SMP Customer Working Group Meeting #3

September 27, 2011

Green Bay Metropolitan Sewerage District
Cleaning Water Today For Tomorrow's Generations

Planning for the Future

Must replace the solids handling facility

1. Aging infrastructure
2. Environmental compliance by May 2016
3. Increase evaporative capacity

AGENDA

1. MACT Standards
2. Rehabilitation of Multiple Hearth Furnaces
3. Co-Digestion
4. Alternative Cost Analysis
5. Rate Impact

MACT Standards

- EPA published new air emissions standards for sewage sludge incinerators in May 2011
- Regulations are known as the Maximum Achievable Control Technology (MACT) standards
- MACT rule applies to multiple hearth furnaces new and existing (MHFs) and new and existing fluidized bed incinerators (FBIs)
- **We must comply with MACT standards by May 2016**

MACT Standard Categories

- Existing MHF – “Existing Source”

  If the existing MHFs are rehabilitated so the costs exceed 50 percent of the value of the system, the MHFs are categorized as new and subject to the “new source” MACT Standards
- New MHF – “New Source”
- Existing FBI – “Existing Source”
- New FBI – “New Source”

"Existing Source" Emission Standards for MHFs

- Current MHFs, without modification, fall under existing source MACT standards
- Existing system – does not meet MACT standard for nitrogen oxide (NOx)
- New pollution control technology to meet standard is required
- Caveat: uncertain if there is a reliable solution to meet NOx standard in a MHF

AGENDA

1. MACT Standards
2. Rehabilitation of Multiple Hearth Furnaces
3. Co-Digestion
4. Cost Alternatives
5. Rate Impact

"New Source" Emission Standards for Rehabilitation of MHFs

- Rehabilitation costs for the MHFs to last another 20 years will exceed 50 percent of the value of the system
- MHFs will be classified as a "new source"
- New source MACT standards are more strict than existing source so new pollution control technology will be required for carbon monoxide, NOx, cadmium, and lead

MHFs Rehab Concerns

- $88 million for rehabilitation
- Uncertain if there is a reliable solution to meet NOx MACT standard in a MHF
- The MHF's emergency bypass dampers open nine times per year on average – emissions will not meet MACT standards
- Bypass dampers open because of equipment malfunctions, unexpected power outages, sensor failures, SCADA failures, etc.

MHFs Rehab Concerns

- GBMSD must provide documentation each time bypass damper opens and prove it was caused by a malfunction and could not have been prevented
- Malfunction prevention is open to interpretation by government regulator
- Fines for violating the MACT standards under the Clean Air Act are significant—up to $25,000 per day per parameter violated

MHF Rehab Not Recommended

- GBMSD is committed to 100% regulatory compliance
- Our operational philosophy is to minimize the risk of violating regulatory requirements
- Staff is not recommending rehabilitating the MHFs to the Commission.
  1. GBMSD will not meet air quality standards with open bypass damper
  2. Government regulator determines compliance in emergency bypass situation – demands significant documentation on malfunction
  3. Too risky to spend $88 million to rehab MHFs only to be put on a compliance schedule to replace them
  4. Highest 20-year present worth cost

AGENDA

1. MACT Standards
2. Rehabilitation of Multiple Hearth Furnaces
3. Co-Digestion Study
4. Cost Alternatives
5. Rate Impact

Co-Digestion Feasibility Study

- Growing trend in wastewater treatment industry
- Mixes high strength organic wastes and municipal wastewater solids to increase biogas production
- Market analysis from surveys and interviews identified suitable waste sources within 60 miles of the Green Bay Facility
- Dairy wastes are most suitable and available for co-digestion
- A&B Leist Trucking – 24,000 truckloads per year

Co-Digestion Facility Examples

- Sheboygan
  - Doubled methane gas production compared to municipal waste only
- Stevens Point
  - Increased methane gas production by about 50% from restaurant grease traps
  - Expanding to full-scale operation, expects to double methane gas production

Why Co-Digestion?

