

Milwaukee Metropolitan Sewerage District Greenhouse Gas Emissions Inventory Project

NACWA Summer Conference and 39th Annual Meeting
July 17, 2009

Project Background

Objectives of the Greenhouse Gas (GHG) Inventory Project:

- Prepare an inventory of GHG emissions for all MMSD operations and facilities
- Evaluate MMSD Greenseams Program for potential carbon credit use
- Position for anticipated GHG regulations including GHG trading programs, whether mandatory or voluntary



GHG Inventory Development

- Determined calculation methodologies
- Determined inventory boundaries
- Collected GHG emissions data (2000-2007)
- Calculated emissions
- Documenting results including reductions achieved
- Evaluate future reduction opportunities

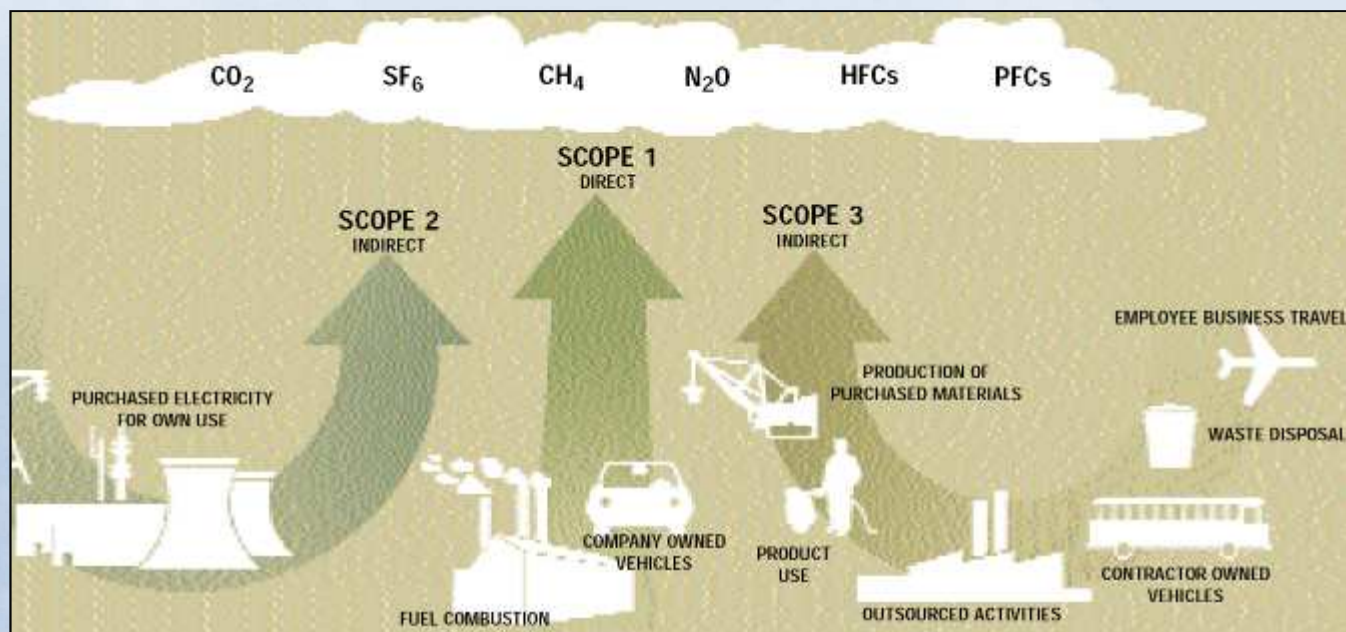


GHG Inventory Development

- Used recognized methodologies
 - WRI protocol
 - TCR protocol
 - Climate Leader's protocol (emission factors)
 - California Climate Action Registry (CCAR)
 - ▶ Local Government Operations Protocol, chapter 10 on Centralized Wastewater Treatment Facilities
 - ▶ Urban Forestry Protocol



Emissions Categorized by “Scopes”



Preserving The Environment •
Improving Water Quality



Emission Sources/Facilities

- Jones Island Water Reclamation Facility
- South Shore Water Reclamation Facility
- Headquarters/Central Lab Building
- Other Sources
 - Interceptor sewers and pump stations
 - 13th Street Facility
 - Alterra/Flushing Station
- MMSD-owned vehicles



Emission Sources/Types

- Direct Emissions (Scope 1)
 - Stationary combustion (turbines, boilers, dryers, IC engines, flares)
 - Mobile combustion (vehicles)
- Indirect Emissions (Scope 2)
 - Purchased electricity



Greenhouse Gases and Global Warming Potential (GWP)

- GWP: Measurement of GHGs relative to CO₂

Source: Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis* (Cambridge, UK: Cambridge University Press, 2001).

Note: A GWP is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming as calculated over a specific time interval, 100 years is commonly used by regulators.

GHG	100-yr GWP
CO ₂	1
CH ₄	21
N ₂ O	310



Wastewater Treatment Plant Sources: Reporting of GHG Emissions

- CO₂ emissions from burning biosolids and digester biogas are biogenic (natural carbon cycle) and do not count toward the EPA stationary combustion source threshold determination.
- CH₄ and N₂O emissions from the combustion of biosolids and digester gas are considered anthropogenic (man-made) and are therefore included.

