

# City of Mesa Food to Energy Program

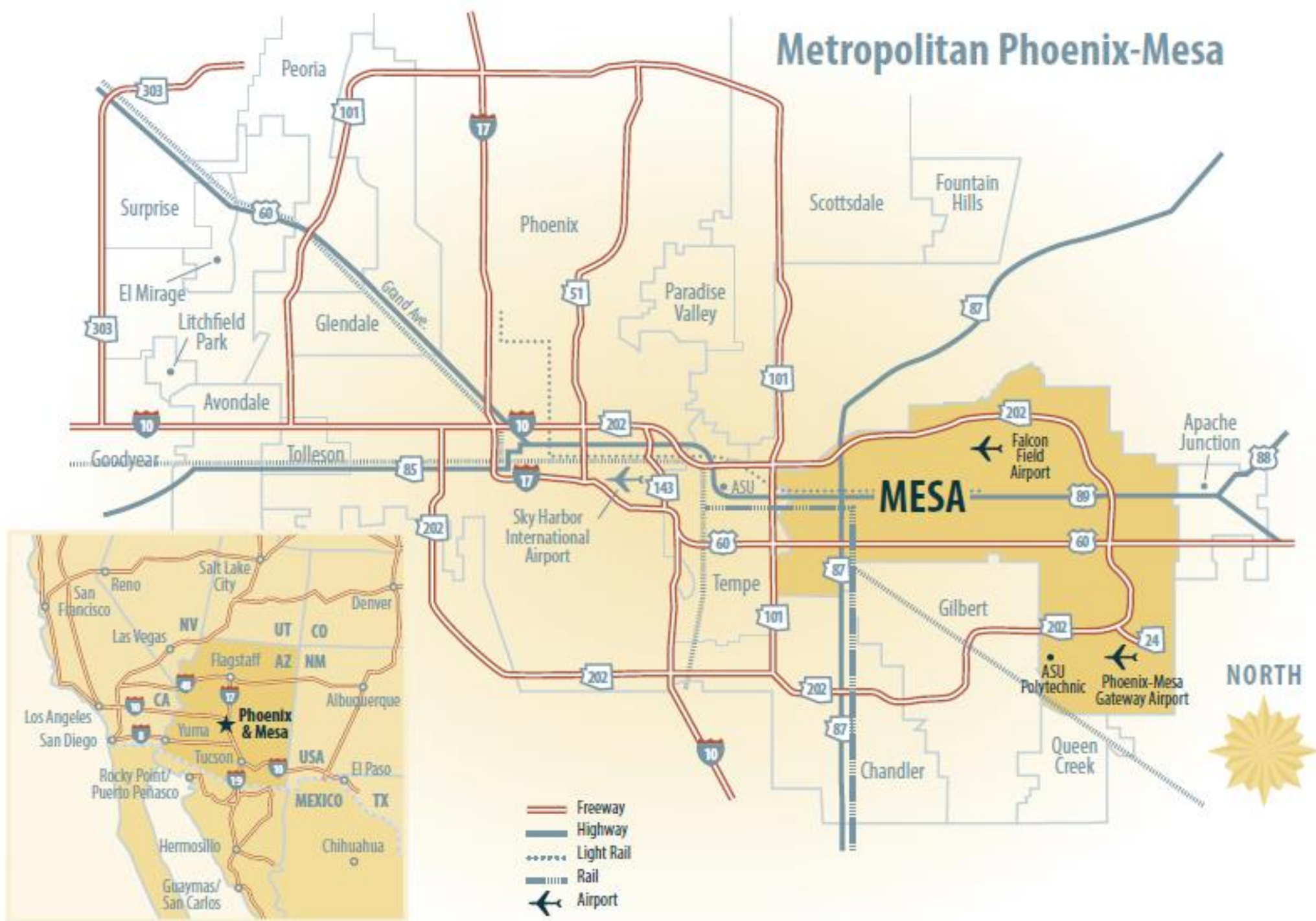
Scott Bouchie, Director

Environmental Management & Sustainability Department

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# Metropolitan Phoenix-Mesa



# Environmental Management & Sustainability Department

Trash, Recycle, & Green Waste Collection

Environmental Compliance

Bulk Item/Appliance Pick-Up

Water Conservation

Neighborhood Clean-Up

Energy Efficiency/Renewable Energy

Recycling Education & Outreach

Sustainability Outreach & Engagement

Household Hazardous Materials Facility



# Environmental Management & Sustainability Department 2019 Statistics

Landfilled - 240,000 tons

Recycling Contamination – 10% -13%

Recycled – 30,000 tons

Residential Accounts – 120,000

Green Waste – 18,800 tons

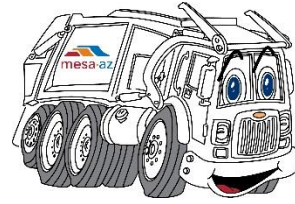
Commercial Accounts – 1,100

Household Haz Material– 165 tons





Business



Organics Collection



Center Street  
Bio Slurry



Used Onsite



Electric  
Energy



NWWRP

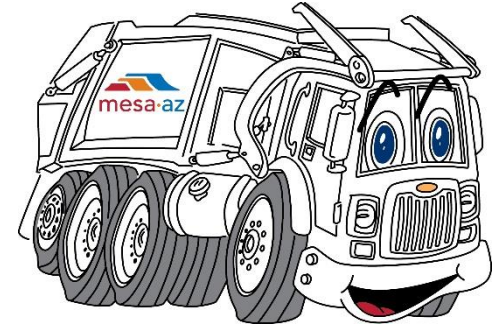


Natural Gas Utility



Renewable Natural Gas





# City of Mesa Feasibility Study Tasks

Task 1: Project Management

Task 2: High Strength Waste Feedstock Analysis

Task 3: Pre-Processing Facility Requirements

