

# Feasibility Study

## Composting Portions of Municipal Solid Waste within the City of Flagstaff



Typical windrow composting Site Recycled Organics Unit, 2003

Presented by  
The City of Flagstaff  
Sustainability and Environmental Management Section  
and  
Solid Waste Section

# Introduction

## ▶ Composting Defined

- Organics transform into a loose soil-like substance
- Typically aerobic—microorganisms use oxygen as a catalysts for metabolism
- Moisture rich—allows microorganisms to travel across the surface of the material

## ▶ Benefits

- Agricultural benefits
- Increases Diversion
- Mitigation of Greenhouse Gases

## ▶ Drawbacks

- Competes with other programs for paper and cardboard
- Odor
- Continuous monitoring

# Discussion Items

- ▶ Solid Waste Management Plan
- ▶ Why Composting?
- ▶ Sources of Feedstock In Northern Arizona
- ▶ How Much is available
- ▶ How Do We Get it
- ▶ Method of Processing Compost
- ▶ Markets for Compost
- ▶ Other Economic Factors

# Previous City Studies

- 1994 Sewage Sludge/Solid Waste Composting Feasibility Study (Black & Veatch)
  - “Incorporating co-composting into the current system would significantly increase solid waste disposal costs.”
- 2004 Solid Waste Audit (SEMS & Solid Waste)
  - Approx. 46% (by weight) of trash could be composted
- 2005 Compost Market Research and Marketing Plan (R. Alexander and Associates)
  - Report heeds “cautious optimism” moving forward
  - Successful marketing and distribution would not occur overnight
- 2012 Waste Audit (SEMS & Solid Waste)
  - Estimates organic fraction of waste from City residential & commercial collection services

