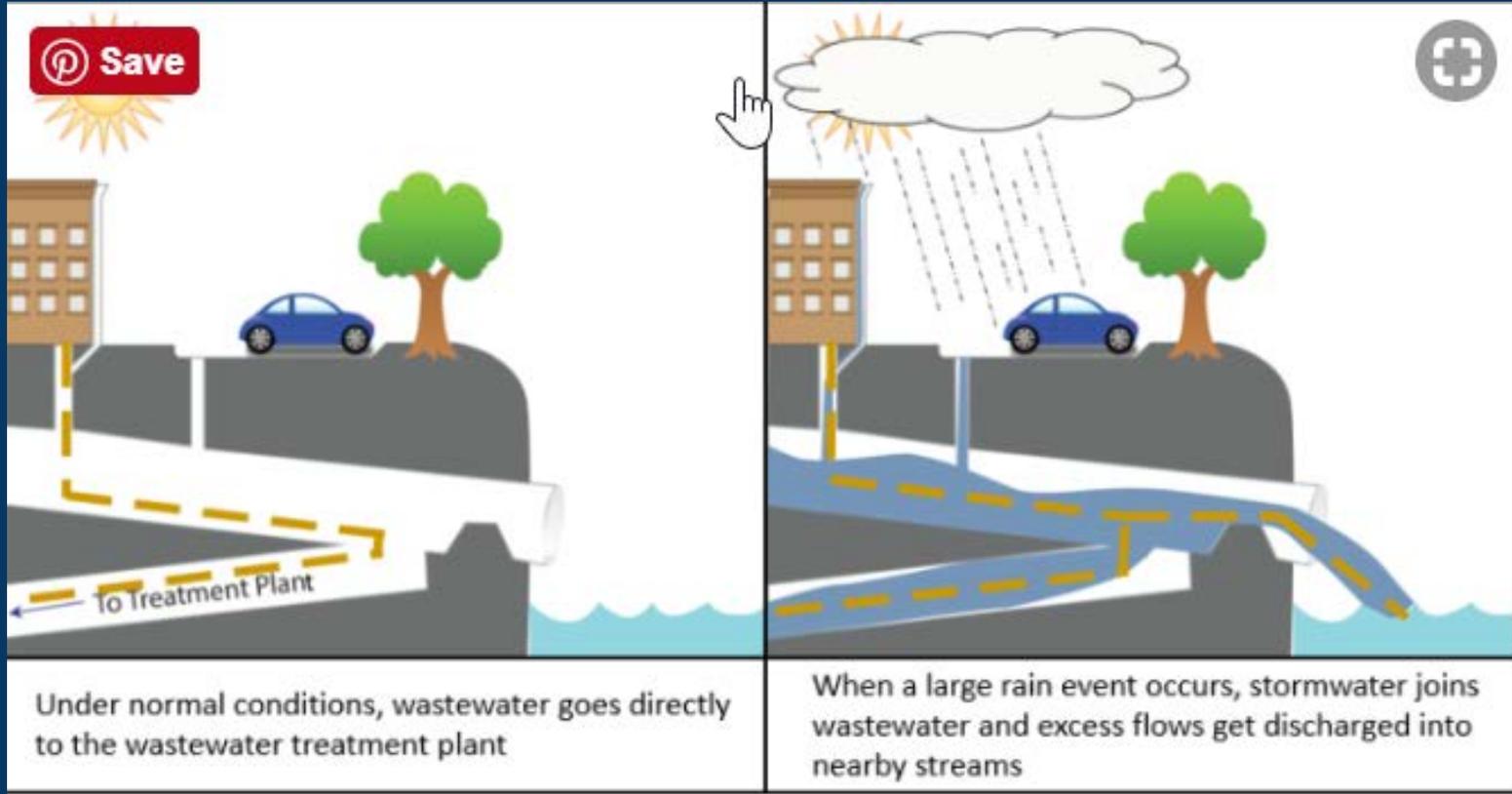
Why we did it.



# Cleaning Stormwater



# Eliminating CSOs



# Rain gardens



A man in a white t-shirt and dark pants is working in a lush garden. He is standing in the middle ground, surrounded by various plants, including tall green stalks with large, flat-topped umbels of small flowers. The garden is enclosed by a chain-link fence supported by wooden posts. In the background, there are dense green trees under a blue sky with light clouds. The overall scene is bright and sunny, suggesting a clear day.