Emission Source	CO ₂	CH ₄	N ₂ O
Fossil Fuels	Yes	Yes	Yes
Digester Biogas Fuel	No	Yes	Yes
Biosolids Fuel	No	Yes	Yes
Wastewater	No	No	No



Wastewater Treatment Plant Sources: Reporting of GHG Emissions

*Naturally occurring sources (Biogenic)
are not anticipated to be regulated*

Wastewater

No

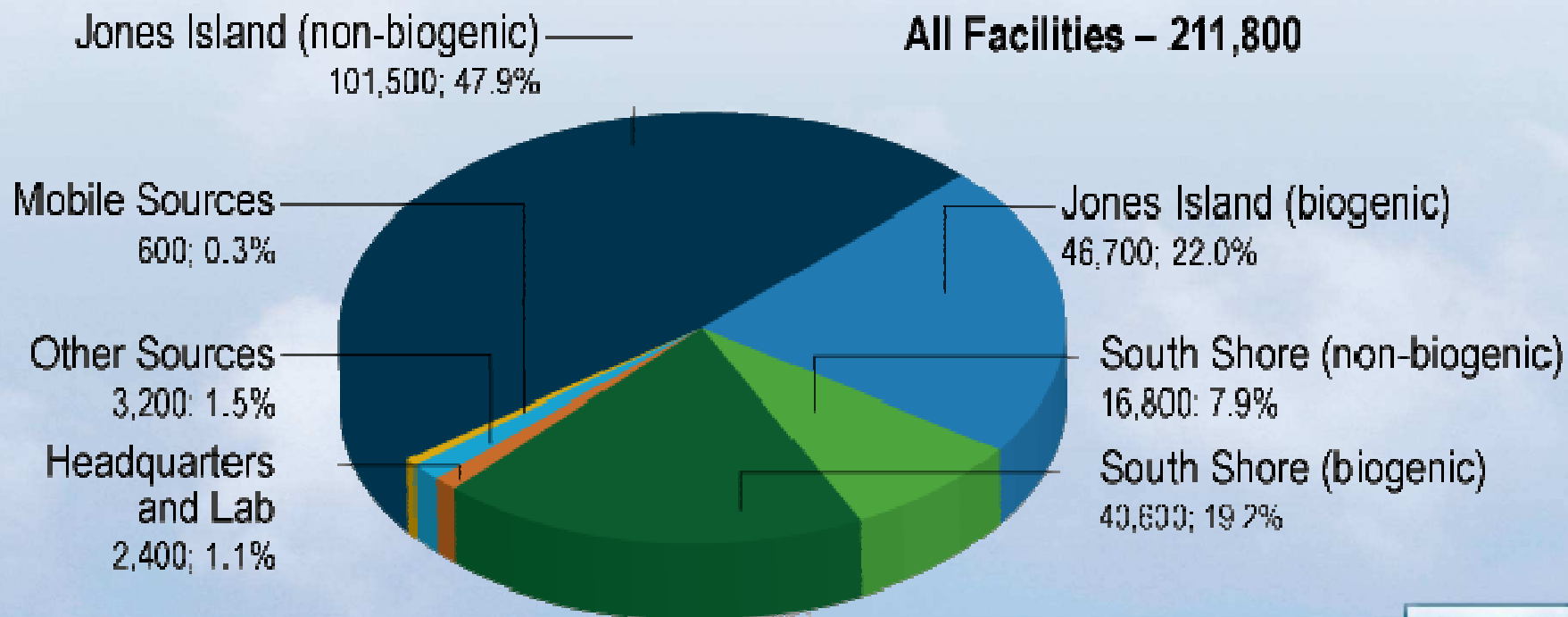
No

No



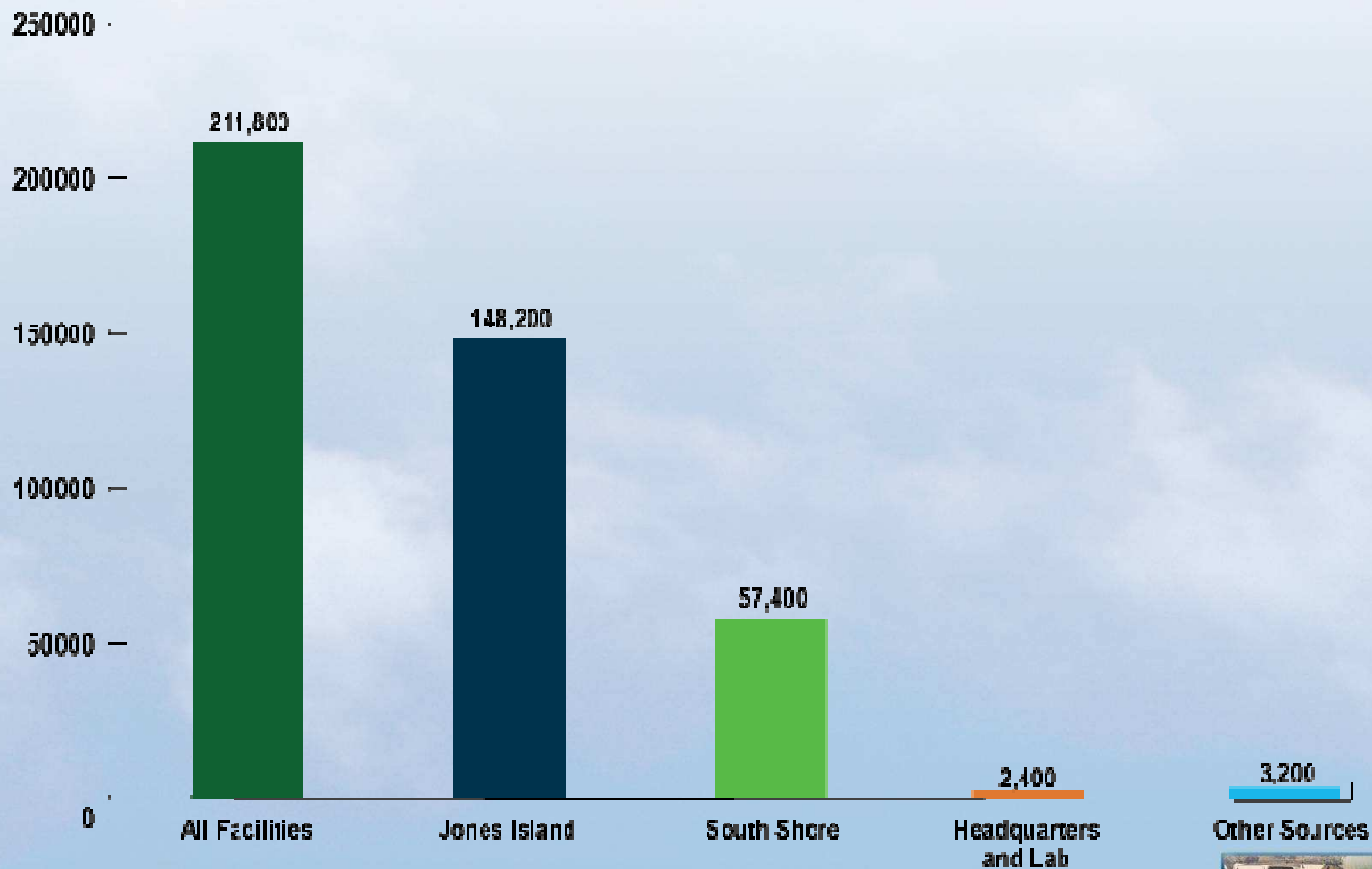
2007 GHG Inventory By Facility

Metric Tons of Equivalent CO₂ (including Biogenic CO₂)



2007 All GHG Emissions By Facility

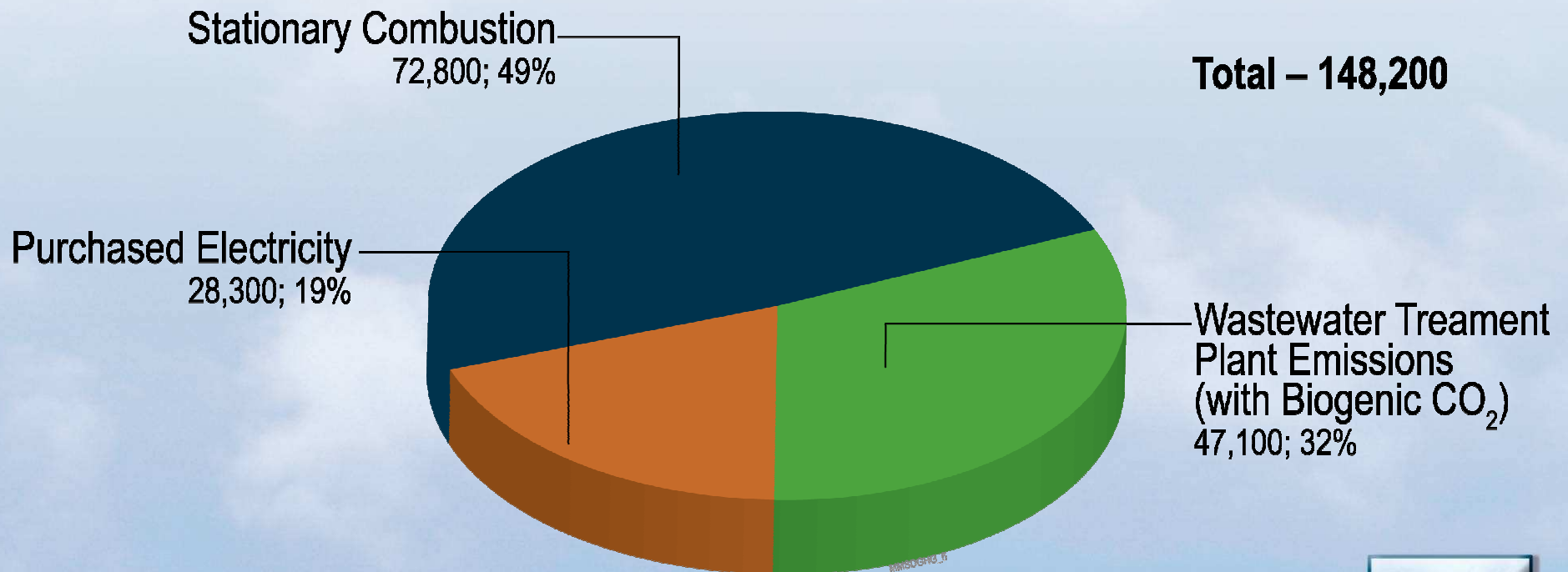
Metric Tons of Equivalent CO₂ (including Biogenic CO₂)



