

# CNG Conversions at Waste Management Hauling Facilities

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# Current Natural Gas Infrastructure

## Current WM Fleet

- Natural Gas Fleet – 4,200 trucks (3800 CNG & 400 LNG)  
Approximately 25% of Total Fleet)
  - CNG continues to be predominant platform for future truck replacements 90%+ of all new purchases

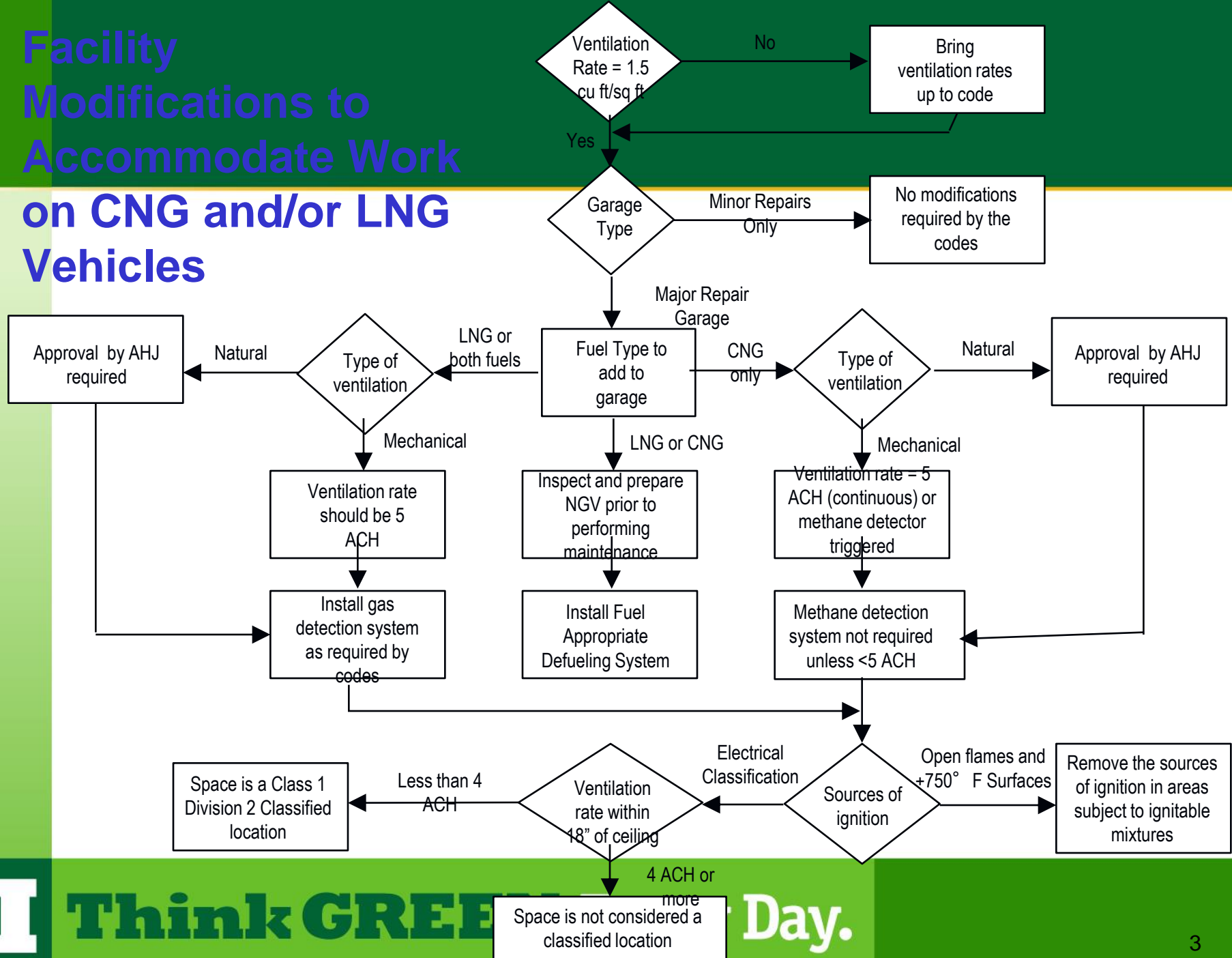
## WM Current Natural Gas Fueling Infrastructure

- 81 facilities providing natural gas fueling
  - 10 LNG, 8 LCNG, 69 CNG Time fill, 25 Retail,
- 79 Maintenance facility upgrades

## What's in the WM Pipe Line

- 8 CNG Fueling stations / Maintenance Facility upgrades in construction, 8 CNG design / permitting, 15 in conceptual development

# Facility Modifications to Accommodate Work on CNG and/or LNG Vehicles



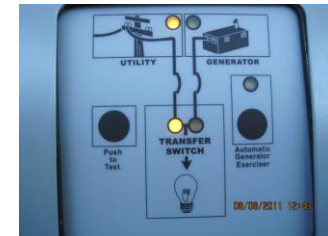
# WM Natural Gas Vehicle Maintenance Facilities – A Closer Look