# Land Care

# Riverside Golf Course



- Reduced pesticide use by over 60%
- Only apply pesticides to  $\frac{1}{3}$  of fairways as needed + greens
- Staff implemented practices to support habitat
- 100% organic fertilizer
- Solar powered golf carts



# Synthetic Pesticide Ban

- Pesticides such as Round Up may not be used on private or public property in Portland, with limited exceptions
- Promotion of organic land care practices
- Currently in effect for City property
- Takes effect on Jan. 1, 2019 for private property



# Urban Meadows

Wildflower Meadow

Community Gardens

Small native trees & shrubs

Mount Joy Orchard

North St

Eastern Promenade

Back Cove Trail

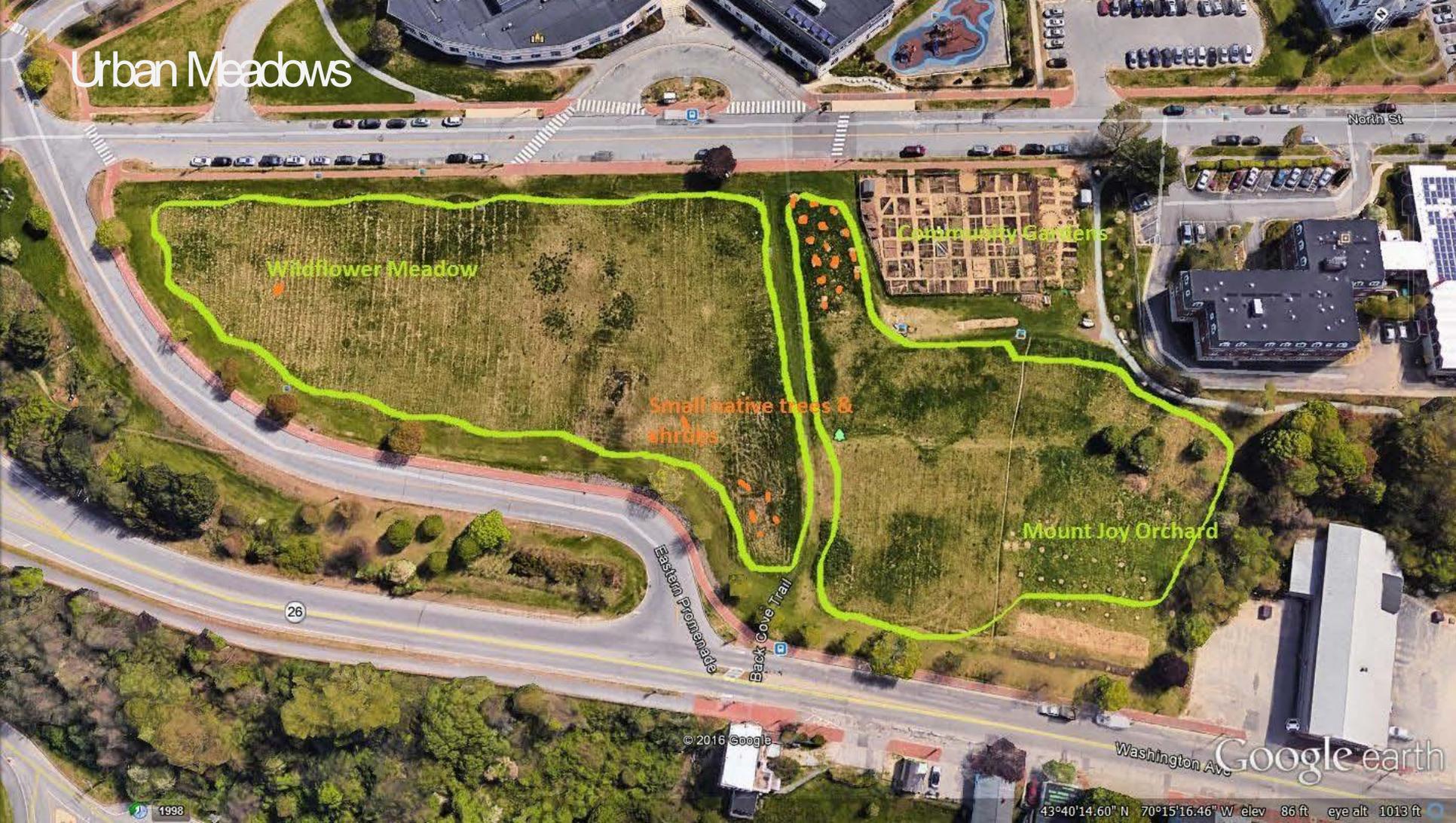
Washington Ave

Google earth

© 2016 Google

43°40'14.60" N 70°15'16.46" W elev 86 ft eye alt 1013 ft

1998



# Mobility

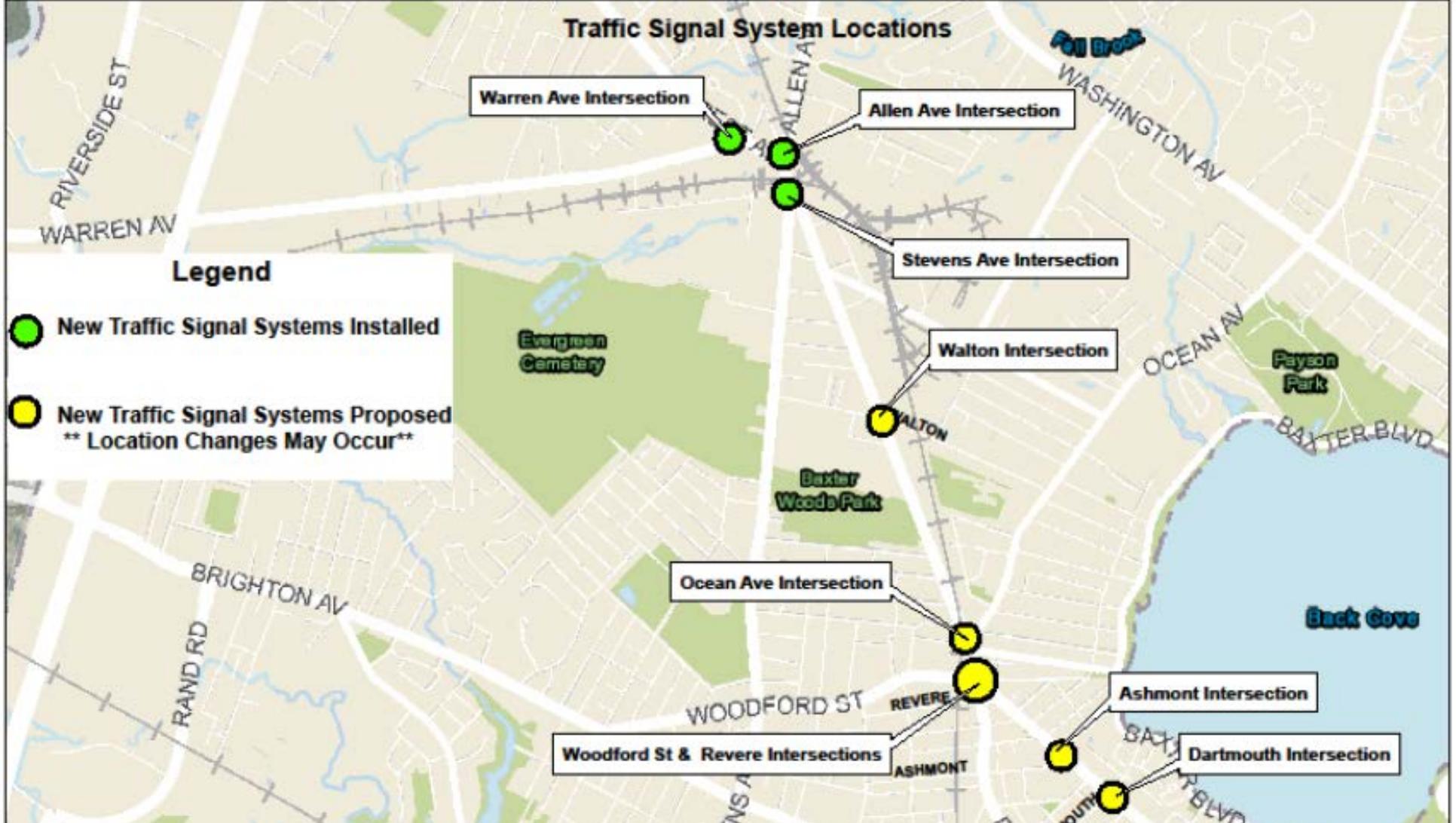


# Morrill's Corner Smart Traffic Control

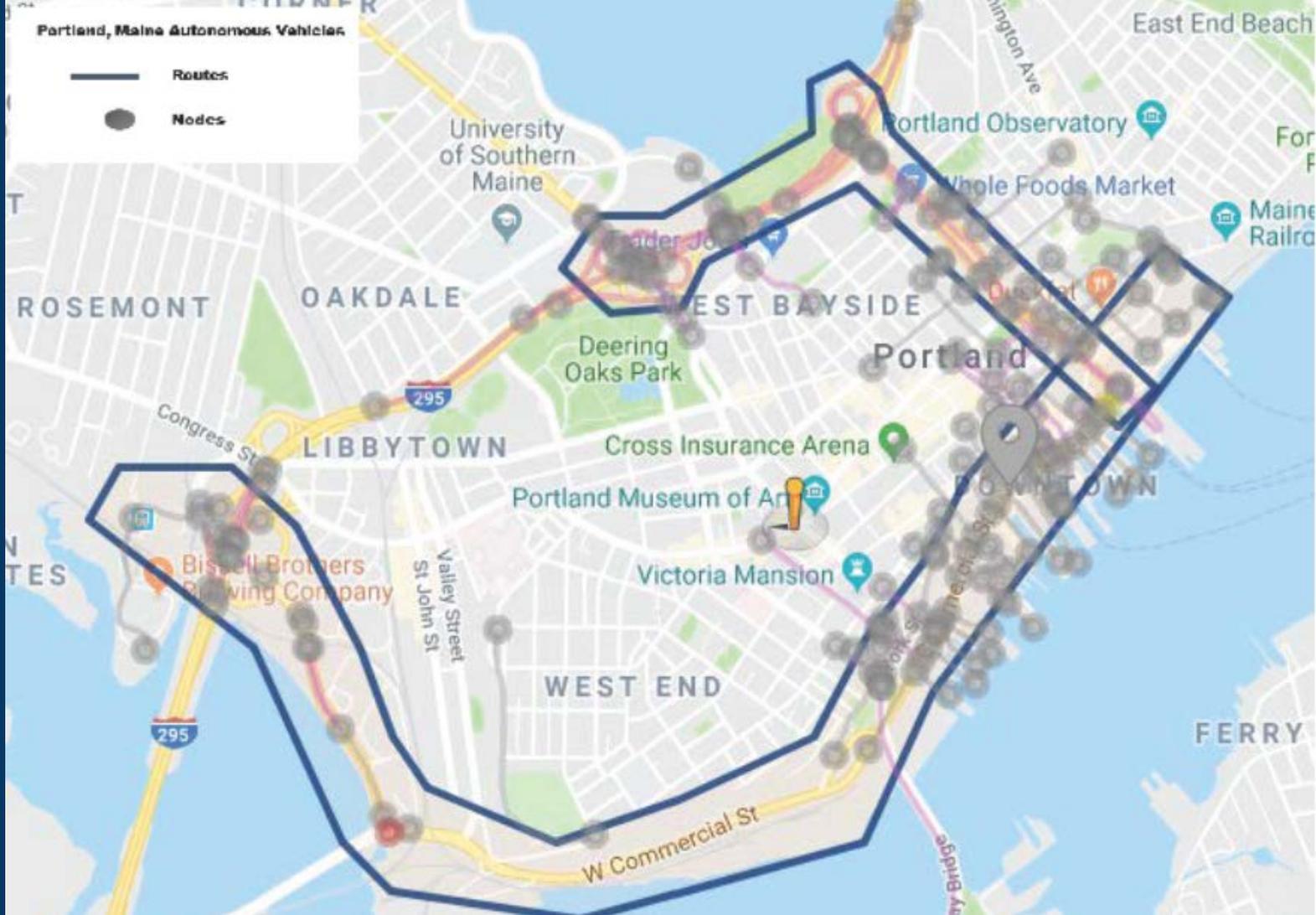
- Main bottleneck for east/west commute
- Deployed Surtrac - CMU tech
- System sits on top of existing control equipment
- Wait time at signals reduced by more than 20%
- Deploying at additional intersections on Forest Ave



# Traffic Signal System Locations



# Autonomous Vehicle (AV) Preparation - INRIX Road Rules



# Bike Routes - Neighborhood Byways

- Network of neighborhood streets connecting schools, neighborhoods, and shopping
- Delineated using signs and pavement marking
- 1st “contra flow” bike lane in the City (Nevens St.)