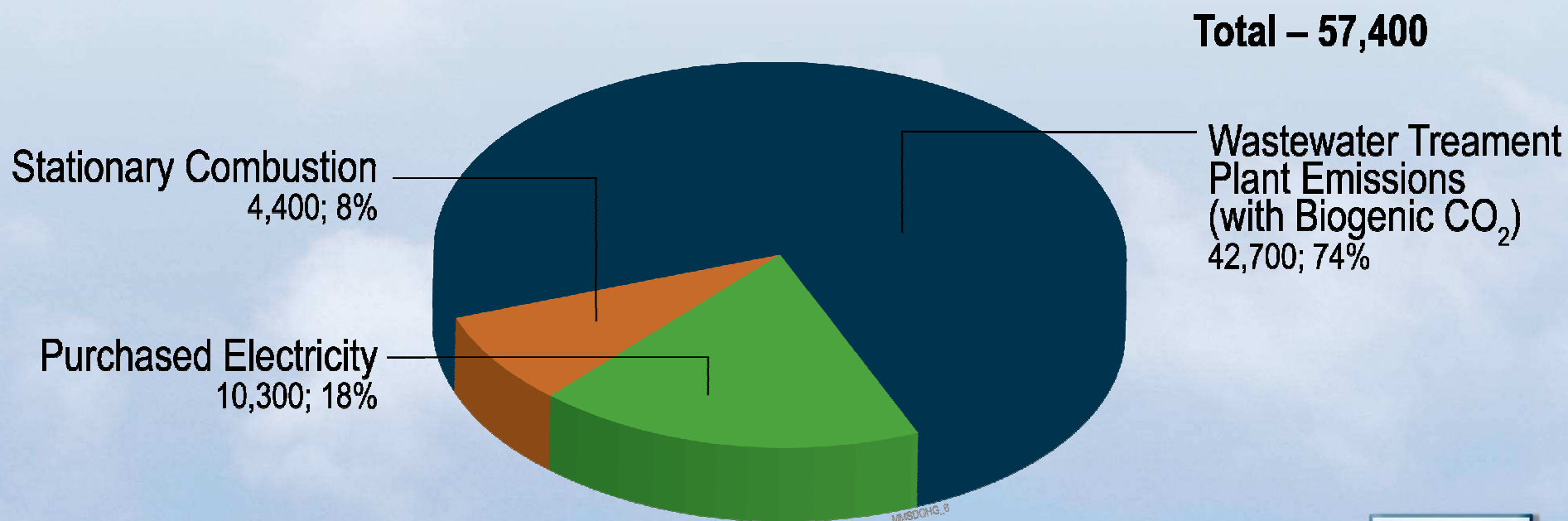
Jones Island

2007 GHG Emissions by Source

Metric Tons of Equivalent CO₂

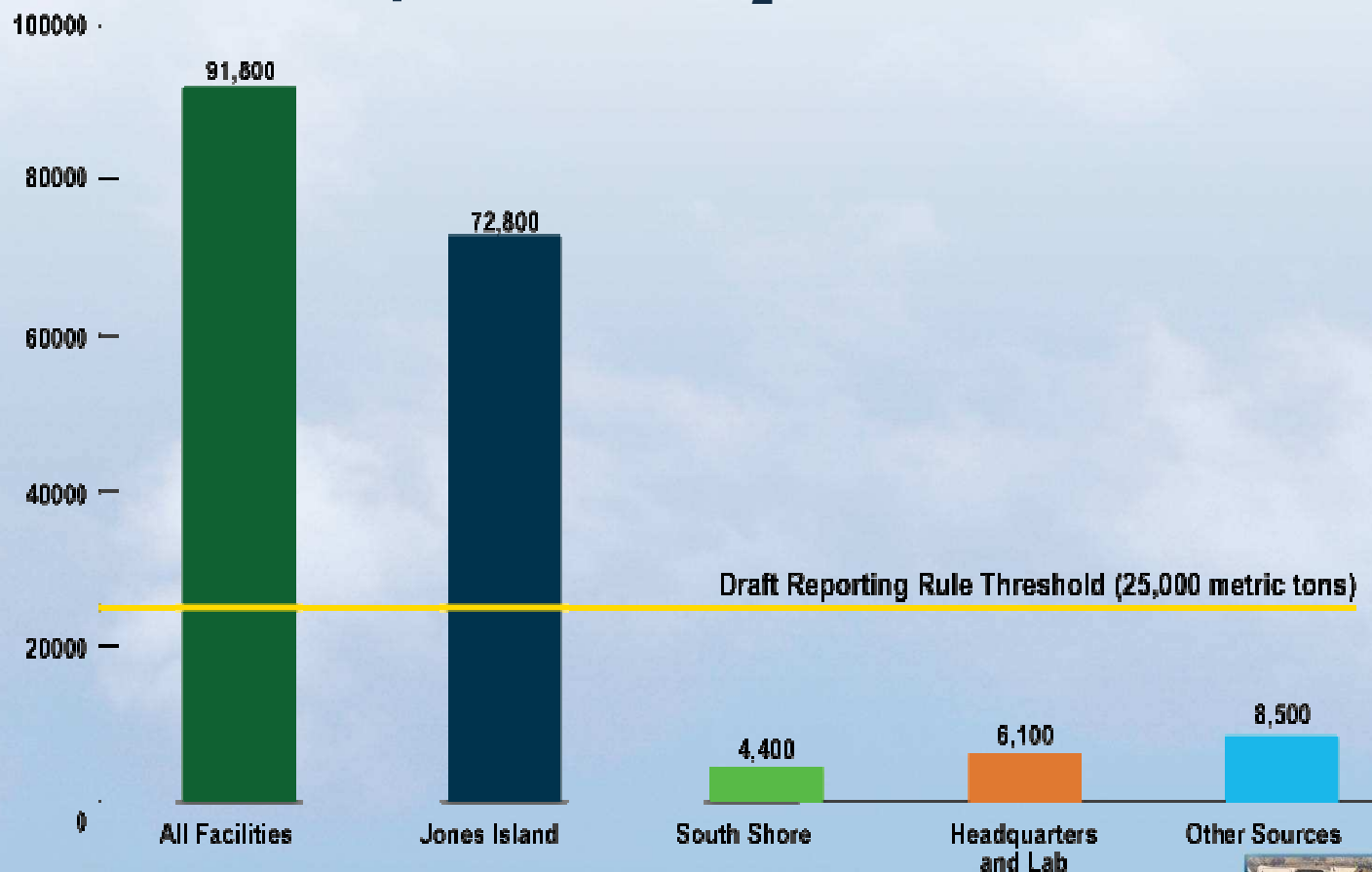


South Shore 2007 GHG Emissions by Source Metric Tons of Equivalent CO₂



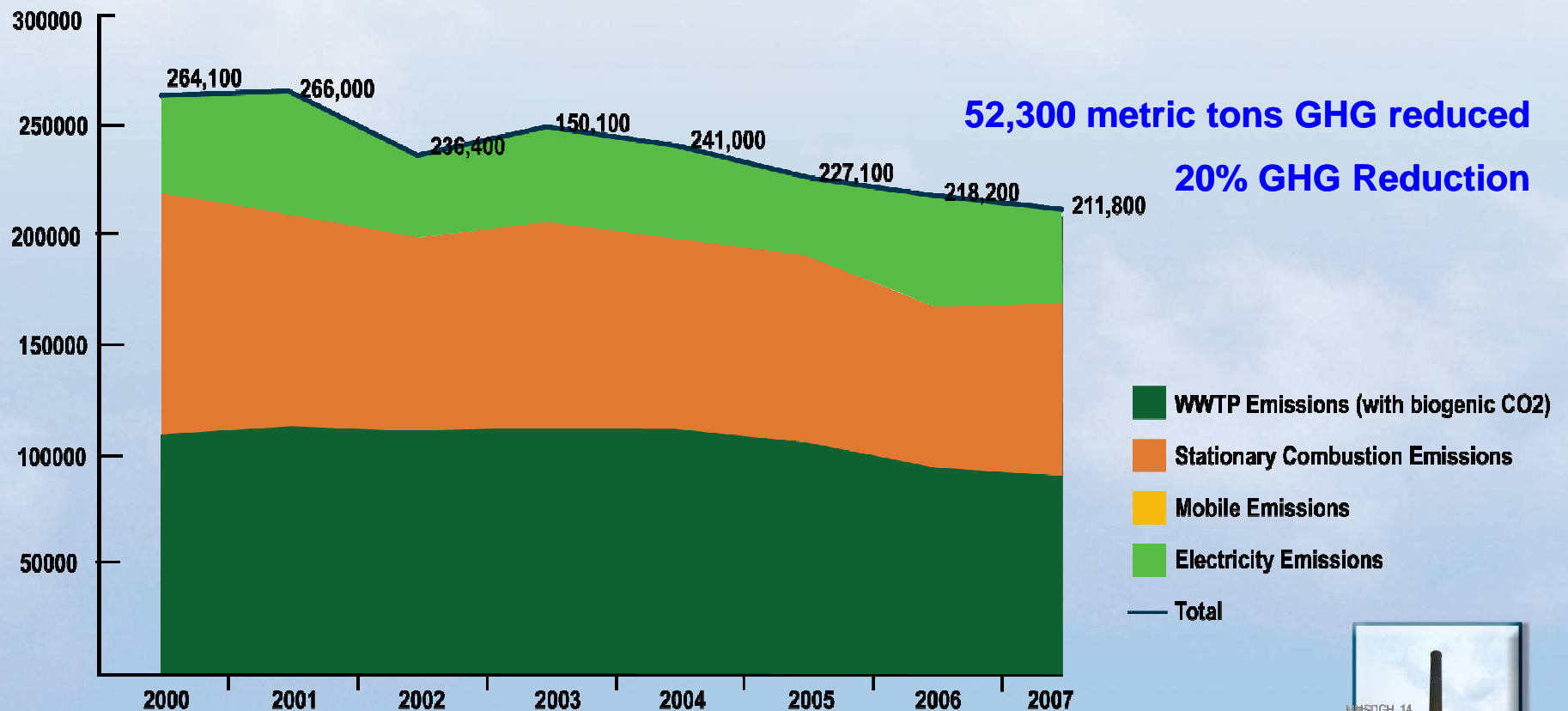
Stationary Combustion 2007 GHG Emissions by Facility

Metric Tons of Equivalent CO₂



All Facilities (with Biogenic Emissions) 2000-2007 GHG Emissions by Type

Metric Tons of Equivalent CO₂



GHG Reductions (1991 to 2006)

Voluntary Emission Reduction Registry

- South Shore: 1,386,000 metric tons of CO_{2e}
 - Digester gas to generate power
- Jones Island: 239,900 metric tons of CO_{2e}
 - Generation of power and use of waste heat in the dryers
- Total = 1,625,900 metric tons of CO_{2e}, equivalent to:
 - Annual GHG emissions from 297,800 passenger vehicles or
 - Annual GHG emissions for electricity use for 225,500 homes



Greenseams Program Could Reduce MMSD Carbon Footprint

- Greenseams permanently protects land to prevent flooding using voluntary purchases of undeveloped, privately owned properties
- 1,850 acres of land in program
- Could plant trees to sequester/absorb CO₂
 - If MMSD were to plant ~100,000 trees (160 trees/acre on 700 acres)
 - Could reduce GHG emissions by 9,000 metric tons CO₂/yr

