

# Emissions Inventories Benefits and Insights

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June 7, 2021



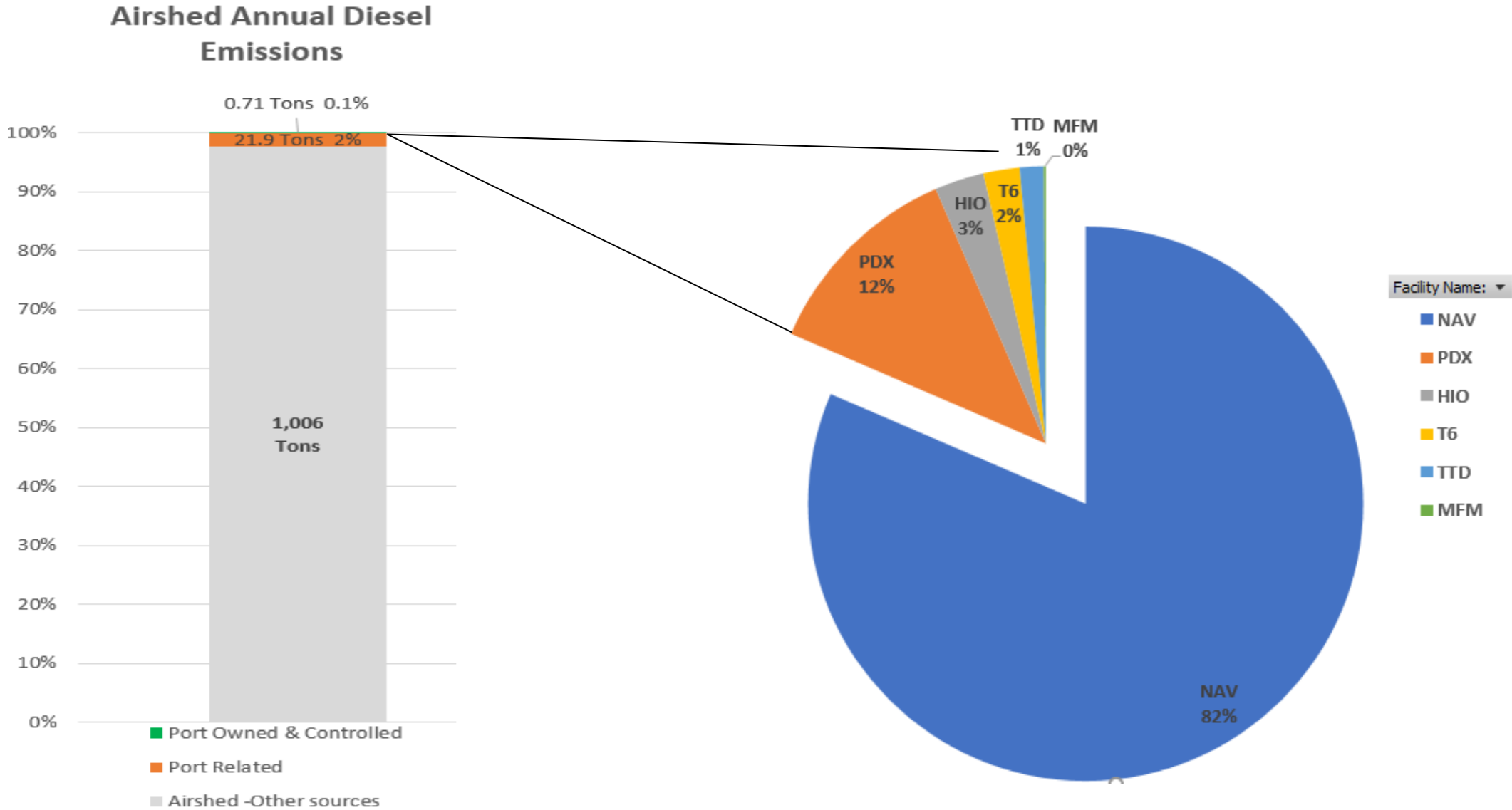
# Inventory Benefits

- Environmental
  - Identify & mitigate emissions.
- Community relations
  - Credibility
  - Environmental justice
- Financial
  - Energy efficiency and cost savings
  - Focus limited resources
  - Supports grants and funding
- Compliance
  - Regulatory reporting
  - NEPA
  - General conformity