# Bikeshare Ordinance



City is ready and prepared for bike share to be in Portland

# Planning for the future



# Climate policy to date



2001 -- First greenhouse gas inventory

2005 -- Second greenhouse gas inventory

2009 -- Sustainable Portland Report

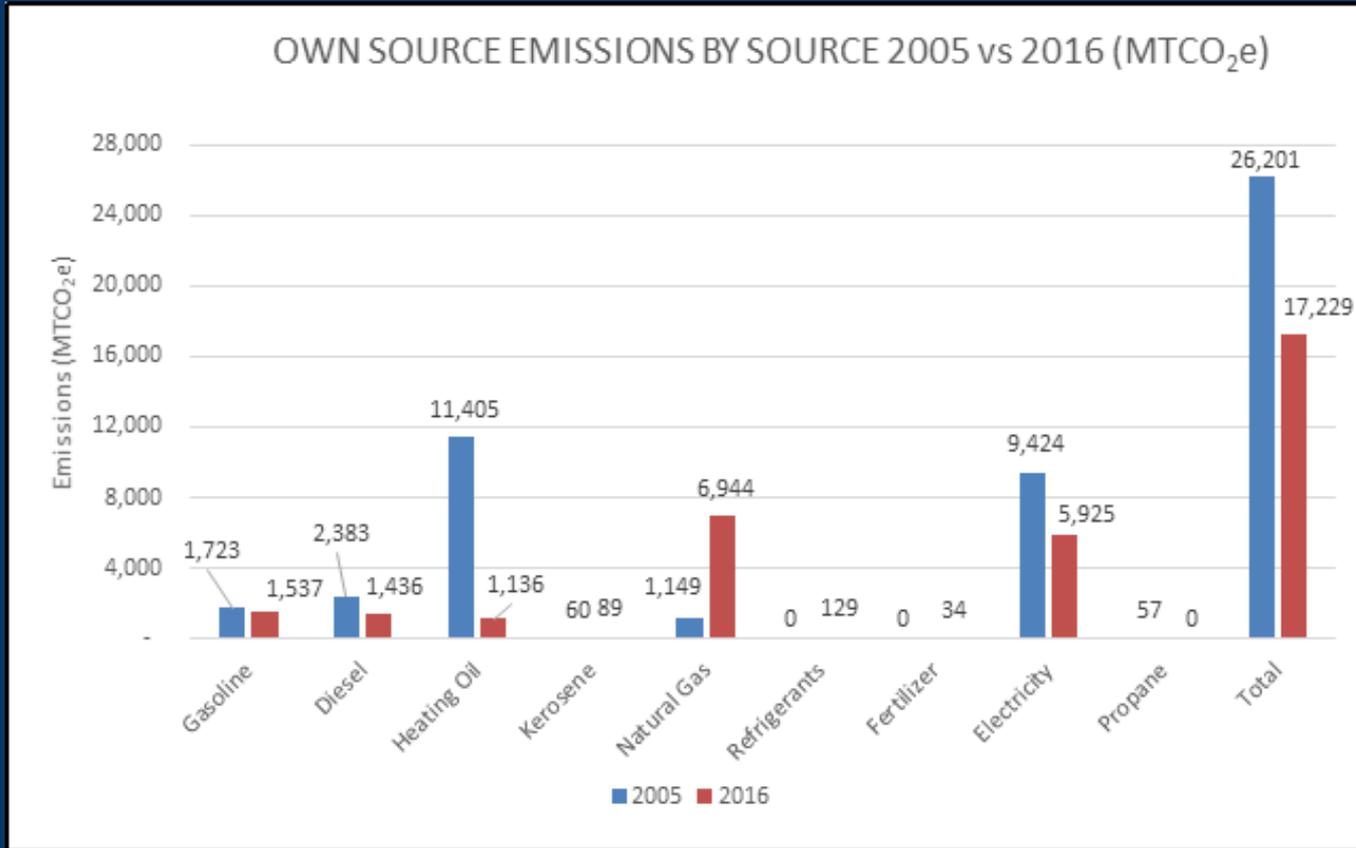
2011 -- Proclamation to support planning for sea level rise