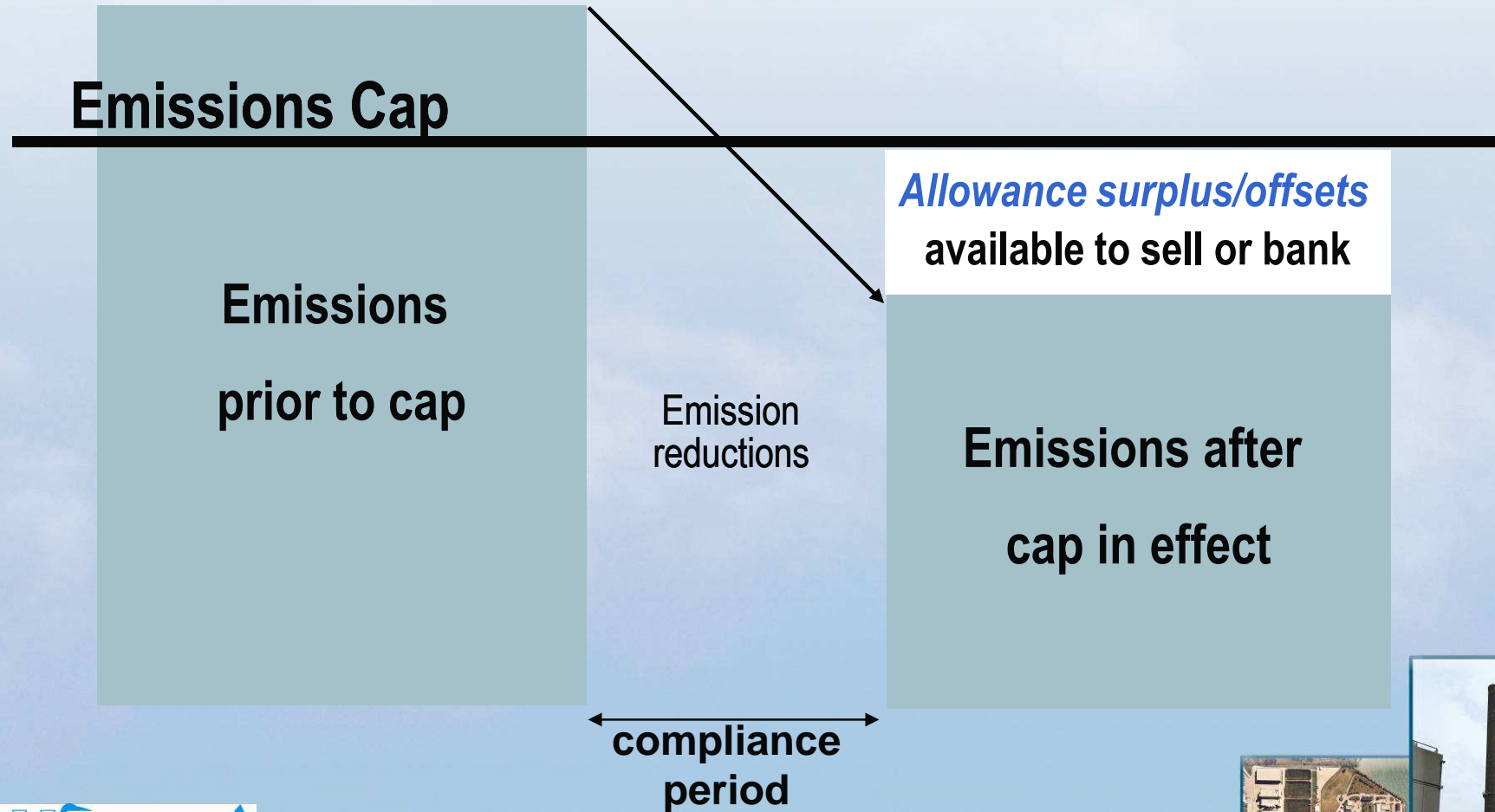


EPA GHG Reporting Requirements: How the Draft Regulations May Affect MMSD

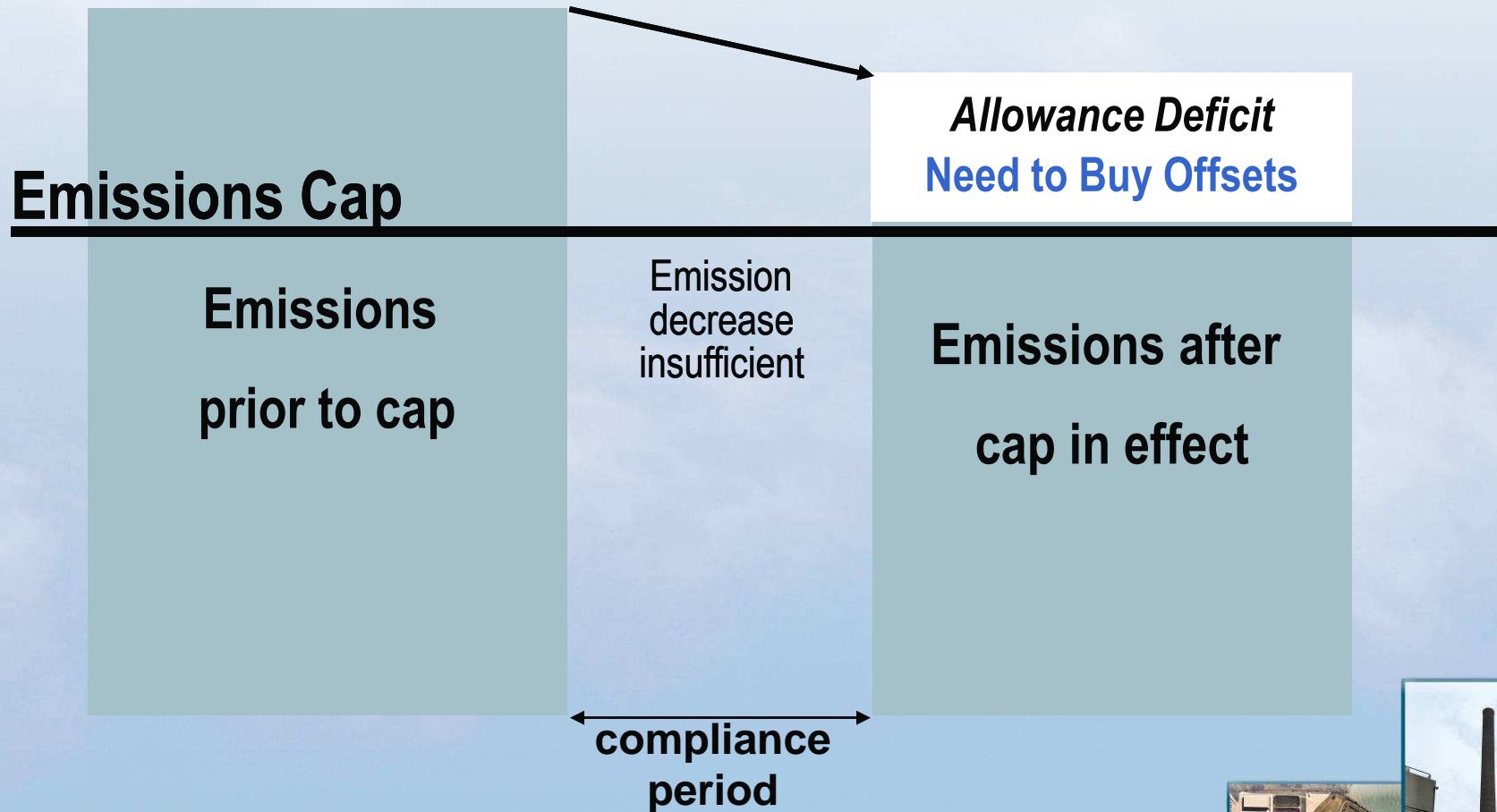
- Draft rule released March 10, 2009
- Facility level reporting
- Applicable to facilities with direct emissions $\geq 25,000$ metric tons/yr CO_{2e} (e.g. stationary sources, Jones Island)
- Reporting anticipated to begin March 2011 for 2010 emissions
- Used to help identify facilities subject to cap and trade regulations



