



*Monitoring Greenhouse Gas  
Emissions to Improve Operations  
at  
Greater Farallones National Marine Sanctuary*

*May 24, 2017  
Advisory Council Meeting*



**Greater Farallones  
National Marine  
Sanctuary**

**Cordell Bank  
National Marine Sanctuary**

*Cordell Bank*

Pt. Reyes

**Greater Farallones  
National Marine  
Sanctuary**

*Farallon Islands*

**Monterey Bay  
National Marine Sanctuary**

Cordell Bank National  
Marine Sanctuary Headquarters

Greater Farallones National Marine Sanctuary  
Headquarters and Visitor Center

San Pablo  
Bay

Oakland

San Francisco

CALIFORNIA





# Greater Farallones National Marine Sanctuary



- 3,295 square miles
- 30 staff, 3 buildings in Presidio



# Ocean Climate Program



- Green Operations planning began in 2006
- 1st initiative of our new Ocean Climate Program
- Address climate change impacts in the region
- Foster awareness, advocate solutions, and promote action among government agencies, public & private organizations, and individuals



# Vision



*Improve the energy conservation and efficiency of our Crissy Field campus*

- Draft & implement Green Operations Action Plan
- Measure Greenhouse Gas Emissions each year
- Share information
- Modify behavior

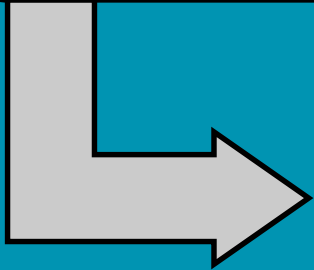


# Process



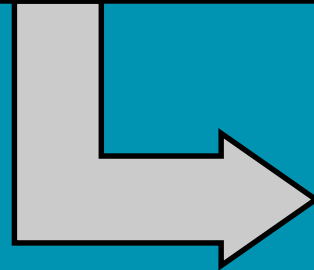
Set  
Targets

- Green Operations Action Plan



Measure  
Emissions

- Greenhouse Gas Inventory (CLIP Tool)

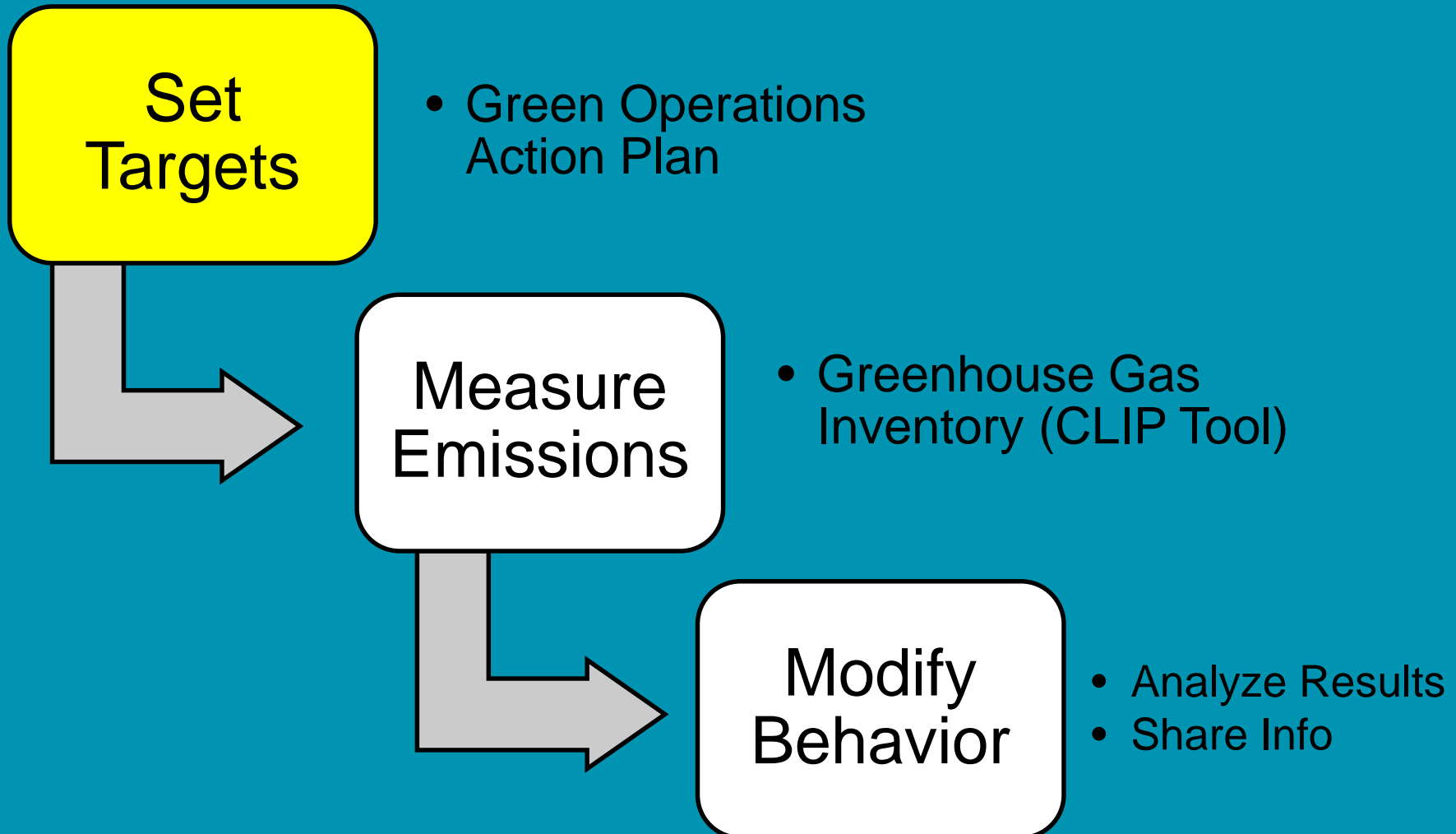


Modify  
Behavior

- Analyze Results
- Share Info



# Process





# Green Operations Action Plan



- Drafted plan with group of stakeholders; +130 actions
- 5 categories:
  - Energy
  - Transportation
  - Water
  - Waste
  - Education & Outreach
- Each category has specific actions, **measurable reduction target**, evaluation methods, and potential partners

## Ocean Climate Initiative Action Plan Green Operations: Reducing Our Carbon Footprint

### Introduction

The following chapter provides over 130 action plan strategies to reduce the green house gas emissions that result from the facilities and operations of Gulf of the Farallones National Marine Sanctuary. They are binned in five categories: Transportation Management, Energy Efficiency, Waste Management, Water Management, and Education and Outreach. Within each category a measurable target, specific actions, evaluation metrics, and potential partners are identified to the years 2015 and 2020. To complement this chapter, the sanctuary also completed energy, transportation, and waste audits, and derived an emissions inventory for the calendar year (see attached 2008 Emissions Inventory). These studies help to prioritize recommended actions, and provide an effective evaluation and education tool to sanctuary management. The scope of the document was defined to focus on all staff activities that occurred at the headquarters facility on Crissy Field in San Francisco, CA, and included employee commuting, all work-related travel including flights, and use of the Research Vessel *Fulmar*.