- GBMSD is a top energy consumer!
- Electricity use – 43,355,193 KWH
- Natural Gas Use – 207,391 MMBTU
- Energy Cost = $4.3 million per year
- Energy prices are increasing – 8.8% proposed increase for 2012
- Co-digestion can increase biogas production by 50%

AGENDA

1. MACT Standards
2. Rehabilitation of Multiple Hearth Furnaces
3. Co-Digestion Study
4. Alternative Refinement
5. Rate Impact

SMP Alternatives

- Alternative 2: Incineration with Energy Recovery
- Alternative 3A: Digestion with Thermal Processing
- **Alternative 3B: Digestion with Thermal Processing and Electrical Generation**
- Alternative 11: Composting
- Alternative 14: Incineration and Drying

Alternative 3B Description

- Modified version of Alt. 3 - eliminates drying and producing a pellet
- Alt. 3B captures methane gas from digester and recovers the heat energy from the thermal process
- First year of operation recovers $2.2 million of energy

Alternative Costs:
Analysis Refinements:

- Calculated cost for all alternatives in today's dollars
- Reduced the size of the system and future 2035 load projections (85 dtpd to 64 dtpd) based on customer feedback
- Obtained new vendor quotes for materials and equipment
- Increased projected pellet value based on company interviews
- Added pollution controls to comply with MACT standards
- Updated energy costs