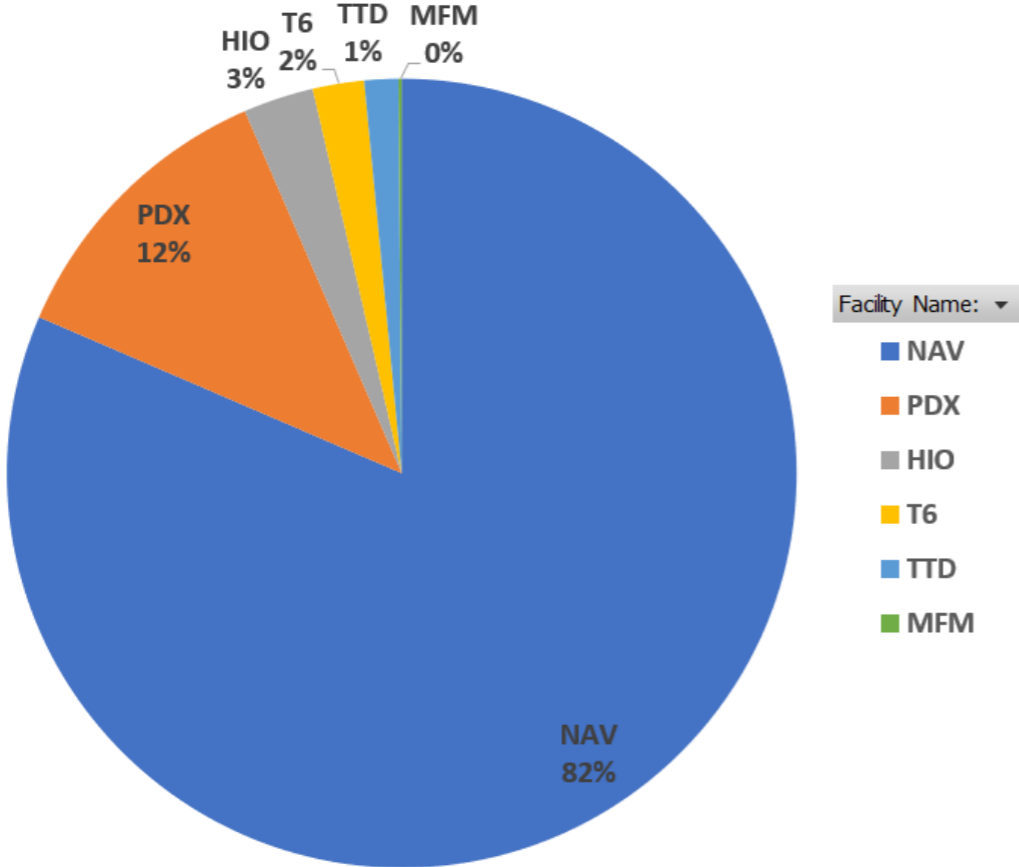
# Benefits – Environmental

## Diesel PM – Port Owned and Controlled Sources



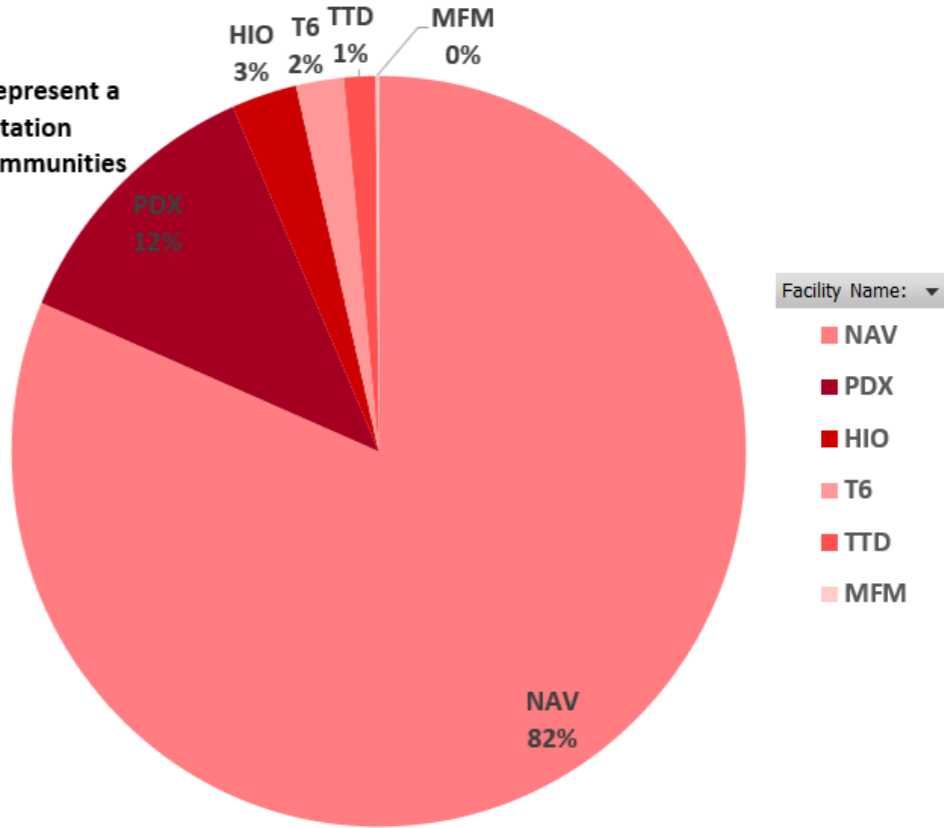
# Benefits – Environmental, E.J., Community