This chapter was developed by the Gulf of the Farallones National Marine Sanctuary Advisory Council's Green Operations Working Group, as part of the Office of National Marine Sanctuaries Blue Seas Green Communities Initiative. Participants included representatives from the San Francisco Department of Environment, Golden Gate National Recreation Area (landlord), Presidio Trust (utilities provider), a green architectural firm (LEED expert), and several members from the Advisory Council. Presented to the full Advisory Council in August 2009, the Council accepted the recommended strategies and forwarded them onto the sanctuary superintendent for adoption and promulgation to other sanctuary sites within the National Marine Sanctuary System.

### I. Transportation Management

**GOAL:** Reduce green house gas emissions through green transportation choices.

**Objective:** Reduce per capita green house gas emissions generated from transportation 5% annually, or 25% by 2015 and 50% by 2020. Baseline year one data was derived using the National Park Service CLIP Tool (see Appendix I).

**Strategy TM-1:** Reduce CO<sub>2</sub> emissions from employee travel to and from workplace.

**Activity 1.1:** Encourage carpooling through employee incentives.

**Activity 1.2:** Encourage carpooling by designating two closest (and most visible) campus parking spots as HOV/Alternative Vehicle spaces.

**Activity 1.3:** Improve bike parking on campus

- Increase the number of spaces to hold eight bikes comfortably.
- Delineate the bike parking area.
- Encourage people to use the bike rack for parking, not storage of their bicycles.

**Activity 1.4:** Take advantage of federal transportation subsidy programs



# Reduction Targets



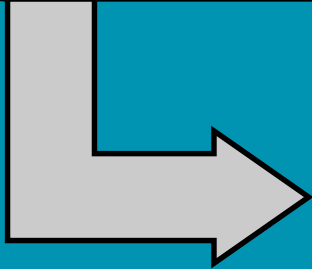
Category	2015	2020
Energy	15%	30%
Transportation	25%	50%
Water	10%	20%
Waste	95%	100%

# Process



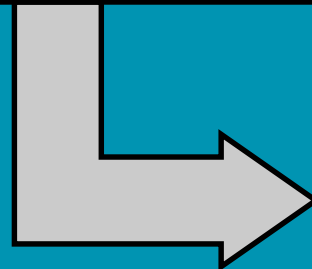
Set  
Targets

- Green Operations Action Plan



Measure  
Emissions

- Greenhouse Gas Inventory (CLIP Tool)



Modify  
Behavior

- Analyze Results
- Share Info

# Greenhouse Gas Inventory



- Measure energy (natural gas & electricity), transportation, wastewater, and solid waste
- National Park Service CLIP Tool
- Convert emissions to  $\text{MTCO}_2\text{E}$  (per capita)
- Use 2008 as baseline





# How we measure emissions



- Staff transportation survey (Google Forms)
- Gather utility data
  - natural gas (PGE)
  - water, electricity (Trust)
  - waste (Recology)
  - vehicles (GSA + staff survey)
- Assemble data in Emissions Inventory document that serves as our final report
- Enter data in CLIP Tool

CY2015 Emission Inventory  
April 2016, jbj

## 2015 (Calendar Year) Greenhouse Gas Emission Inventory for the Gulf of Farallones National Marine Sanctuary

The Gulf of the Farallones National Marine Sanctuary (GFNMS) used the National Park Service's (NPS) [Climate Leadership In Parks \(CLIP\) Tool](#) to complete an inventory of 2015 greenhouse gas emissions generated from facility use, operations, and transportation activities at the sanctuary's headquarters. This information was compared to data collected since the 2008 baseline inventory to measure performance in meeting reduction goals.

Data were gathered from utility statements, internal records, and an employee transportation survey. The Greenhouse Gas (GHG) inventory includes totals for stationary combustion fuel (natural gas for heating), purchased electricity, mobile combustion (auto, public, boat and air transportation), wastewater treatment, and municipal solid waste and disposal. Each input is described in greater detail below.

For the purpose of this audit, emissions were measured only for internal staff at the headquarters facility on Crissy Field, and not for visitors to the sanctuary.

### Executive Summary

Total and per capita emissions in calendar year 2015 began to increase. The demand for natural gas and electricity has essentially remained level year after year, with an increase observed when a new building was added to this survey in 2010. Due to the site's heater not functioning from late Jan to mid Mar, it consumed less natural gas than in past years. Together, these sources of energy contribute approximately 20% of the site's total emissions. Wastewater and solid waste have also remained steady since 2008, and continue to contribute less than 3% of the sites total emissions.

Transportation remains the highest portion of emissions, contributing nearly 80% of the site's total. Automobile transportation (commuting & government vehicles) makes up nearly 70% of that, the highest percentage since 2008. In 2015, the sanctuary completed the public process to expand its boundary 100 miles to the north (to Pt Arena). Staff travelled more and farther to these new sanctuary areas which resulted in an increase in mobile combustion. A new car was also acquired to support expanded travel.