Task 4: Anaerobic Digestion Capabilities

Task 5: Food Waste/FOG Benchscale Test

Task 6: Potential Incentives and Biogas End Uses

Task 7: Financial Feasibility

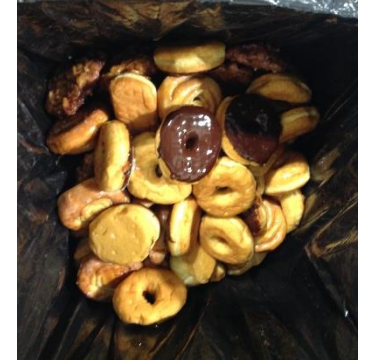
Task 8: Final Feasibility Report



# Collection

## Partners

- United Food Bank
- Mesa Public Schools
- Sheraton
- East Valley Institute of Technology Culinary School
- Bashas
- Arizona State University
- City of Tempe Grease Cooperative
- Arizona Recycling Coalition





# Processing & Testing



# Food Waste Collection Results

- All the partners were enthusiastic about the program
- Developed food waste collection service delivery model
  - Nearly all commercial food waste needed to collect enough for excess capacity
  - Difficult to establish competitive rate
- Preliminary design of pre-processing facility to remove packaging/contamination.
  - High capital cost



# Benchscale Digestion Results

- Established safe operating parameters
- Identified warning indicators
  - Composition can significantly alter conditions
  - Volatile Fatty Acids (VFA's) accumulate, decreasing pH rapidly
- Increase in methane production noted



# Biogas End Use Results

- Developed RNG specifications with COM Energy Resources
- Developing RNG monitoring procedures
- Gas system interconnection