Port Owned Emissions by Facility



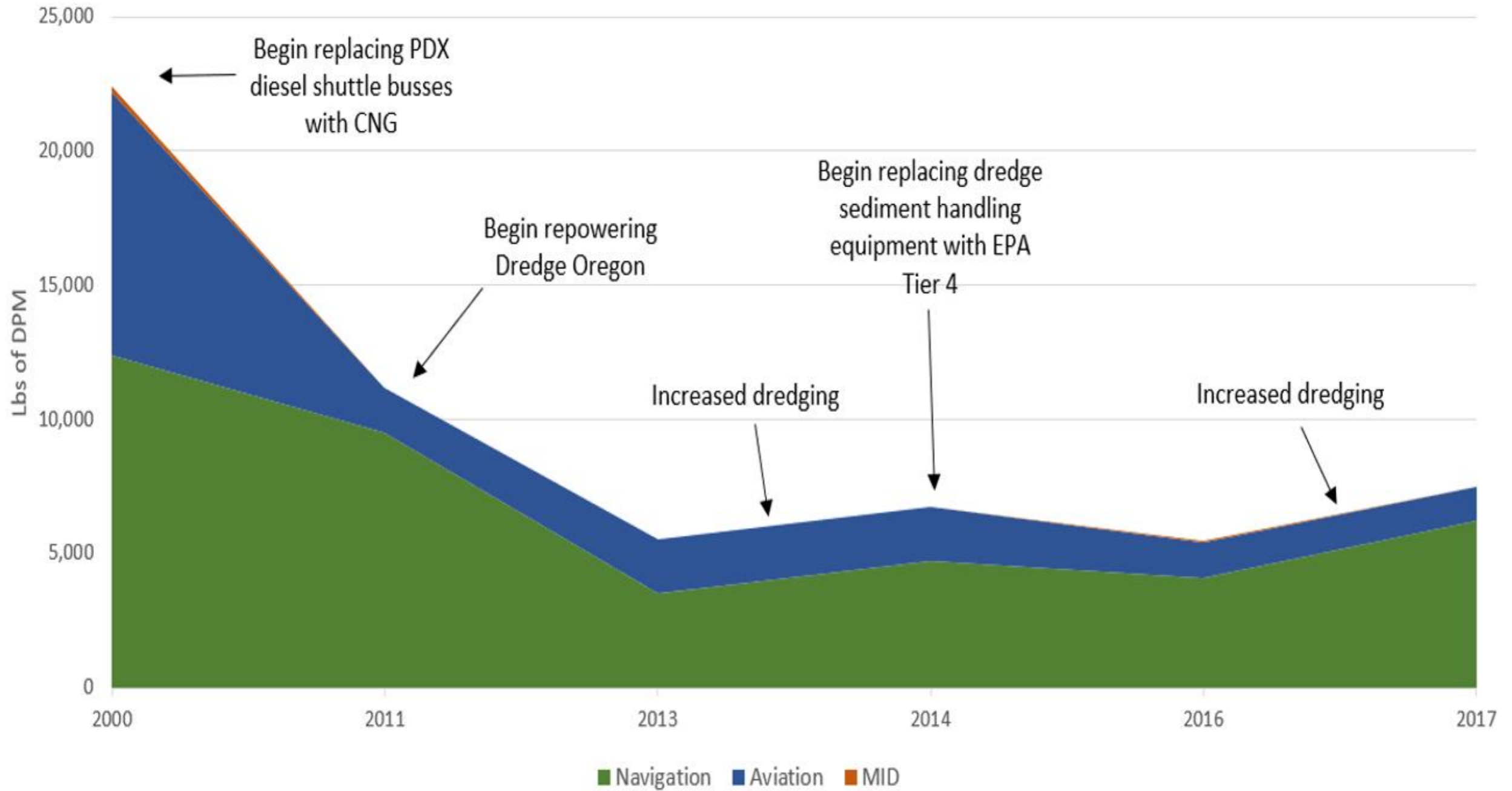
Port Owned Emissions by Facility, Prioritized by Nearby EJ Communities