### Highlights

- *Per capita emissions have declined by 2.62 Metric Tons Carbon Dioxide Equivalent (MTCO2E) since 2008*
- Sanctuary added an additional government vehicle due to sanctuary expansion
- Sanctuary staff travelled to the expansion area to discuss and implement boundary and program expansion

# Energy



**TARGET:** Reduce 15% by 2015 / 30% by 2020

**RESULTS:** Reduced 15% since 2008 (21% of 2015 emissions)

**Challenges** - Vampire loads, new building, old heater, drafty windows

**Successes** - HVAC serviced, Energy Star fridge & dishwasher, LED lights, new computers, broken heater\* being replaced



# Transportation



**TARGET:** Reduce 25% by 2015 / 50% by 2020



**RESULTS:** Reduced 23% since 2008 (77% of 2015 emissions)

**Challenges** - Lack of public transit (Only PresidiGo, No Muni), long commutes for some staff, large management area

**Successes** - Carpool parking, hybrids, reduced Air travel due to budget constraints\*





# Water



**TARGET: Reduce** 10% by 2015 / 20% by 2020

**RESULT: Increased** 100% since 2008 (1% of 2015 emissions)

**Challenges** - Manual sprinkler system, recycled water source, drought, watering “historic landscape”

**Successes** - High-efficiency toilets & sinks, utilities improvements, dishwasher



# Waste



**TARGET:** **Reduce** 95% by 2015 / 100% by 2020.

**RESULT:** **Reduced** 50% since 2008 (1% of 2015 emissions)

**Challenges** - Following  
Recology targets;  
unrecyclable items

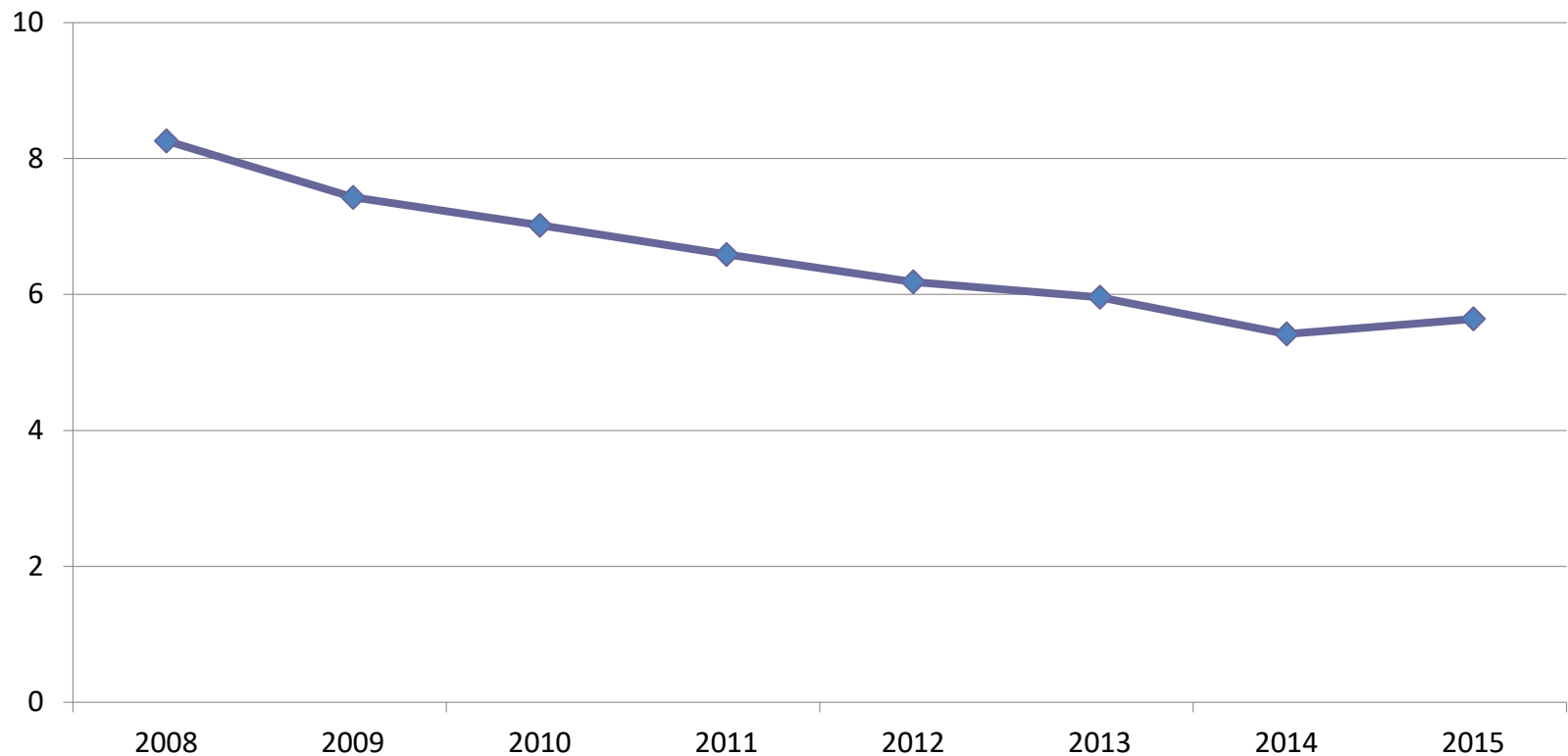
**Successes** - Reusable  
meeting supplies,  
composting, junk mail,  
more recycle bins