Cap and Trade: Surplus



Cap and Trade: Deficit



How Potential Future Federal Cap and Trade Program Could Affect MMSD

- Draft Waxman-Markey bill (GHG reductions, cap & trade, offsets)
- Economy-wide GHG emission reductions:
 - 3% by 2012 from **2005** levels
 - 17% by 2020
 - 42% by 2030
 - 83% by 2050
- EPA Administrator to publish list of eligible offset types



How Potential Future Federal Cap and Trade Program Could Affect MMSD

Eligible offset project types include:

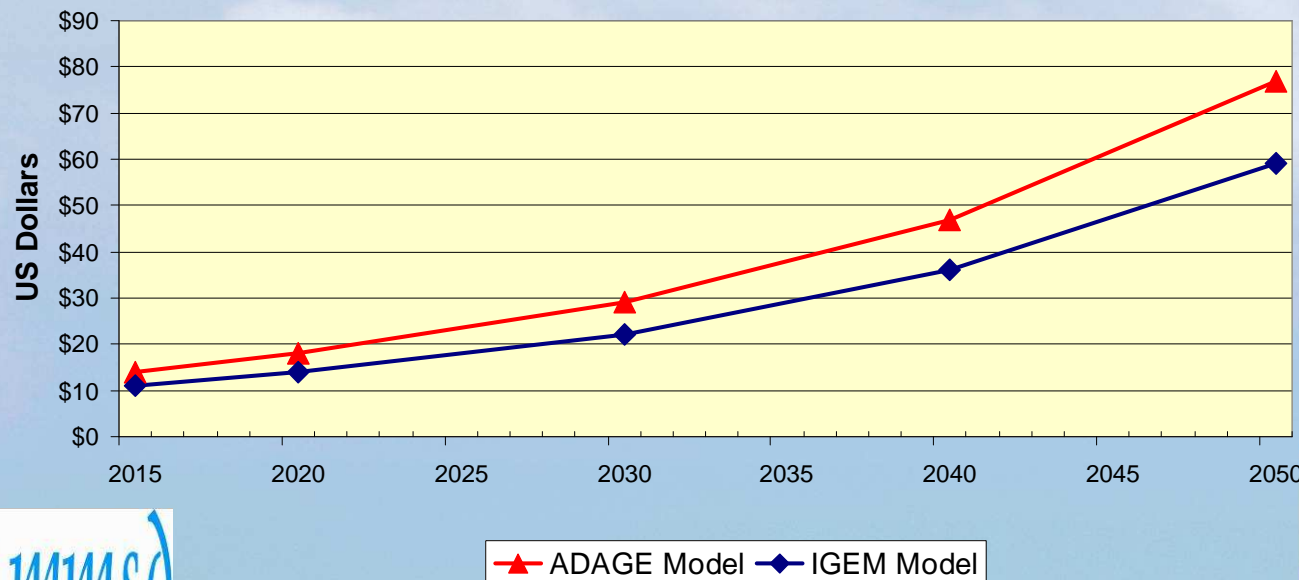
- Greenseams program
 - ▶ Conservation of grassland and forested land
 - ▶ Urban tree-planting and maintenance
- Landfill gas project
 - ▶ Methane collection and combustion



How Potential Future Federal Cap and Trade Program Could Affect MMSD

- Offsets generated may be used to meet future reduction requirements, or may be saleable
- Allowance prices could reach ~ \$20/metric ton CO₂e by 2020

National Carbon Offset Credit Future Price Projections—
US EPA Preliminary Analysis of Waxman Markey



MMSD LANDFILL GAS PIPELINE ROUTE

JONES ISLAND

VEOLIA EMERALD
PARK LANDFILL

Google

Legend

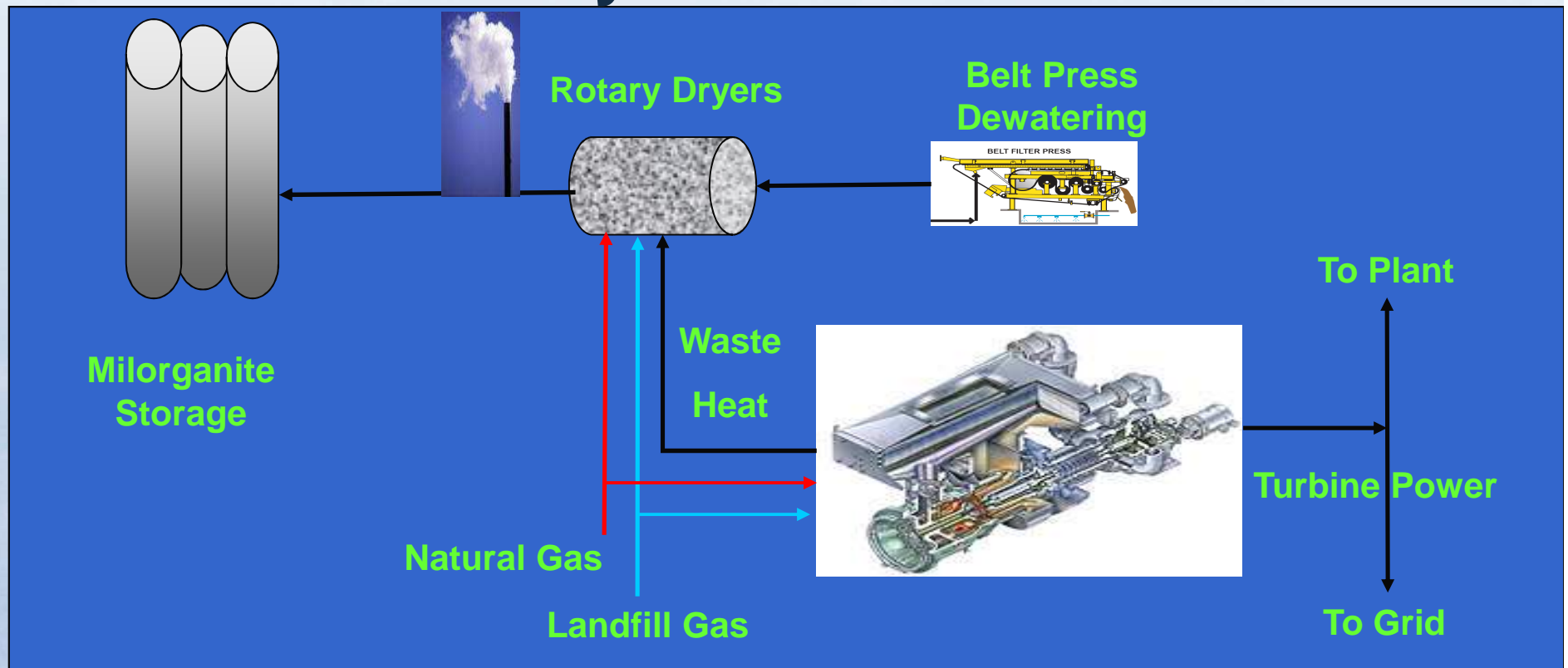
- Existing West Shore Pipeline
- Proposed Alternate Route 1
- Proposed Alternate Route 2
- Proposed Primary Route