- Type
  - 79 Major Repair Facilities
    - 1 New Construction
    - 78 Facility upgrades
      - 72 CNG Only
      - 6 CNG & LNG
  - 0 Minor Repair Facilities
- Upgrade Strategy on Major Repair Facilities
  - 11 Continuous Ventilation (Southern States)
  - 68 Detection based emergency ventilation
    - 2 Declassify the ceiling space
    - 66 Relocate electrical in ceiling space

# Maintenance Facility Upgrades – Additional Considerations

- Intended
  - Lighting Upgrades
  - Fall Protection
  - Operational improvements
  - Paint
  - Back up Power Systems
  - Shunt tripped breakers
- Not Planned
  - Current Use Verses Original Construction (Code interpretations)
  - Fire sprinkler systems, Occupancy separation, ADA,

# Maintenance Shop Upgrades



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# Maintaining your Safety Systems

- Training
  - Ventilation System
  - Gas Detection System
  - Heating System
  - Back up Power Systems
  - Interlocks and interaction of the above systems
- Routine Maintenance
  - Does everything work like it is supposed to?
  - Inspection, Calibration, Performance Testing and Maintenance.
  - System Audits

# Market Barriers to NGVs

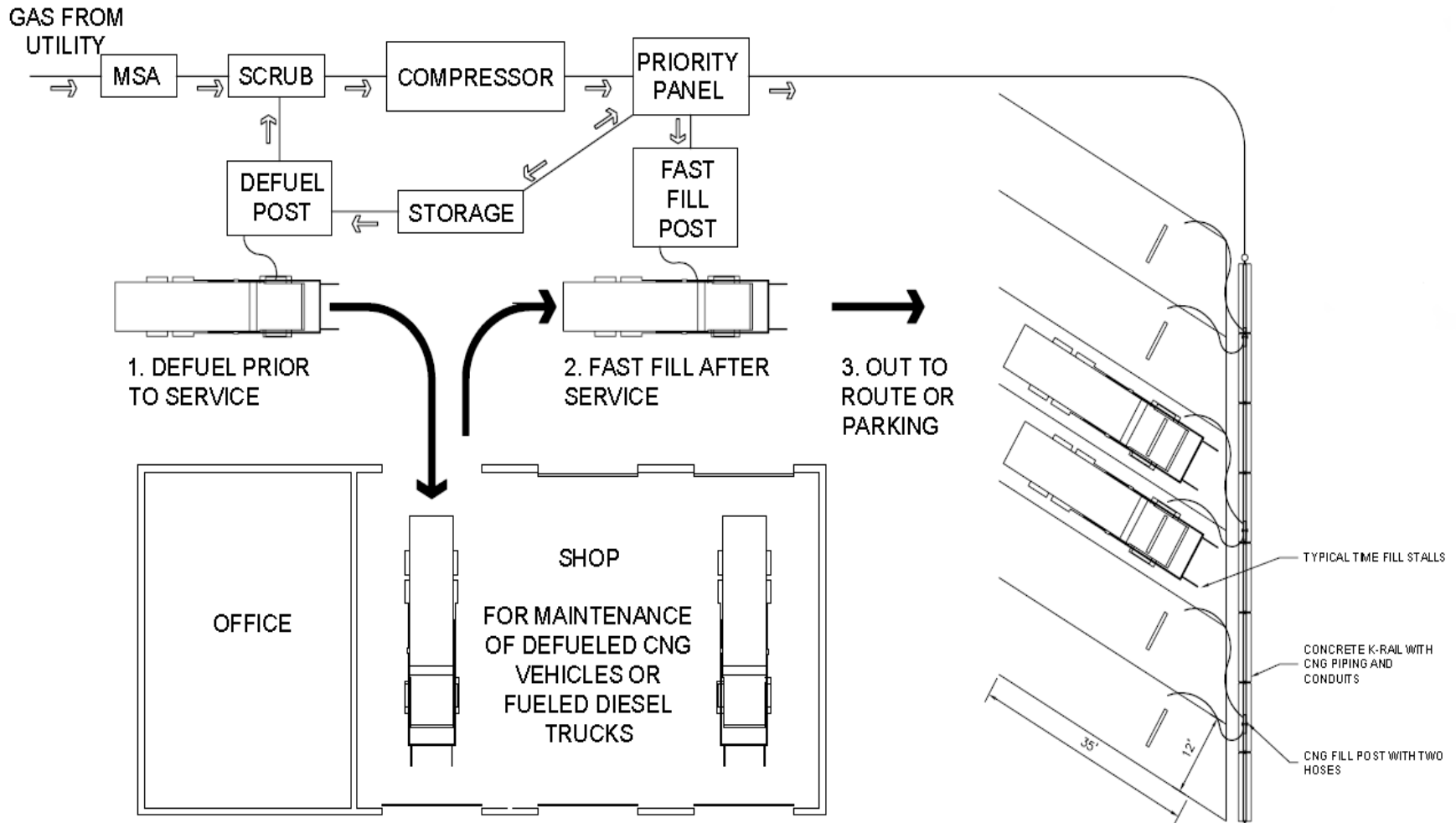
- Safety upgrades to vehicle maintenance facilities
  - Major Repair Facility
    - Warm Climates ( Continuous Ventilation)
      - Principal costs – addition of exhaust fans and intake louvers
      - Approximate cost \$10 to \$15 per square foot
    - Colder Climates (gas detection based emergency ventilation)
      - Principal costs – entire rework of electrical, heating and ventilation systems and the addition of gas detection.
      - Approximate cost \$40 to \$60 per square foot
  - Minor Repair Facilities
    - Verify compliance of current ventilation system