# Per Capita (Person) Results



**Per Capita Emissions by Year  
(MTCO<sub>2</sub>E )**



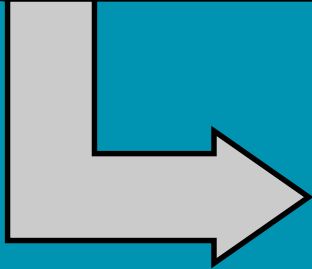


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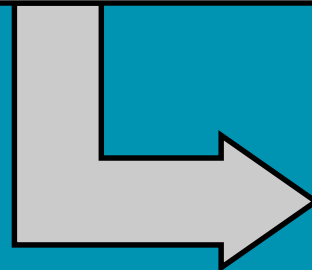
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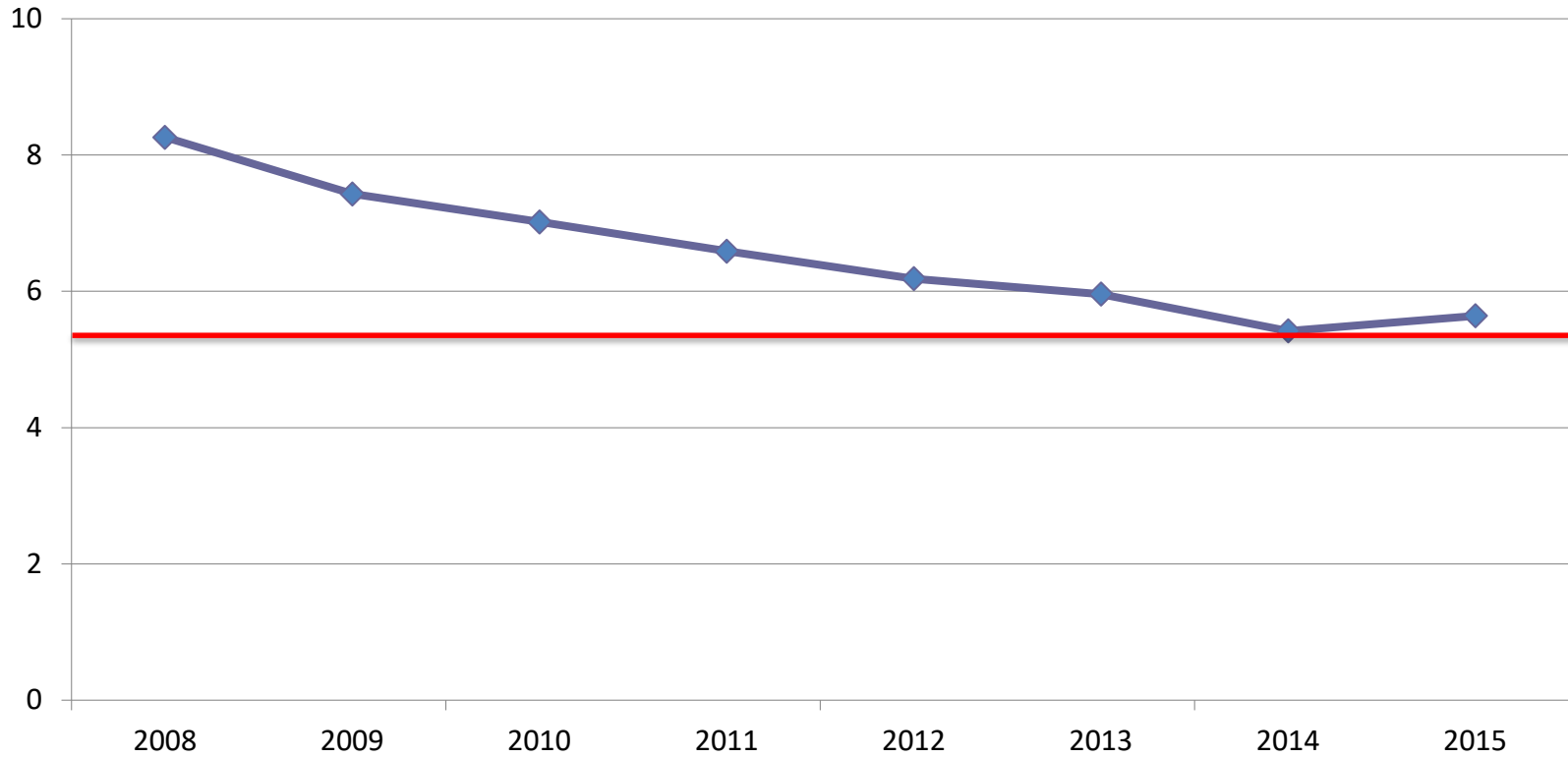
Modify  
Behavior

- Analyze Results
- Share Info

# Per Capita Results



Per Capita Emissions by Year  
(MTCO<sub>2</sub>E )

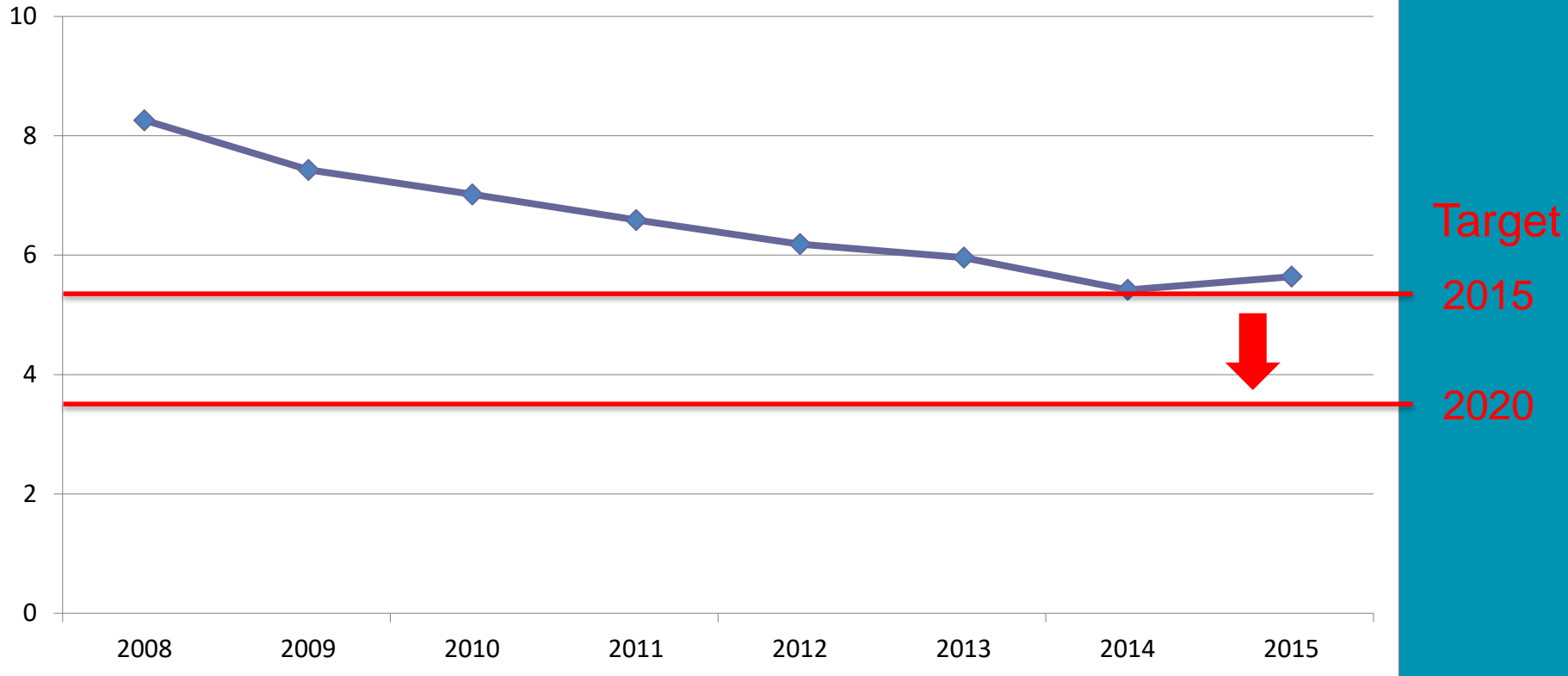


Target  
2015

# Per Capita Results



Per Capita Emissions by Year  
(MTCO<sub>2</sub>E )