# Comparing Composting Methods



Wildcat SPB-20



Washington State University

Turned Windrows

Static Pile-Aerated Beds

# Comparing Composting Methods



Washington State University



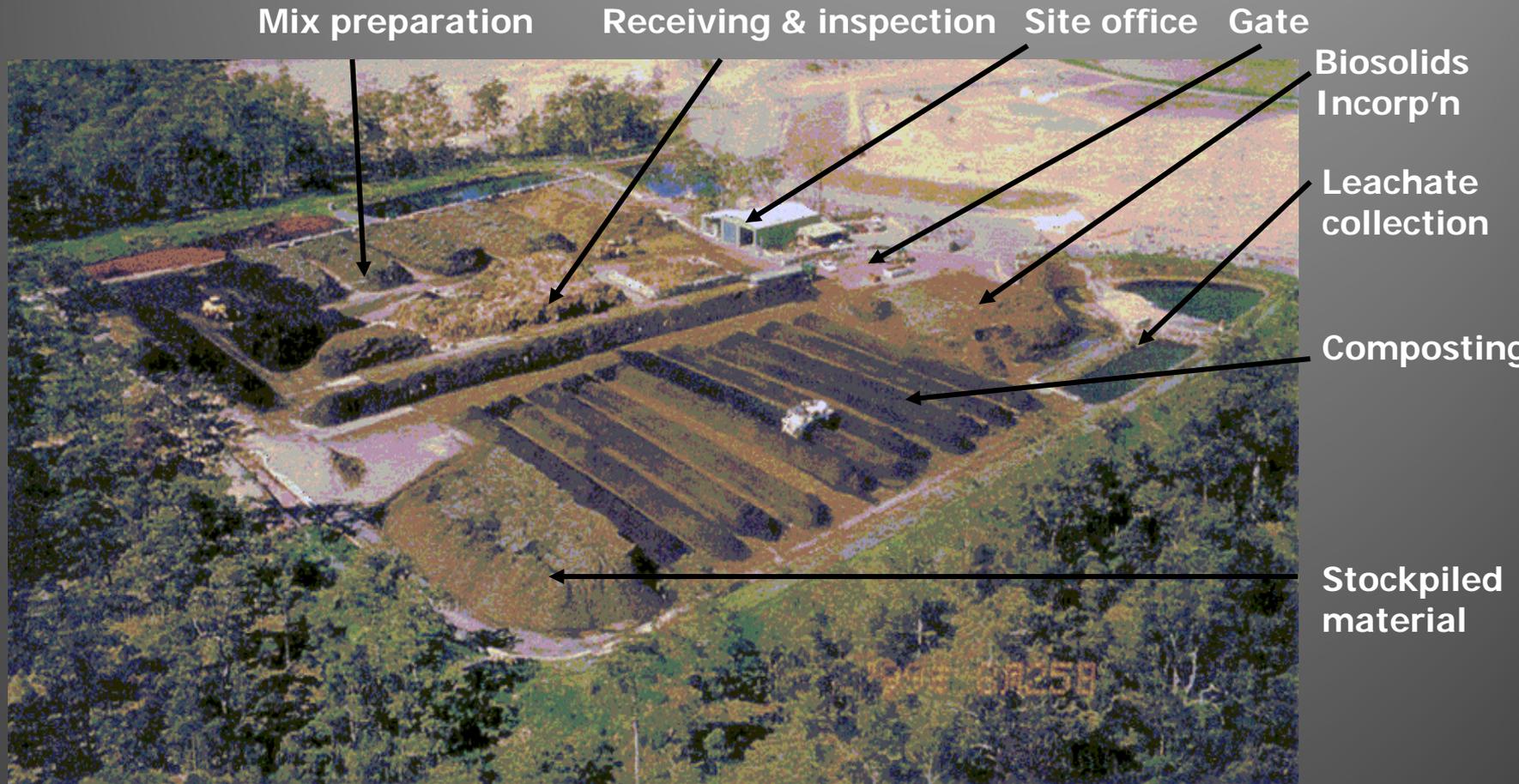
BioCycle Magazine

**In-Vessel Systems**

**Anaerobic Digestion**

# Site layout – Windrow composting facility, Australia

## 9 Acres Required for Conceptual City Site



Typical Compost Facility–Wyong, Australia–Angus Campbell, 2003

# Potential Feedstock In Flagstaff

## ▶ Residential Sources

- Cardboard and paper—would be competing interests for Recycle Program
- Food waste
- Wood waste—would be competing interest for landfill

## ▶ Organic Waste From Local Businesses

- Restaurant food scraps
- Organic waste from industrial sources
- Wood waste from construction activities
- Biosolids from Wastewater Treatment Plant

## ▶ 17,000 to 27,000 Tons Available Annually

- 9 Acres of Land Necessary

# Comparing Capture Methods

## ▶ SOURCE– SEPARATED

- Delivered by citizens and private haulers to City–Owned site
- Advantages
  - Integrates with changes
- Disadvantages
  - High capital
  - Inconsistent feedstock

## ▶ CITY COLLECTION

- 2 Cans Vs. 3 Cans
- Sorting Facility
  - Public vs. Private
- Advantages
  - Consistent delivery rate
  - Consistent feedstock
- Disadvantages
  - High capital
  - High contamination