# Biogas End Use/Financial Feasibility



Power Generation



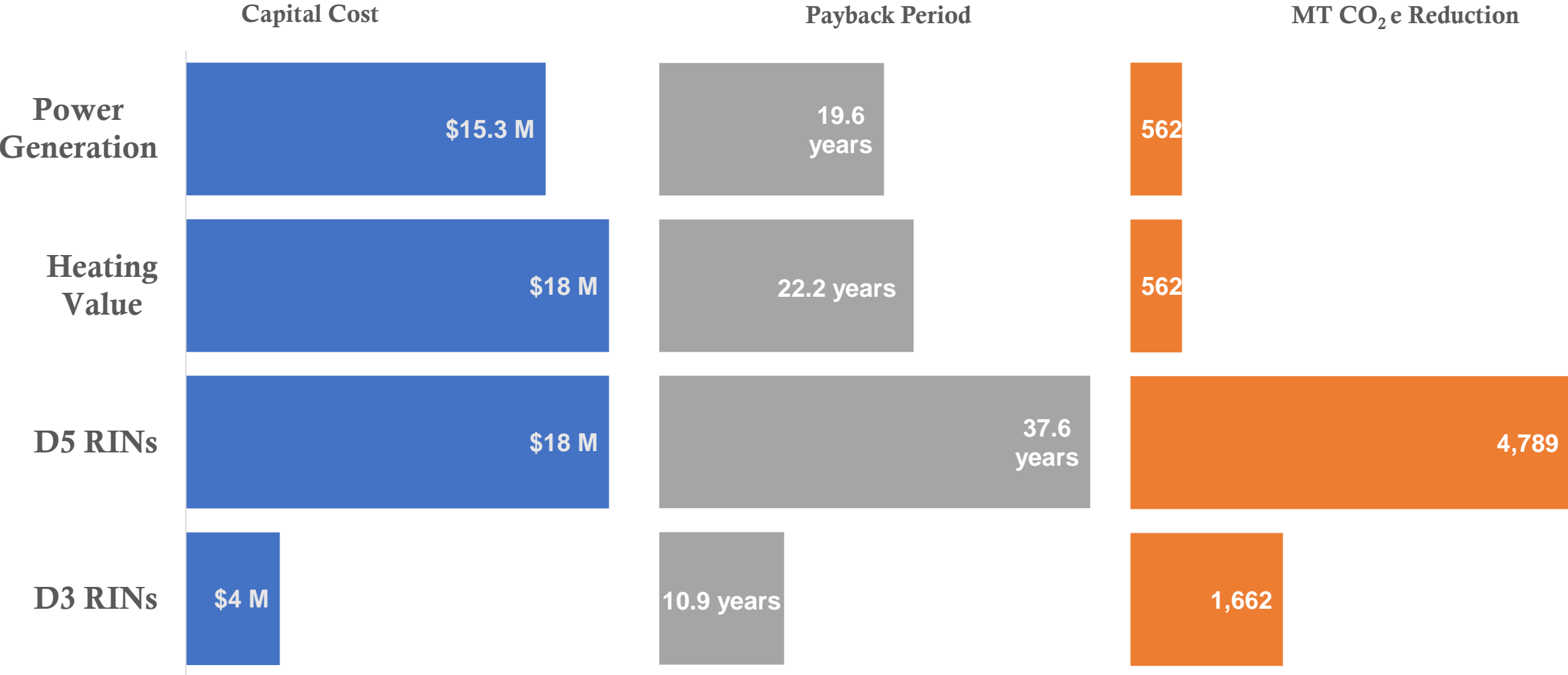
Heating Value



Transportation Fuel



# Biogas End Use/Financial Results



# Moving Forward

## Phase 1 – Flare to Fuel

- Upgrade biogas to generate D3 RINs
- Inject RNG into natural gas system
- Supply approximately 50% of solid waste fleet annual natural gas consumption
- Project initiated with construction time of 18-24 months



# Moving Forward

- Partners/funding to address D3/D5 split
  - Develop a methodology for quantifying cellulose conversion to methane in complex waste streams (cellulosic vs non-cellulosic sources)
  - Working with partners including DOE, EPA, NREL, and ASU
- Source food waste from regional partnerships
- Evaluating another City of Mesa WWTP





# Challenges & Opportunities

- eRIN pathway
- Small Refinery Exemptions/RVO
- Certainty in RFS market



# Questions?

**Scott Bouchie**  
**Director, Environmental Management &  
Sustainability**



# Feedstock Analysis/Pre-Processing Results

Industry Type	Waste Characterization	Packaging/Contamination
Grocery	Bakery, Deli (meats, sandwiches, sides), Produce (vegetables)	Rigid plastic food containers, cartons
Restaurant Kitchens	Produce (vegetables)	Film plastics, Flexible plastic beverage containers
Food Bank	Packaged foods (meat, canned vegetables, baked goods), Produce (fruits & vegetables)	Metal cans, Rigid and flexible plastic containers, Cartons, Film plastics
Cafeteria Kitchen	Prepared Meals (meat, carbohydrates, produce)	Food wrappings, Flexible plastic beverage containers
Grease Interceptor	FOG, white water	Sediment, utensils