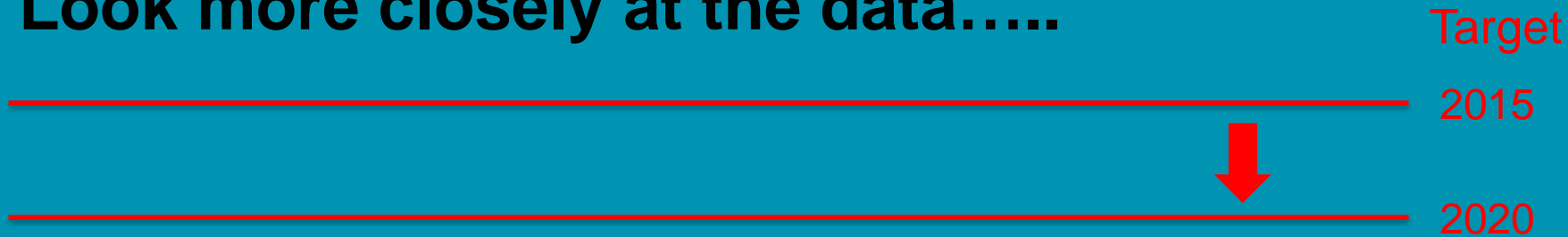
# How do we accomplish this?