Darker colors represent a larger representation of nearby EJ Communities

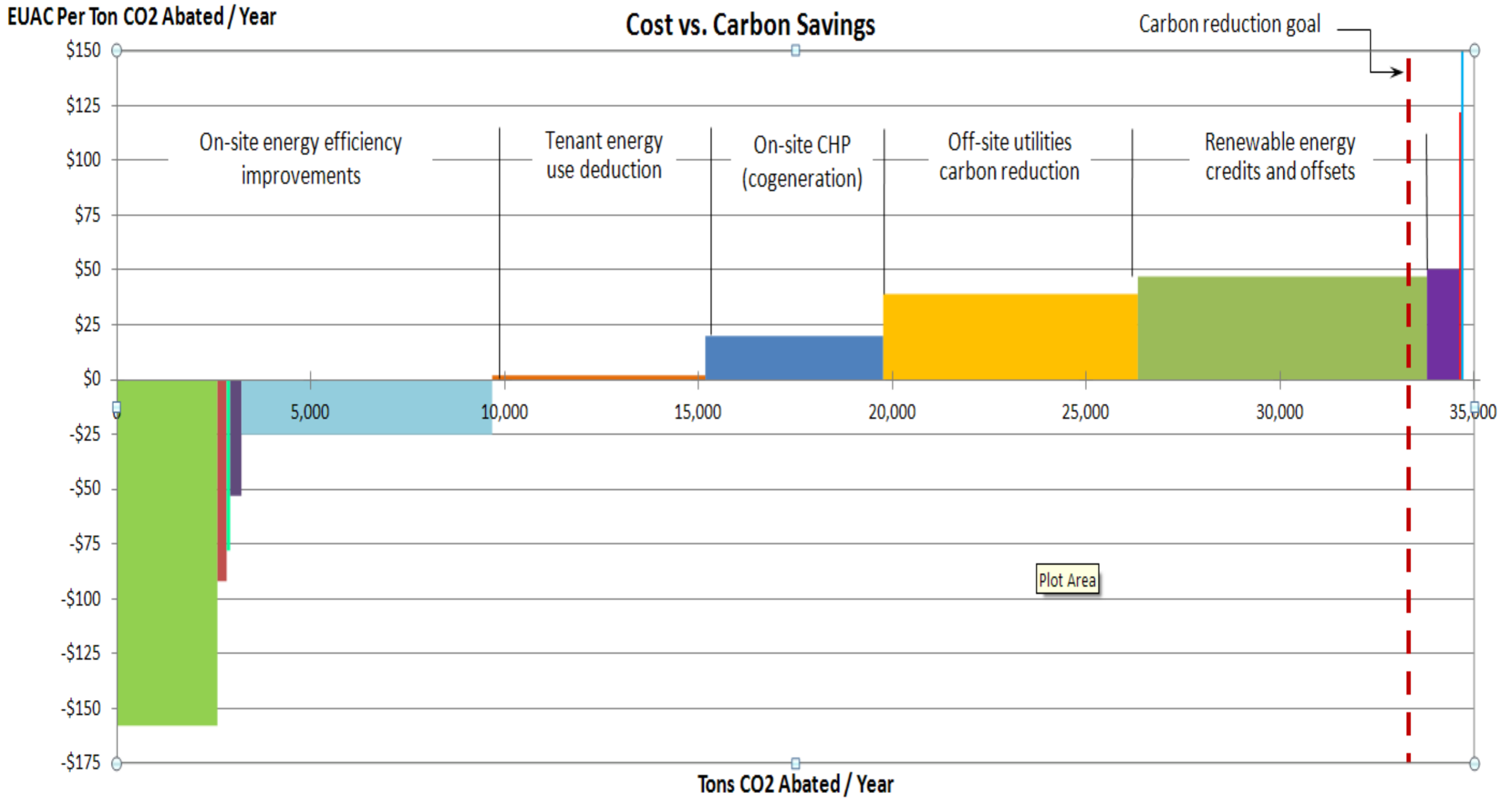


# Benefits – Environmental, E.J., Community

Diesel Particulate Matter (DPM) Emissions



# Benefits – Energy & Cost Savings



- ECO 1
- ECO 2
- ECO 3
- ECO 4
- ECO 5
- ECO 6
- ECO 7
- ECO 8
- ECO 9
- ECO 10
- ECO 11
- ECO 12
- Carbon Reduction Goal