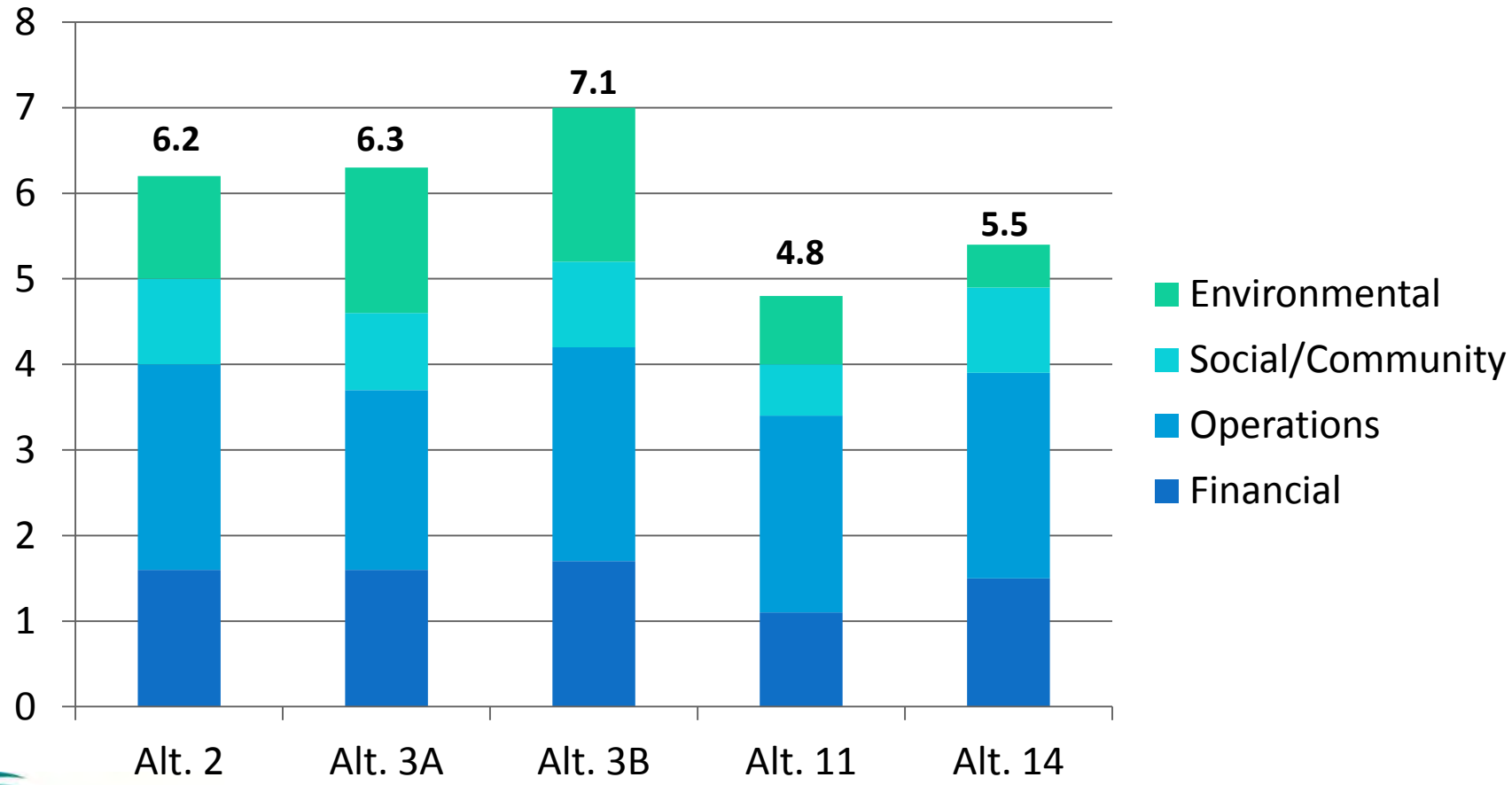
Alternative Costs: Analysis Results

	Alt. 2	Alt. 3A	Alt. 3B	Alt. 11	Alt. 14	Alt. 16
Capital Cost	$112,700,000	$154,900,000	$146,900,000	$80,600,000	$109,100,000	$88,400,000
Total Present Worth (40 year)	$180,200,000	$149,000,000	$134,600,000	$218,100,000	$187,800,000	$215,800,000
Total Present Worth (20 year w/ Salvage Value)	**$121,500,000**	**$121,600,000**	**$112,600,000**	**$143,400,000**	**$123,500,000**	**$130,300,000**
Annual O&M 2015	$2,100,000	$700,000	$500,000	$3,500,000	$2,300,000	$3,300,000
Annual O&M 2025	$2,900,000	$400,000	$200,000	$5,400,000	$3,300,000	$5,000,000
Annual O&M 2035	$4,100,000	($100,000)	($520,000)	$8,700,000	$4,800,000	$7,700,000
Annual O&M 2045	$5,800,000	($1,300,000)	($1,900,000)	$13,900,000	$7,000,000	$11,500,000
Annual O&M 2055	$8,300,000	($3,600,000)	($4,600,000)	$22,800,000	$10,200,000	$17,300,000

Alternative Analysis: Process and Criteria

- Employed structured, rigorous analysis framework to consider monetary and non-monetary factors
- Defined criteria for weighting, scoring and ranking across alternatives
  - Criteria and criteria weights based on Customer Advisory Committee input (and consistent with Commission values)
- Criteria employed:
  - Financial impact (30%)
  - Operational flexibility (35%)
  - Social/community acceptance (15%)
  - Environmental impact (20%)

Alternative Scoring



Alternatives Analysis Results

- Scoring and ranking across alternatives
  - Lowest ranked alternatives: Alternatives 11 & 14
    - Alt. 11 – significant odor issues, no energy recovery, increased labor, and increased greenhouse gas emissions
    - Alt. 14 – safety (dryer operation) and increased greenhouse gas emission
  - Middle ranked alternatives: Alternatives 2 & 3A
    - Equivalent financial impacts, offsetting non-monetary impacts
  - Highest ranked alternative: Alternative 3B
    - Higher financial impact score (e.g., lower 20-year NPV)
    - Higher scoring on non-monetary impacts

AGENDA

1. MACT Standards
2. Rehabilitation of Multiple Hearth Furnaces
3. Co-Digestion Study
4. Alternative Refinement
5. Rate Impact