**We all have limited time and resources.**

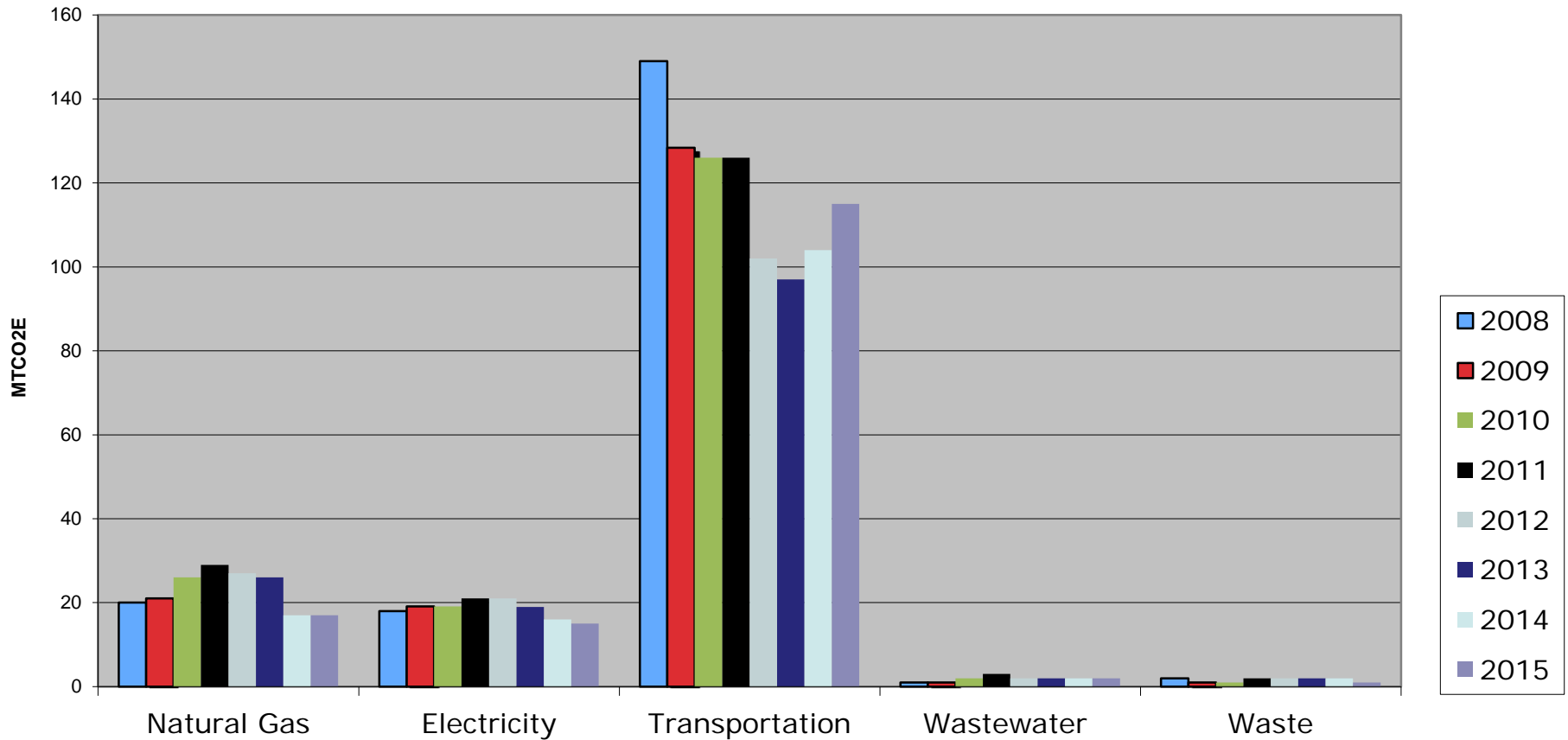
**What should be the priorities?**

**Look more closely at the data.....**

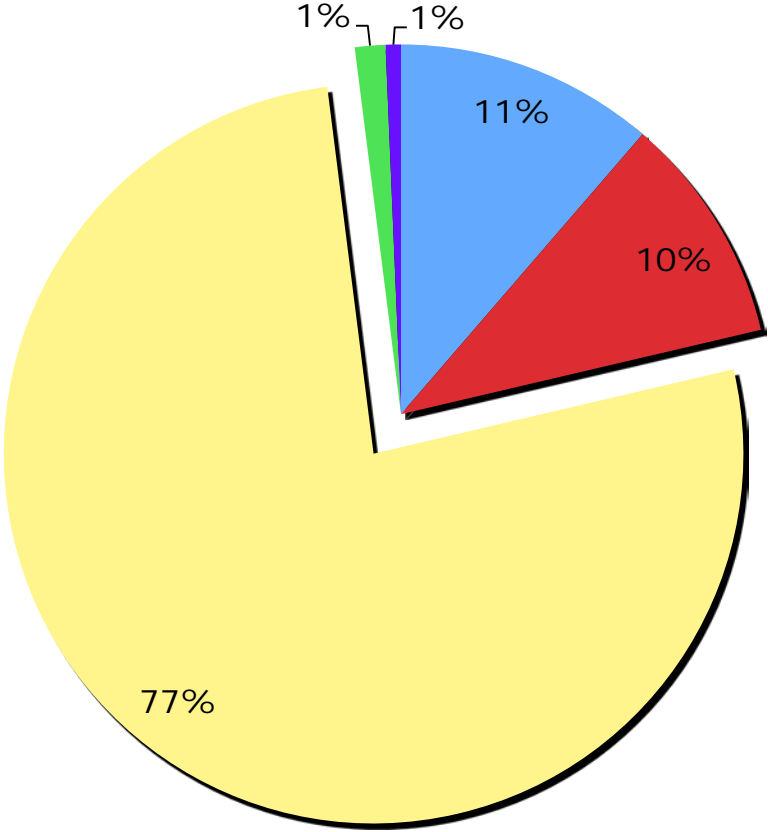




2008-2015  
Gross Emissions by Sector  
Greater Farallones National Marine Sanctuary

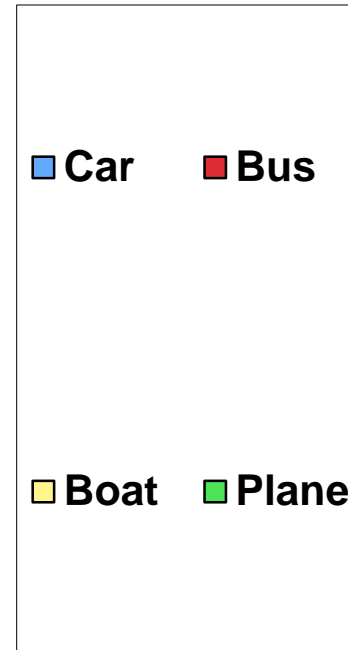
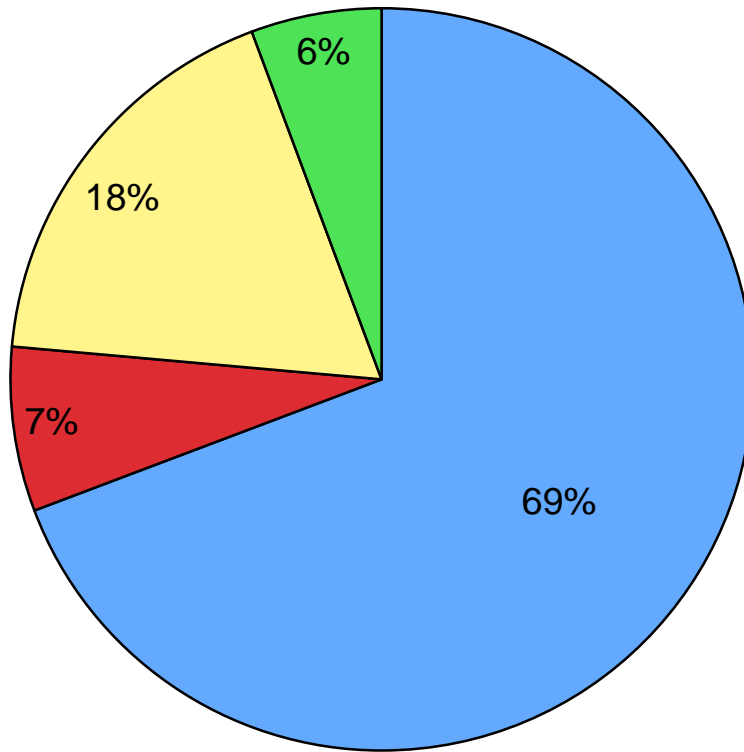