# Benefits – Financial – Grants & Revenue

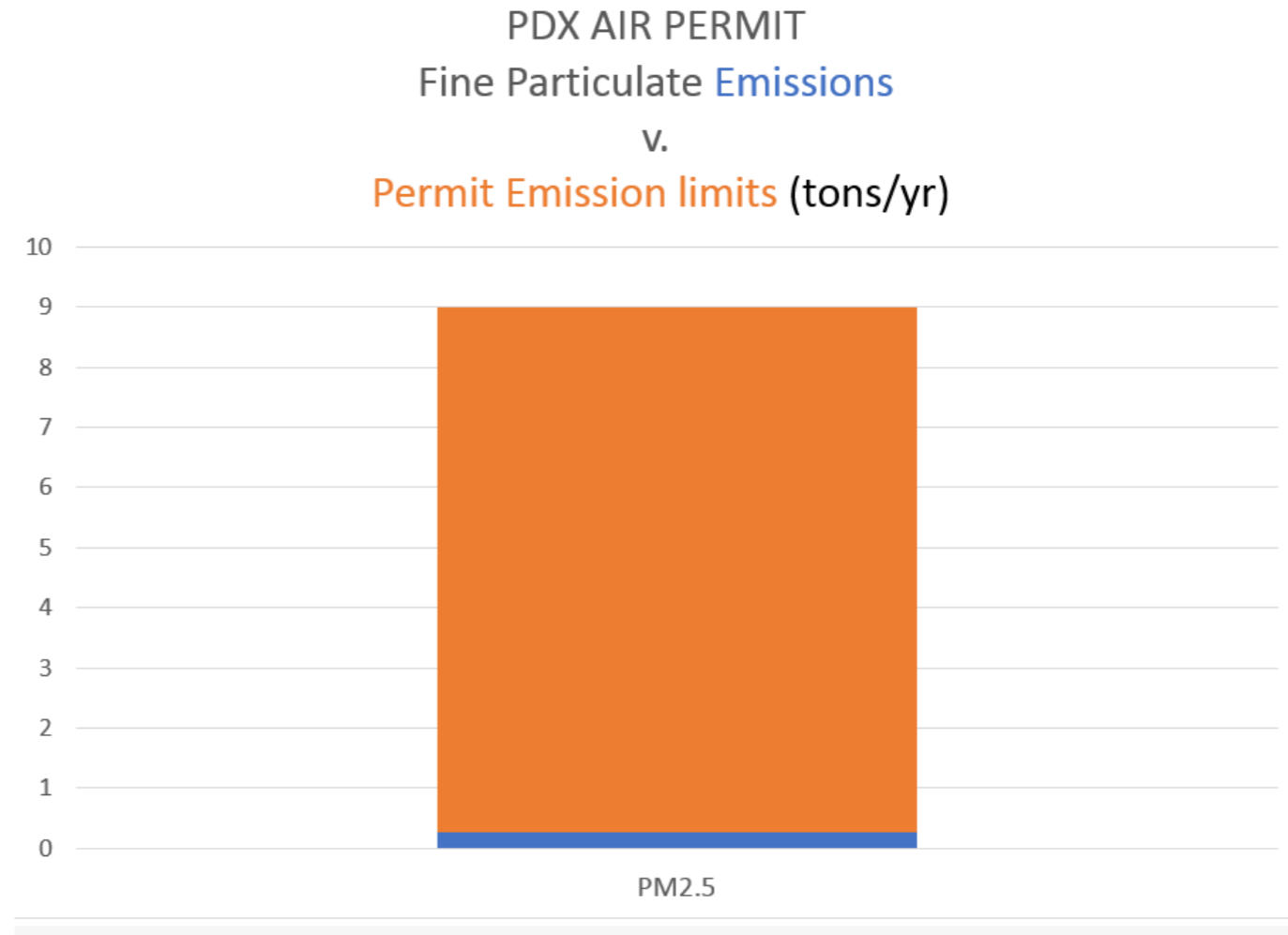
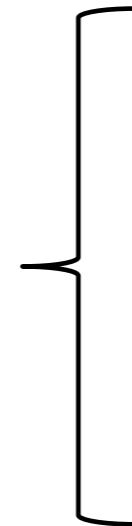
Year	Grant	Funding
2012	Diesel Emission Reduction Act	\$500,000
2014	Voluntary Airport Low Emissions Program	\$331,653
2016	Voluntary Airport Low Emissions Program	\$5,700,600
2018+	Oregon Clean Fuels Program	\$170,306 (to date)