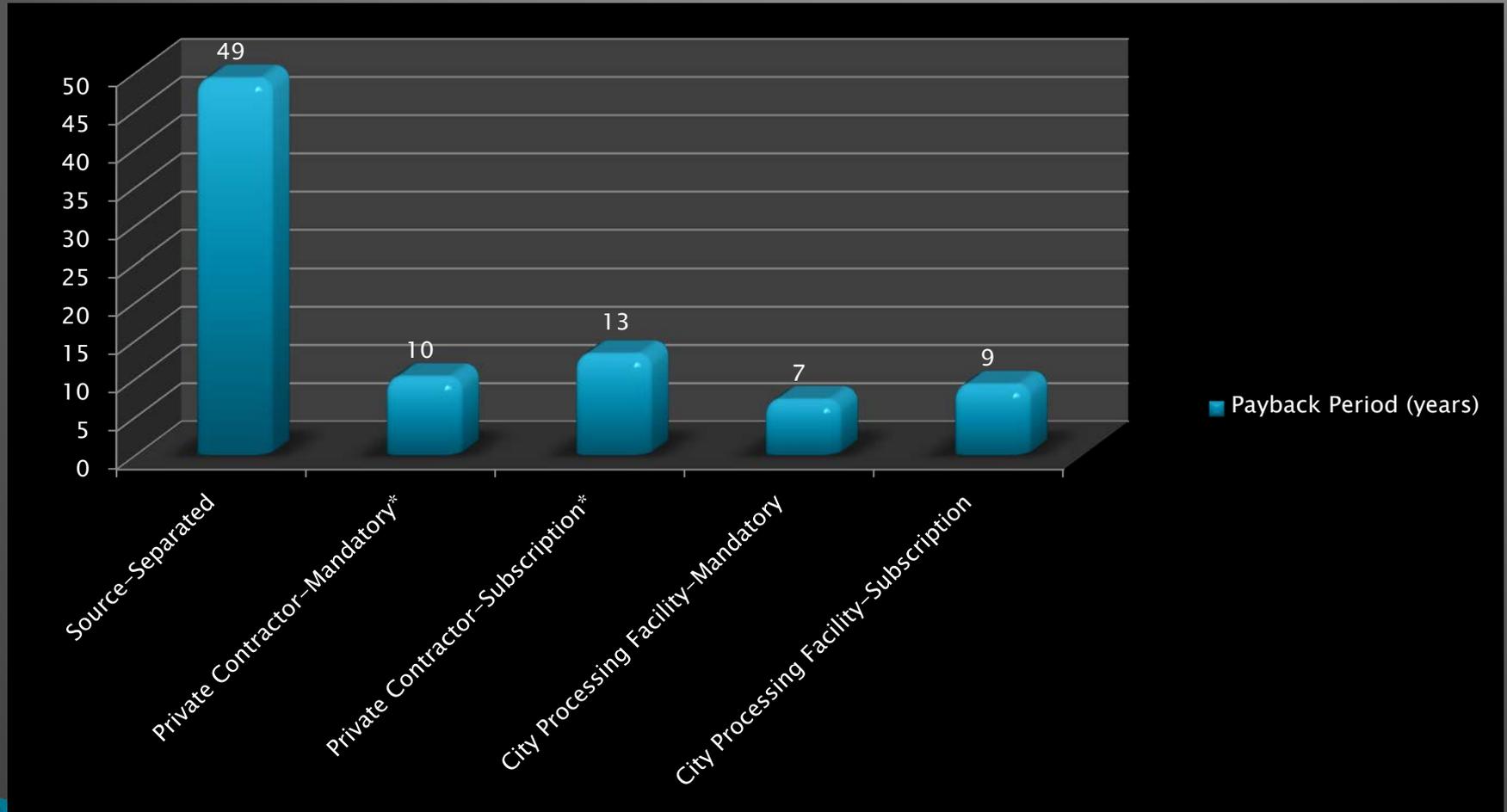
# Scenarios Evaluated

- ▶ Source–Separation
  - Landfill Processing Facility
    - Capital–\$4.5 million
    - Annual O & M–\$900,000
- ▶ Source–Separation & City Collection
  - Private Processing Facility
    - Capital–\$17.6 million (50% assumed by City=\$8.8 mil.)
    - Annual O & M–\$1.9 million (City Collection Services)
  - Conceptual Processing Facility at Landfill
    - Capital–\$10.5 million
    - Annual O & M–\$1.9 million
  - Mandatory or Subscription Based?