CITY OF PORTLAND  
CLIMATE GOALS

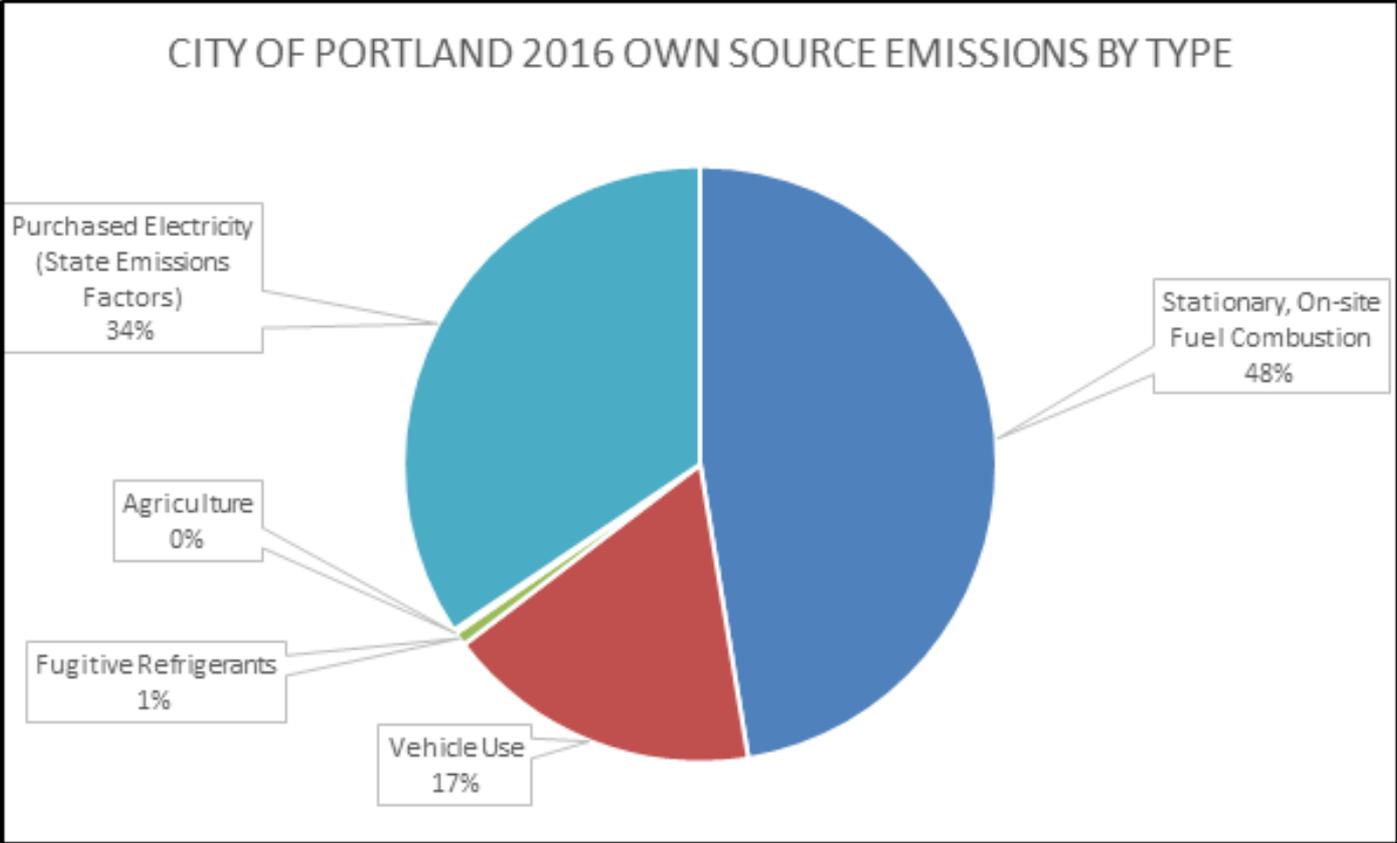
**80%** reduction in greenhouse gas by 2050