Screened Alternative Costs: Results

	Alternative 2	Alternative 3A	Alternative 3B
Capital Cost	$112,700,000	$154,900,000	$146,900,000
Total Present Worth (40 year)	$180,200,000	$149,000,000	$134,600,000
Total Present Worth (20 year w/ Salvage Value)	**$121,500,000**	**$121,600,000**	**$112,600,000**
Annual O&M 2015	$2,100,000	$700,000	$500,000
Annual O&M 2025	$2,900,000	$400,000	$200,000
Annual O&M 2035	$4,100,000	($100,000)	($520,000)
Annual O&M 2045	$5,800,000	($1,300,000)	($1,900,000)
Annual O&M 2055	$8,300,000	($3,600,000)	($4,600,000)

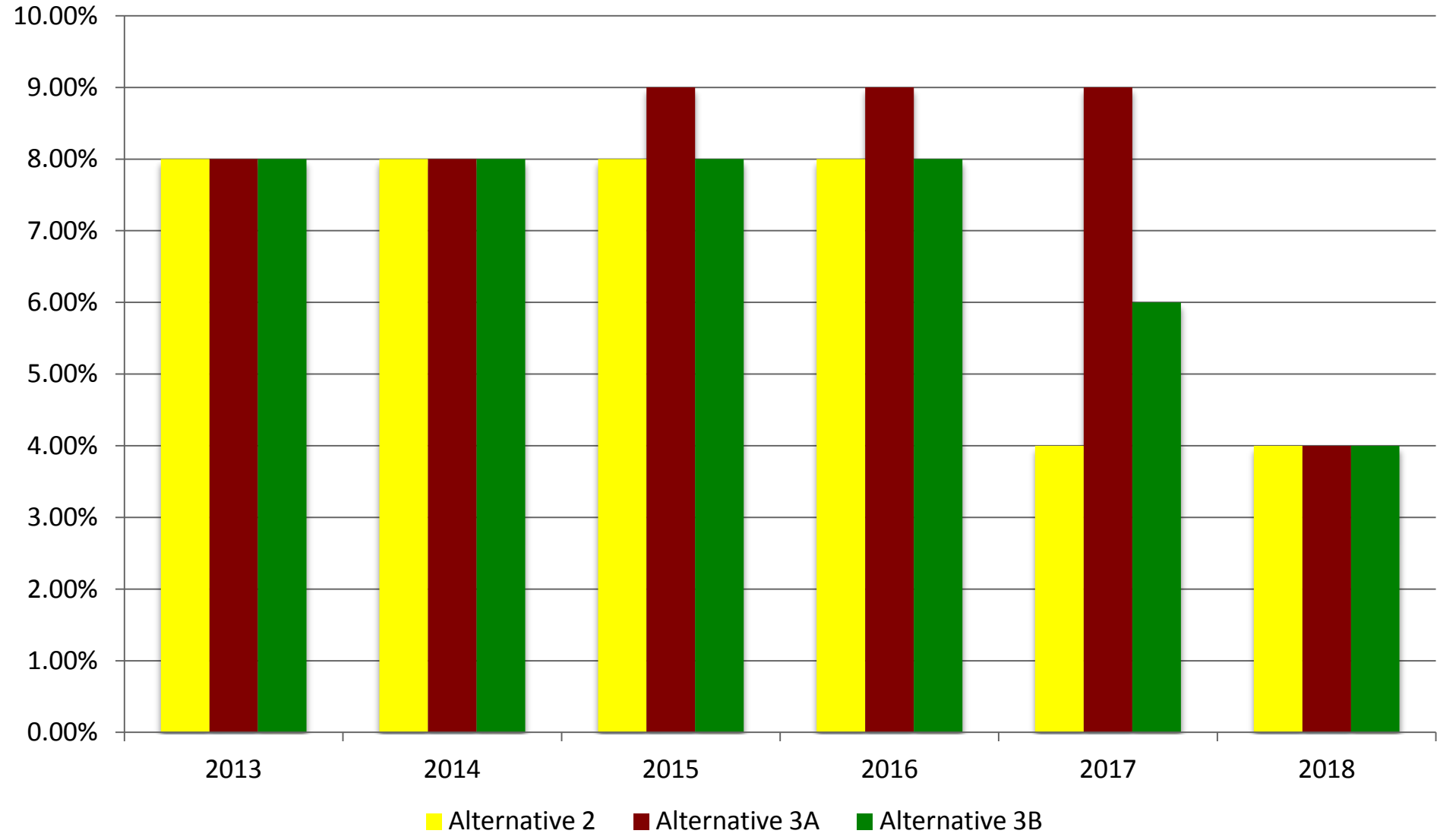
Strategic Financial Planning: **Model Structure**