# Assumptions

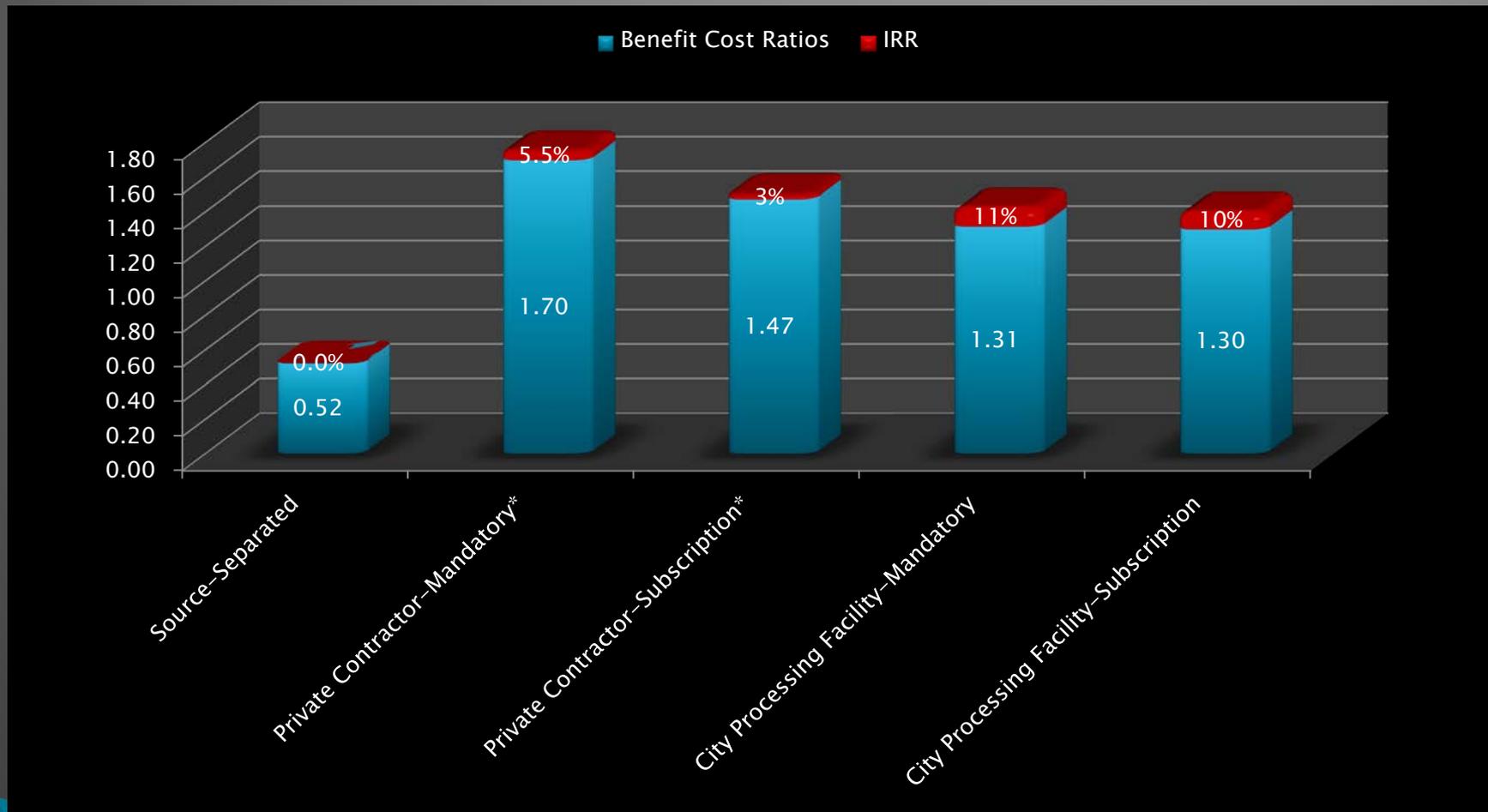
- 12% Commercial Participation
  - \$50 per month for 3 cubic yard service (2x per week)
- Markets
  - Value Markets–No Contamination Permitted
    - Wholesale \$14/cubic yard (*BioCycle*)
    - Bags \$5/bag (1 cubic foot) at Hardware Stores
  - Volume Markets–Non Agricultural
    - Wholesale \$6/cubic yard
    - 3% Increase in price per year
- City–Tip Fee \$28/ton (landfill=\$41.92/ton)
- Private–Tipping Fee \$35/ton

# Payback Period for Five Scenarios



\*Assumes 50% Cost/Revenue Share with Contractor

# Benefit/Cost Ratio and Internal Rate of Return for Five Scenarios



\*Assumes 50% Cost/Revenue Share with Contractor

# Municipal Composting Trends

City	# of Carts	Container Size (Gallons)			Subscription	Mandatory
		32	64	96		
San Francisco	3	\$27.55	NA	NA		No Charge
Seattle	2	\$28.05	\$56.10	\$84.15	\$6.95	NO
San Jose	2	\$29.95	\$59.90	\$89.95	\$4.35/ MONTH	NO
Portland	2	\$28.20	\$37.80	\$43.80	\$18.35	NO
Flagstaff	3?	NA	NA	\$17.13	\$58.00 (5,000 Residents)	\$18.50

# Observations

- ▶ Potential Landfill Airspace Savings
  - 1 to 4 years
- ▶ Compost Program Competes with Recycle Program
- ▶ 3-Can System for Residents (Recycle, Trash, Compost)
- ▶ Area Requirements
  - 9 Acres
- ▶ Capital Expenditure
  - \$8.8 to 10.5 million (Depending on Scenario)
- ▶ Cost Benefit Analysis Indicates High Sensitivity
- ▶ Rate Increase Would be Necessary
- ▶ SEMS-Continue Promotion of Backyard Composting
- ▶ Future Presentations
  - Landfill Gas Feasibility Study (January 2013)
  - Cell D Construction (February 2013)