# Potential Solutions to Market Barriers

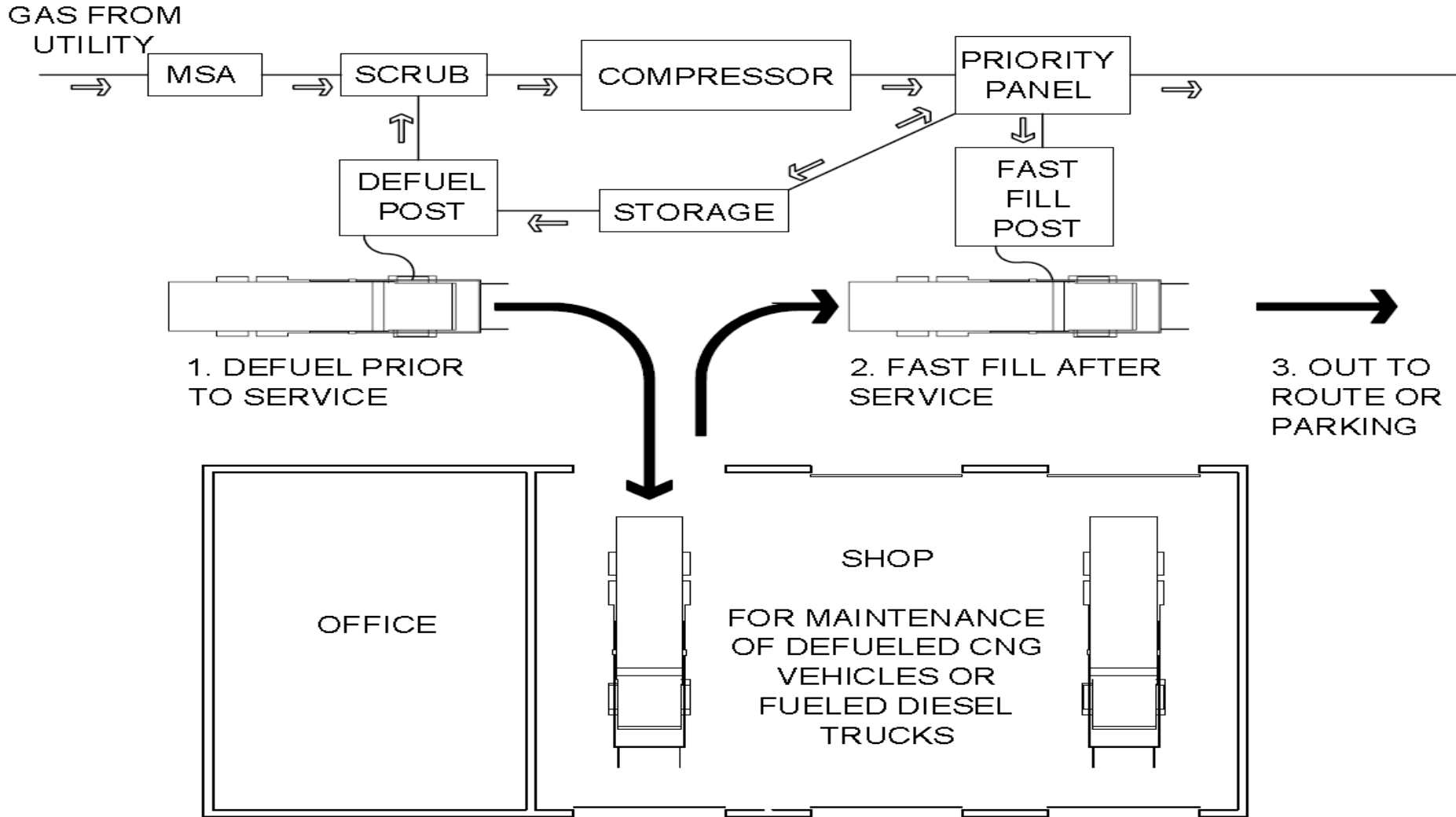
- Standardization of applicable codes
- Defuel before maintenance

# Solutions - Small Site Concept – With Time Fill



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# Small Site Concept – Without Time Fill





**Thank You !**

## **QUESTIONS**



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