- 20-year cash flow analysis
- Revenues
  - Existing rates (including growth)
  - System-wide rate increases
- O&M expenses
  - Budget vs. actual reporting
  - O&M forecast via escalation factors
- Capital financing
  - Existing and future debt obligations
  - Cash financing of capital
- Financial policies / metrics

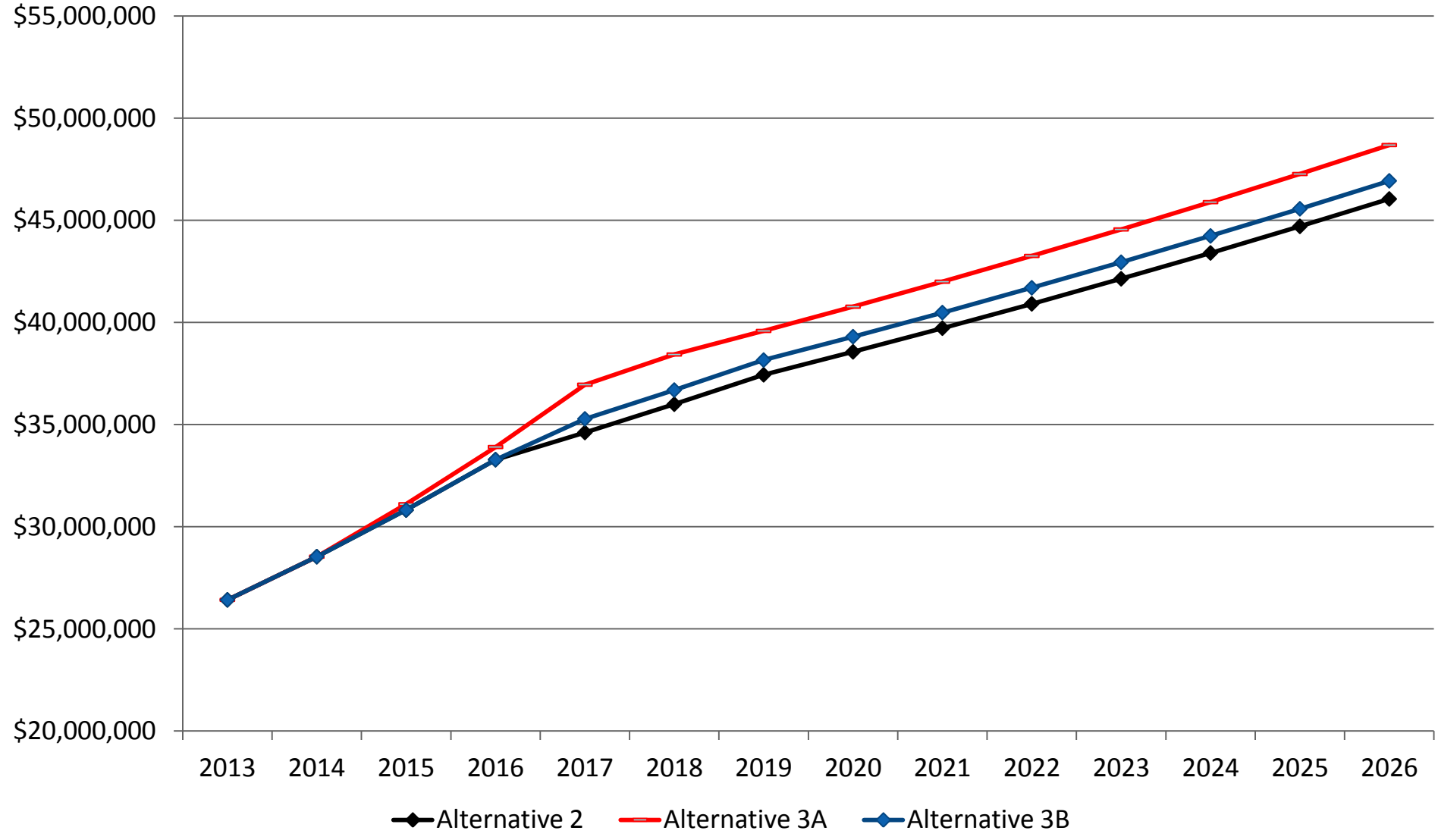
Strategic Financial Planning:
Key Inputs, Assumptions & Outputs