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Landfill Gas Pipeline Supplies Gas to Turbines and Dryers



Landfill Gas Project – Potential Impacts

~95% reduction in Jones Island stationary combustion emissions

- ▶ 70,000 metric ton CO₂e annually (1.4M over 20 years) – Equivalent to:
- ▶ Annual GHG emissions from 12,800 passenger vehicles or
- ▶ Annual GHG emissions for electricity use for 9,700 homes

—Meet all of the proposed cap and trade emission reductions

- ▶ 17% by 2020 (12,000 metric tons reduction required)
- ▶ 83% by 2050

—Excess emissions could be sold as offsets

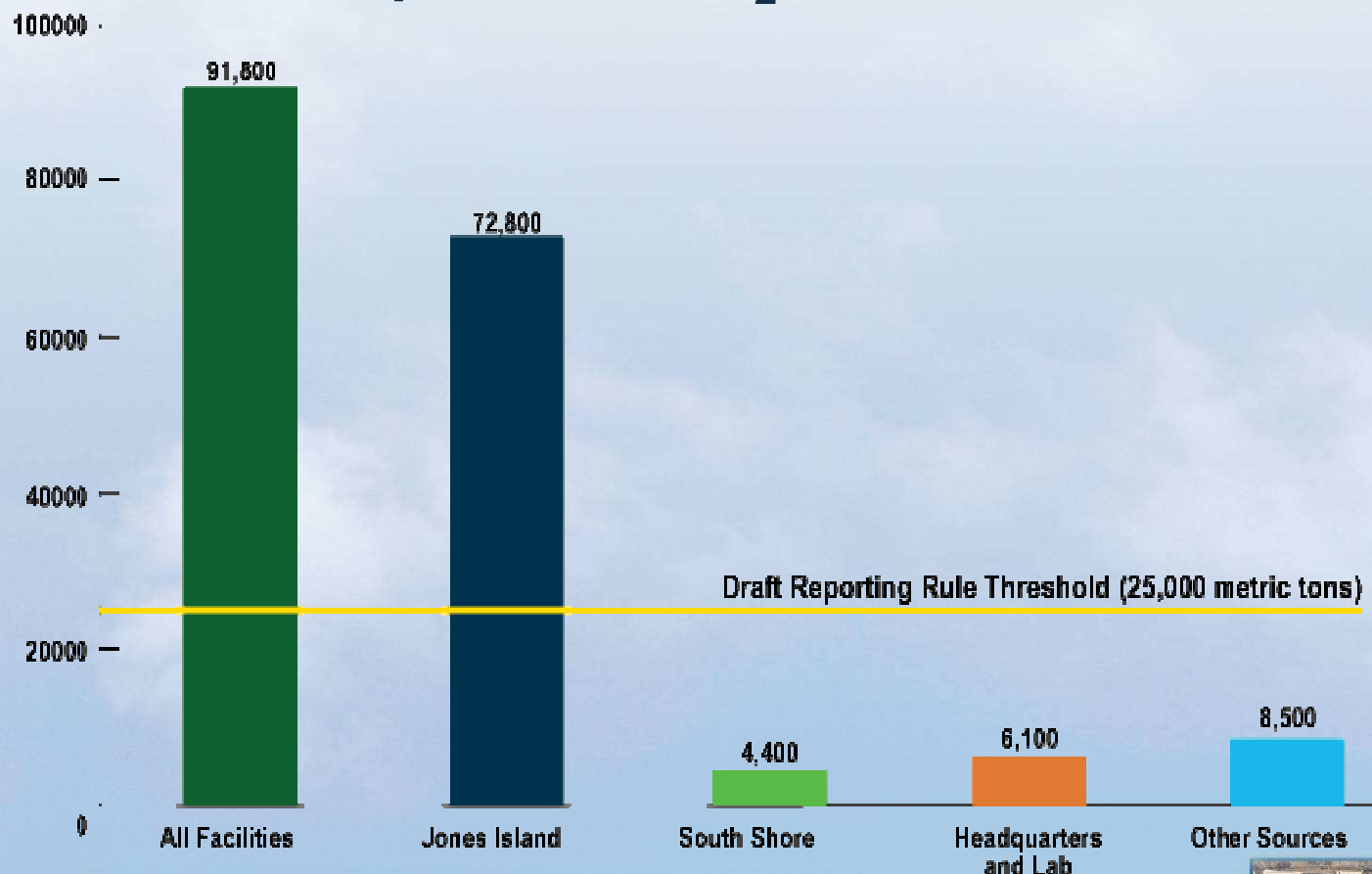
- ▶ Example: @ \$20/metric ton CO₂e (58,000 metric tons sold) = ~\$1M/year by 2020

—Electric utility may pay premium rates for renewable electricity



Stationary Combustion 2007 GHG Emissions by Facility

Metric Tons of Equivalent CO₂



Jones Island Stationary Combustion Sources

Before and After Landfill Gas Project (based on 2007 fuel usage data)

GHG Emissions in Metric Tons of Equivalent CO₂