**2015**  
**Emissions as Percent of Total**  
**Greater Farallones National Marine Sanctuary**

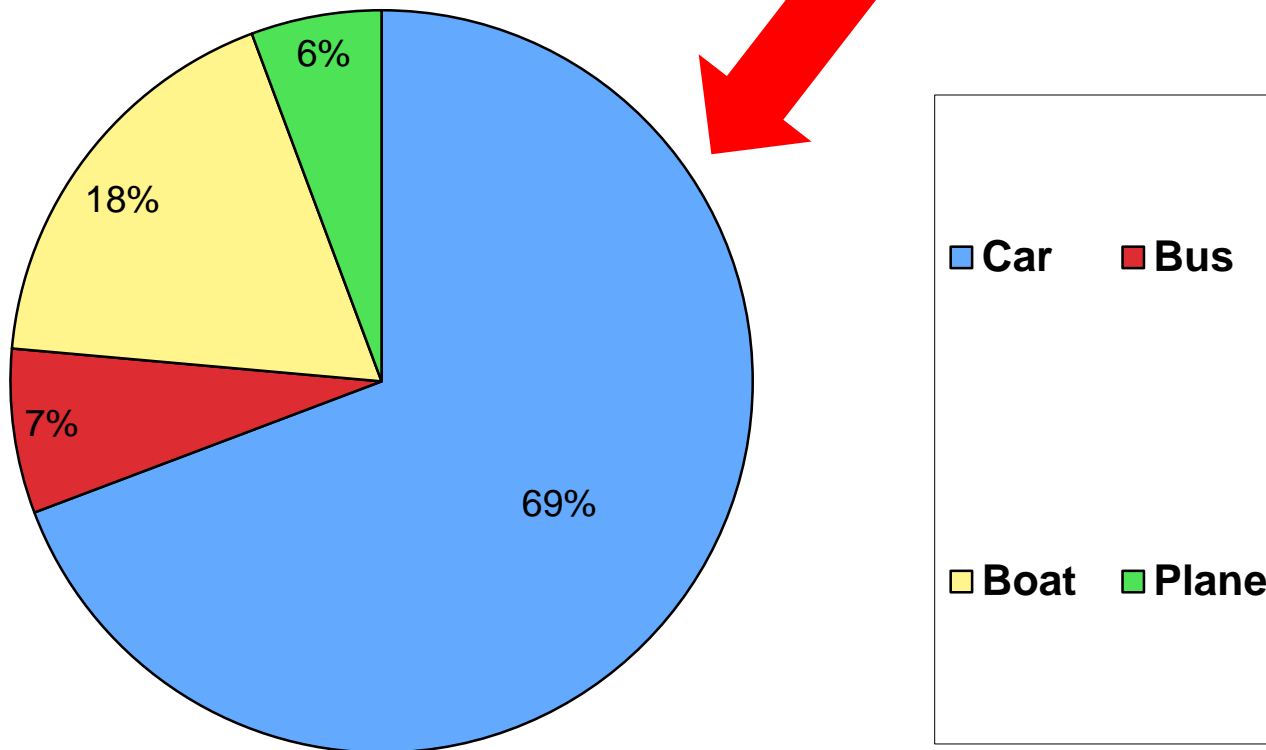


- Natural Gas
- Electricity
- Transportation
- Wastewater
- Waste

# 2015 Transportation Emissions as Percent of Total

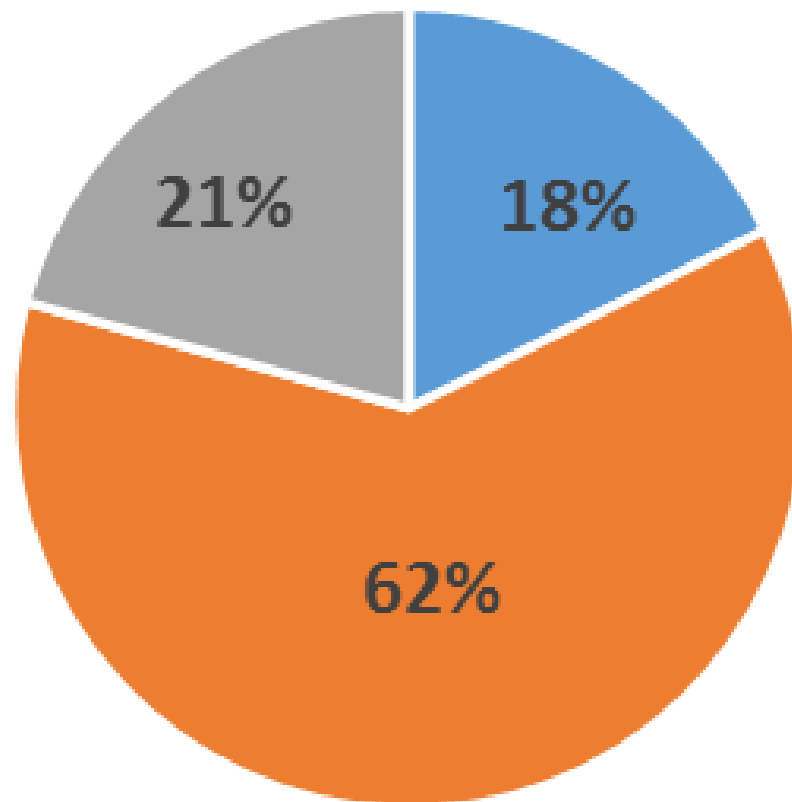


# 2015 Transportation Emissions as Percent of Total





# Auto Miles Traveled



■ Gov. Car   ■ Commute   ■ Work travel

# Setting Priorities



- **Use the CLIP Tool to determine required emission inputs to reach target**
- **Use those required inputs to prioritize operational and budgeting decisions**
- **To reach our 2020 targets, we are prioritizing the following actions....**

# Energy



**TARGET:** Reduce 30% by 2020

**REQUIRES:** Reduce additional 6 MTCO<sub>2</sub> by 2020



**Action 1:** Convert to LED lighting (SF Dept of Energy Audit-free)

**Action 2:** Install high-efficiency heater & Energy Star appliances

**Action 3:** Repair and weather-strip windows

**Action 4:** Purchase Green Power (Trust, when available)

**Action 5:** Smart power-strips



# Transportation



**TARGET:** Reduce 50% by 2020

**REQUIRES:** Reduce additional 40 MTCO<sub>2</sub> by 2020



**Action 1:** Increase telecommuting to 2 days/week

**Action 2:** Acquire biodiesel for research vessel

**Action 3:** More webinars; less auto & air travel (high speed internet)

**Action 4:** Pay for carbon offsets for all air travel





# Water



**TARGET: Reduce 20% by 2020**

**REQUIRES: Reduce additional 1 MTCO<sub>2</sub> by 2020**



**Action 1:** Improve or eliminate irrigation; use graywater when available

**Action 2:** Install low flush toilets and low water faucets



# Waste



**TARGET: Reduce 100% by 2020**

**REQUIRES: Reduce additional 2 MTCO2 by 2020**



**Action 1:** Contingent on Recology meeting its 2020 WASTE ZERO goal

**Action 2:** Purchase green products and recyclable packaging



# Share Information



- With leadership -> change telecommuting policy
- All marine sanctuaries
- Golden Gate Park partners
- CBNMS & GFNMS Advisory Councils
- Resource on website
- Time available for capacity building and training
- Encourage NPS to update and web-enable CLIP
- Encourage & assist partners to adopt the process