# Port Owned Emissions - Permit Capacity

- Current Permit for PDX stationary sources

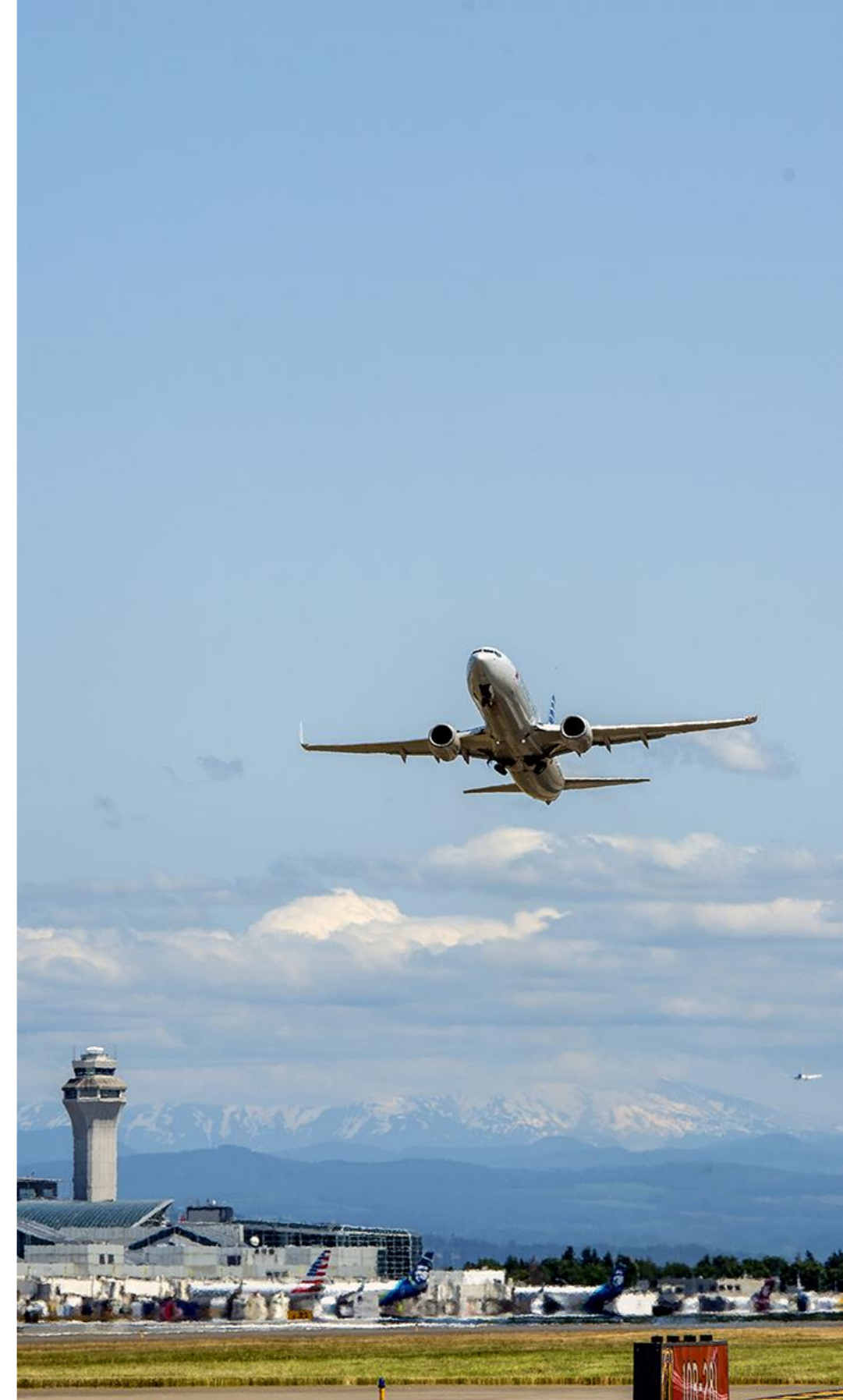
» Capacity





# Insights - Approaches

- Emissions Inventory design
  - Identify objectives and desired outcomes
    - determine inventory boundaries
    - Identify sources
    - Pollutants
      - Criteria, GHGs, air toxics
    - detailed v. simple
    - Frequency
  - Identify available and needed data sources



# Insights – Data Sources

Onsite Rail- Year 20xx	Switcher Locomotives		Line Haul Locomotives			
	xxxxxx Terminal	xxxxx Grain	xxxxxx Terminal		xxxxx Grain	
Engine Type (hp)	1,750	1,750				
# Locomotives (linked) in a move	2	2	2,726,555	Tons of Potash	3,258,782	Tons of Grain (1,400,400)
Gallons fuel/yr*	81,380	185,120		128 tons (weight of loaded car)		128 tons (weight of loaded car)
hp-hr/gallon	15	15		30 tons (weight of empty car)		30 tons (weight of empty car)
trains per year				98 tons of potash per car		98 tons of grain per car
Usage time (minutes per train)				27,822 loaded rail cars		33,253 loaded rail cars
Movement factor (% of usage time)				208 inbound trains (based on 134 cars per train)		303 inbound trains (based on 110 cars per train)
Load factor when moving				17,152 trailing tons per inbound train		14,080 trailing tons per inbound train
hp per train				17,152 horsepower per train (1 hp/trailing ton)		14,080 horsepower per train (1.0 hp/trailing ton)
Annual usage (hp-hr/yr)	1,236,976	2,813,824		4,300 hp (average line-haul locomotive hp)		4,300 hp (average line-haul locomotive hp)
				4 number of line haul locomotives / train		3 number of line haul locomotives / train
				17,200 horsepower per inbound train		12,900 horsepower per inbound train