- **Inputs:**
  - Fund Balances
  - O&M budgeted expenses **– including incremental solids expenses**
  - Capital Program **– including alternative solids project capital**
- **Assumptions:**
  - Cost escalation / inflation factors
  - Capital financing terms (revenue bonds, SRF loans)
- **Outputs:**
  - System-wide rate increases required to finance CIP
  - Projected revenues (future and constant loadings)
  - Projected sources and uses of funds and financial performance metrics

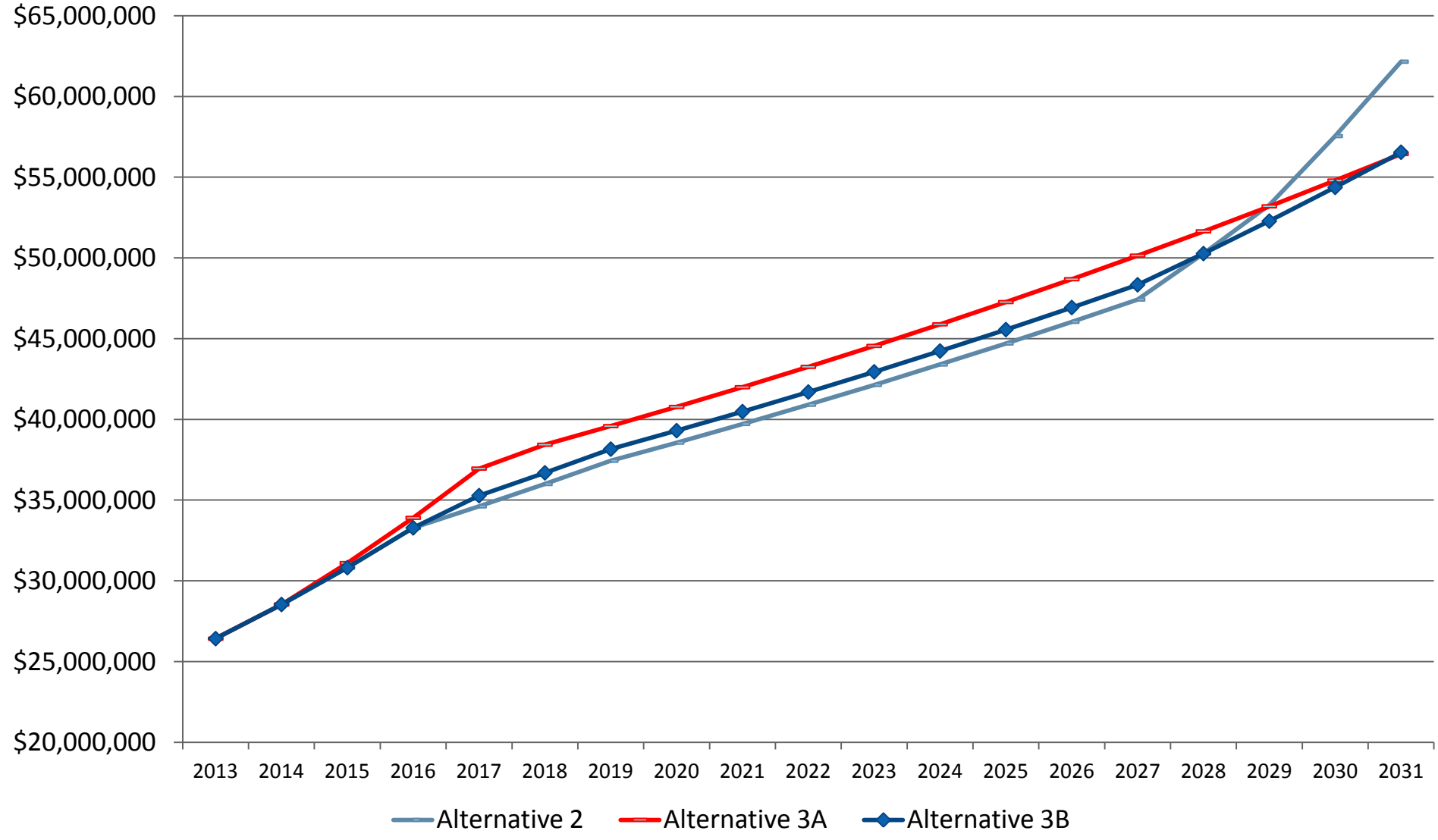
Projected System-Wide Rate Increases for Solids Management Alternatives 2013-2018