# Observations



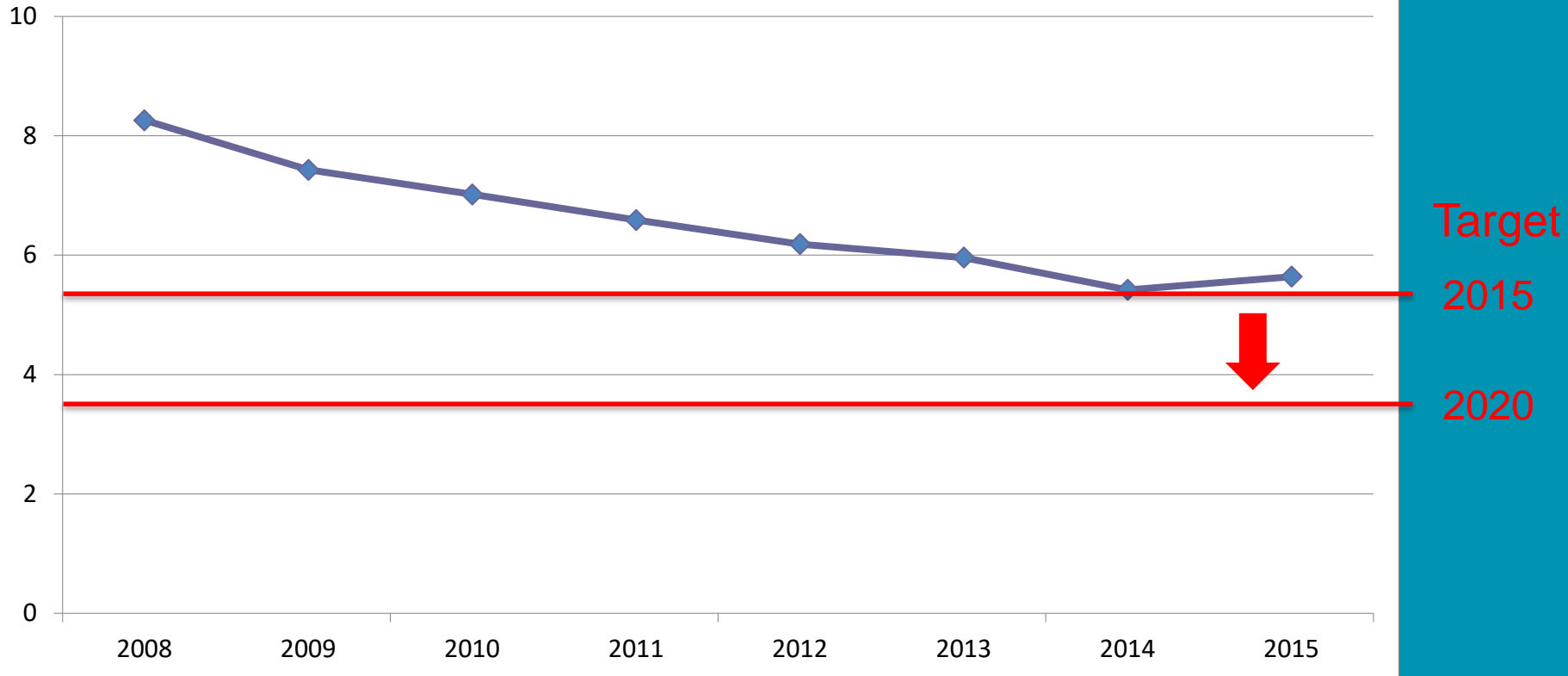
- If you don't measure, you don't know what to prioritize
- Tool is not as important as your results  
(many available: NPS CLIP, EPA Portfolio Manager, etc.)
- Use trends & data to drive change in policies and behaviors
- Organizations are dynamic:
  - Staff fluctuates,
  - Office space changes,
  - You may grow or shrink (we tripled in size in 2015),
  - Change in mission
- Per capita or square footage could work
- Transportation targets are the most challenging for us. We welcome any suggestions to address that.



# Per Capita Results 2015



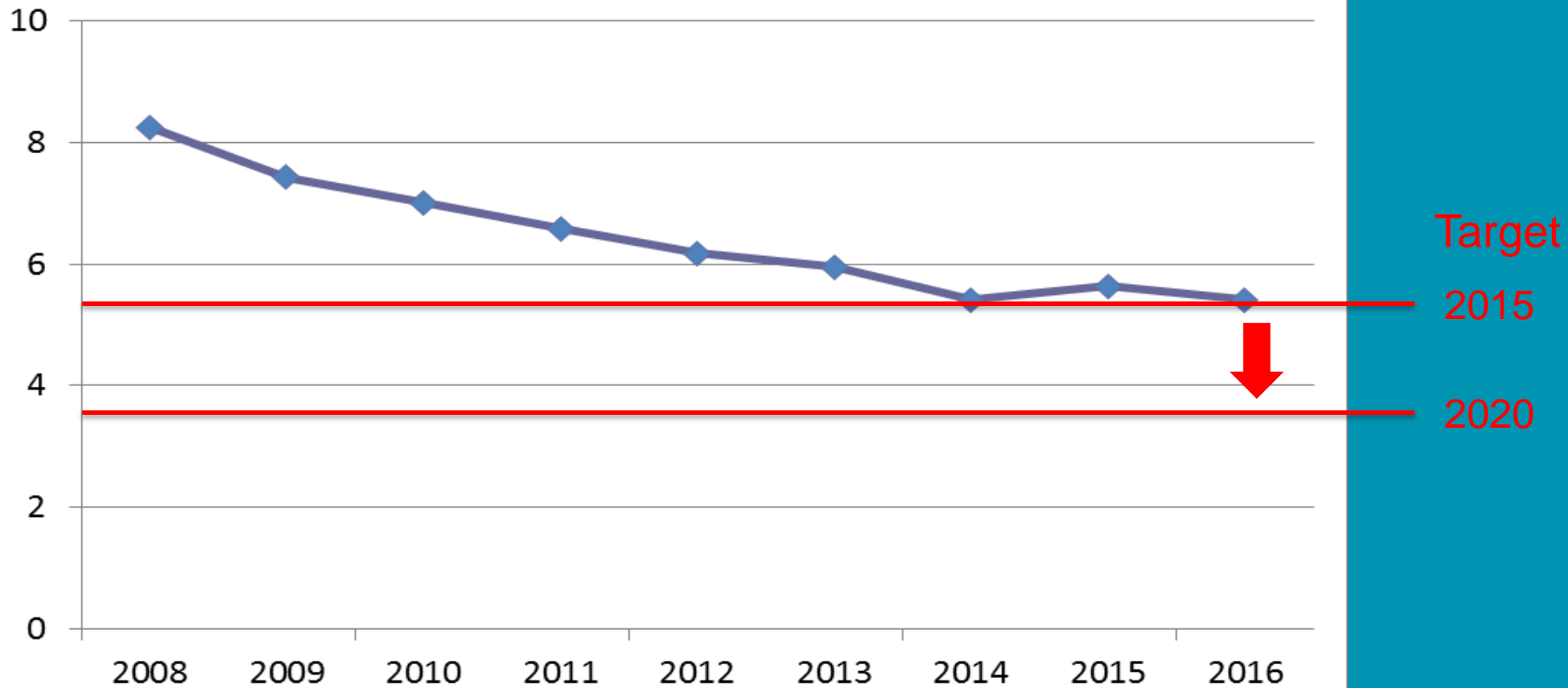
Per Capita Emissions by Year  
(MTCO<sub>2</sub>E )



# Per Capita Results 2016



## Per Capita Emissions by Year (MTCO<sub>2</sub>E)



# More Information



[farallones.noaa.gov](http://farallones.noaa.gov)

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# Definition of Carbon Dioxide Equivalent



## Carbon Dioxide Equivalent (CO<sub>2</sub>e):

The universal metric unit of measurement used to indicate the global warming potential of each of the six greenhouse gases. Carbon dioxide, a naturally occurring gas that is a byproduct of burning fossil fuels and biomass as well as land-use changes and other industrial processes, is the reference gas against which the other greenhouse gases are measured (Nitrous Oxide (N<sub>2</sub>O), Methane (CH<sub>4</sub>), Hydrofluorocarbons (HFC)).