				208 outbound trains		303 outbound trains
				4020 trailing tons per outbound train		3300 trailing tons per outbound train
Assumptions for Yard Engines				horsepower outbound = horsepower inbound		horsepower outbound = horsepower inbound
* Switching needs and patterns may change, as necessary, at each terminal location.				4 number of line haul locomotives / train		3 number of line haul locomotives / train
Movement Factor = % of usage time where engine is actually moving				17200 horsepower per outbound train		12900 horsepower per outbound train
Load Factor = % of total load applied to time during movement						



# Insights – Frequency

	Fuel Use											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Electricity (kWh)	987,082	987,082	987,082	987,082	1,002,853	907,487	1,048,519	1,014,751	1,017,724	999,782	0	<== Insert annual usage
NG (therms)	1,975	2,236	1,598	1,775	3,600	3,160	2,661	3,833	1,803	3,201	0	
Fuel Oil (gal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

CO2 Emission Factors				
	EFs	Units	EFs	Units
Electricity	0.38	kg/kWh	0.83	lb/kWh
NG	0.05	kg/scf	120.0	lb/1000scf
No.2 Fuel Oil	10.21	kg/gal	22.5	lb/gal
Conversions:				
1 kg =	2.20462 lb			
1 KkW =	0.001 MW			
1 therm =	100,000 Btu			
Heat Content of NG =	1,028 Btu per cf			

Year Analyzed	Emission Calculations		
2020	Facility Data	Usage	CO2 Tons
	Electricity (kWh)	999,782	413.9
	NG (therms)	3,201	18.7
	Fuel Oil (gal)	0	0.0



# Insights – Geographic Boundaries

## Columbia River

- OGVs
- Barges
- Dredge

## Portland Airshed

- Cargo Handling Equip
- OGVs
- Barges
- Rail
- Trucks

## Columbia River Gorge (nat'l scenic area)

- Barges
- Rail
- Trucks

# AIR QUALITY

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