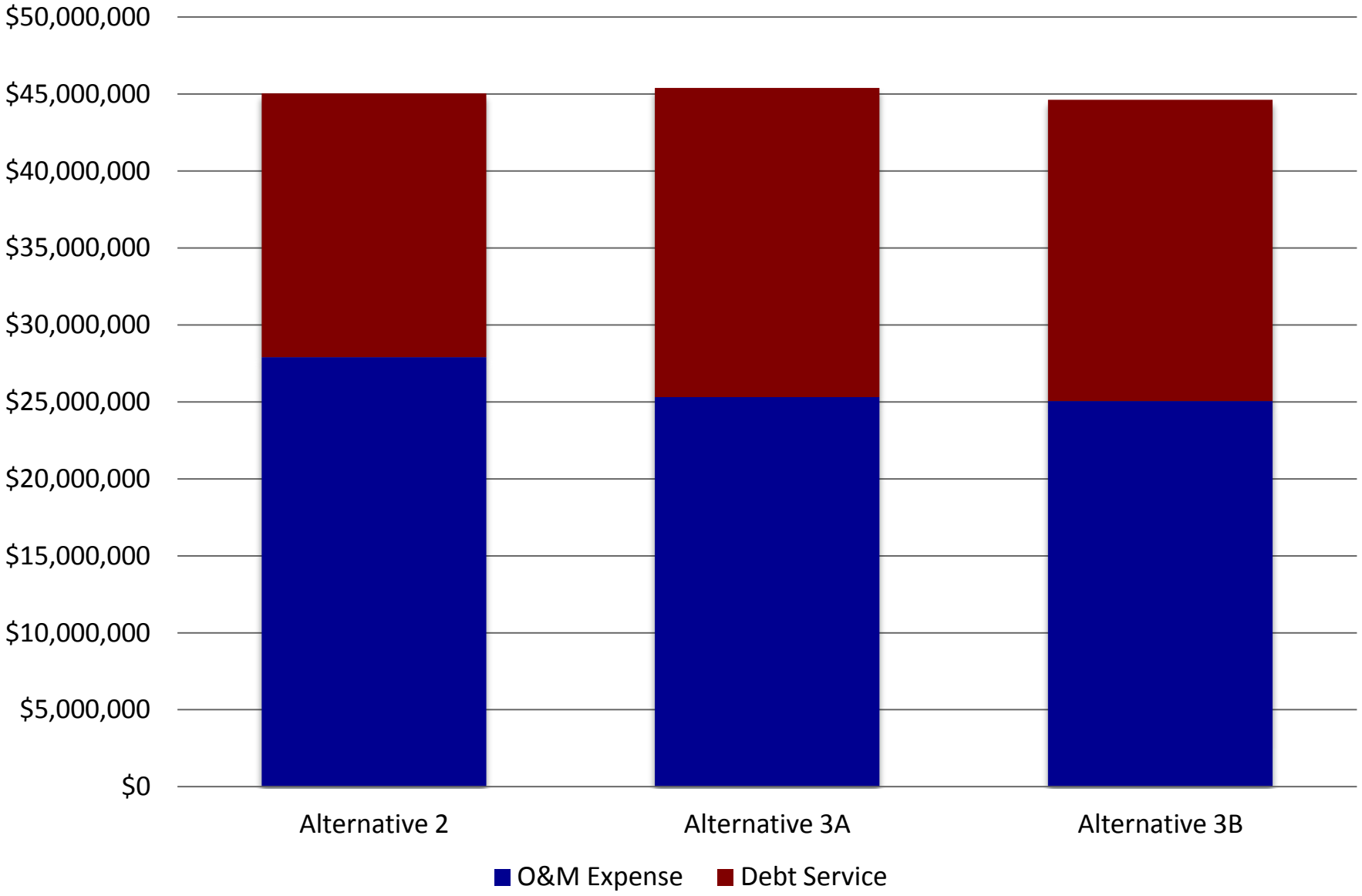
Projected Municipal Revenue with Projected Rates for Solids Management Alternatives - Constant Load 2013-2026