**100%** clean energy by 2040

# 34% reduction in emissions since 2005

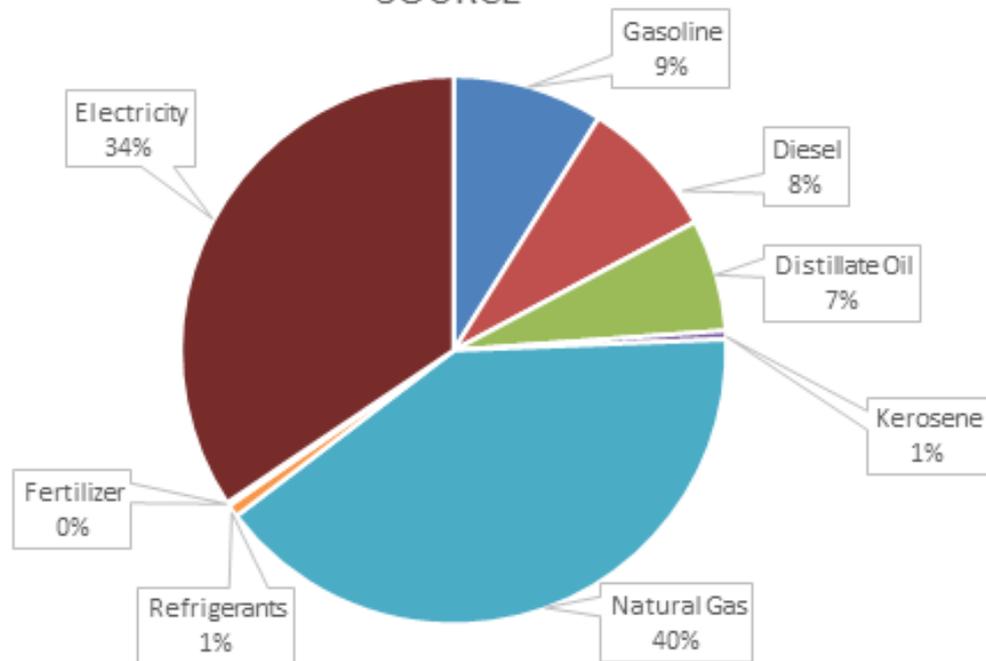


# Municipal GHG Emissions

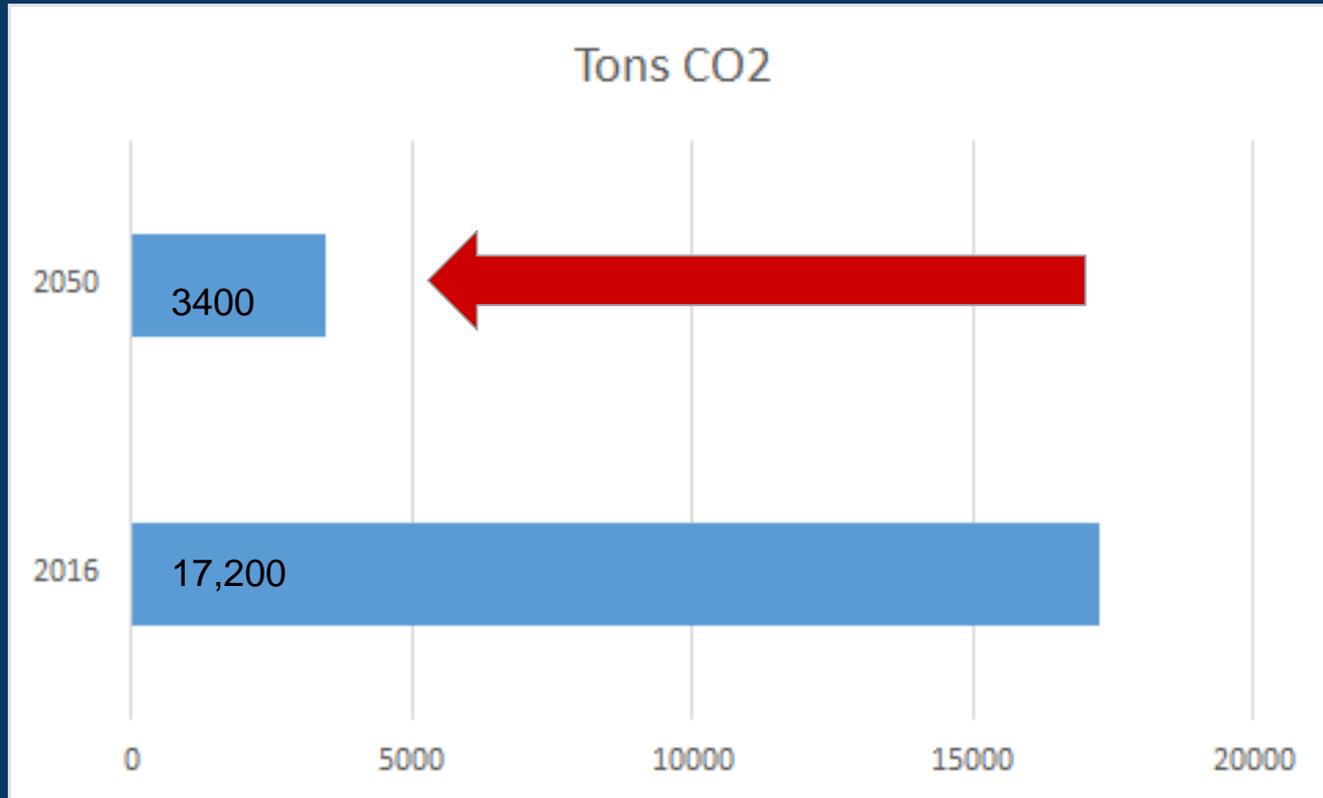


# GHG Emissions by source

CITY OF PORTLAND 2016 OWN SOURCE EMISSIONS BY SOURCE



# What does 80% reduction look like?



# Joint Climate Action Planning Process with South Portland



Julie Rosenbach, South Portland's sustainability director, and Troy Moon, Portland's sustainability coordinator, on Portland's waterfront. Both are involved in efforts to make the cities more resilient as the climate changes. *Staff photo by Brianna Soukup*

# Consulting Team



Carl Eppich

# How we respond now WILL change the future

## CATCH AND RELEASE!

### TIDE & TEMPEST.

Casco Bay is characterized by beautiful steep rocky shorelines, but low-lying areas like Bayside are flood threatened by high tides and heavy rains. Especially when these events combine at once, Maine's sea level rise since 1912 is similar to the global average. A 1' increase is likely by the middle of this century, and possibly over 3' by 2100. (1) Increasingly volatile climate and weather patterns mean Bayside can expect more extreme storm, tide, and heavy rain combinations at the same time.

### A TIMELY RESPONSE.

The Back Cove tidal inlet, with it's narrow channel below Tukey's Bridge, offers a natural buffer opportunity to neatly manage the effects of both tide & tempest. A tidal barrier would allow high tides and high storm runoff to be managed as separate events. High tides can be held away from Bayside, when necessary. Heavy rain can be caught in Back Cove, for release when the tide allows.

### LITTLE POND, BIG FISH.

Catching the flood problem releases Bayside to develop its coastal urban edge and allow public and private amenities to offer a great work-and-play environment. A tidal barrier can generate power on ebb and flood tides, or form a reversing fall where urban kayakers test their mettle. The greatest cost for tidal barrier power is usually the embankment (2), but Back Cove is almost entirely enclosed already. With a permanent flood solution in place a flexible time frame for other changes is possible. I-295 could be lowered and converted to an urban boulevard (3). Enhanced tidal edges around Back Cove can offer further flood protection, water quality improvements, wildlife habitats, and recreational amenities (4).

Refs.

1. Sea Level Rise and Casco Bay's Wetlands - Casco Bay Estuary Partnership, 2013
2. Tidal Energy Technology Brief - International Renewable Energy Agency, 2014
3. Growing Portland: Not Weather, but How. Case Study I-295 to Ground - University of Southern Maine, 2017
4. Swansea Bay Tidal Lagoon (tidallagoonpower.com/projects/swansea-bay)



## TIDAL BARRIER

**Bayside  
Adapts**

Board 1 - Catch & Release - Tukey's Bridge  
Soren Denford, Soren Denford Design Studio  
Richard Lo, Kaplan Thompson Architects  
Danielle Foley, Kaplan Thompson Architects

# How can YOU help?

Talk about it climate change and how it impacts the things YOU care about.

Participate in the Climate Action Planning process.

Get involved with community organizations doing good work.

Follow us on Facebook or Instagram ( @sustainableportlandme) to stay up to date about Portland's climate and sustainability efforts.



# Sustainability Office

Troy Moon  
Sustainability Coordinator

Ashley Krulik  
Sustainability Associate

<http://www.portlandmaine.gov/1890/Sustainability-Office>

@sustainableportlandme (FB and Instagram)