Projected Municipal Revenue with Projected Rates for Solids Management Alternatives - Constant Load 2013-2031



Projected GBMSD 2026 O&M and Debt Service Expenses (Solids Management Alternatives)



Rate Analysis: **Results**

- Near-term (2013 – 2018):
  - 8 – 9% per annum increases through 2016 required under all options to build adequate revenue generation capacity
  - Effective equivalence across final 3 alternative
- Medium Term (2018 – 2031):
  - Alt 2 & 3B near equivalent; Alt 3A incrementally higher
  - Alt 2 requires higher rates to enable phosphorus-related CIP due to O&M being larger share of requirements
- Long Term (Beyond 2035-2038)
  - Retirement of debt for solids alternatives
  - Divergence of O&M expenses widens in latter years

Recommendation: Alternative 3B

Rate / Financial Planning Refinements

- Capital financing of selected solids management alternative
  - Equipment pre-purchase arrangements
  - SRF / revenue bond financing structuring
- Unit charge development
  - Updated / revised cost-of-service analyses
    - Recognize energy content in contributed loadings
    - Fixed charges to reflect value of system availability
  - Policy-based rate adjustments to transition rate impacts for selected user groups

Alternative Selection:
Framing Considerations

- Factors that distinguish alternatives:
  - Decision criteria scoring / ranking
    - Operational considerations
    - Environmental and social / community impacts
  - **Financial implications**
    - **Capital costs**
    - **O&M expenses**
    - **Projected rate impacts**
    - **Projected composition of revenue requirements - risk exposure**
- Factors that are common to all alternatives:
  - Rate / financial planning refinement opportunities
  - Exposure to risk of impacts from customer withdrawal

Alternative Selection: **Staff Recommendation**

- Alt. 3B scored the best overall
  - Most energy production
  - Reduced greenhouse gas emissions
  - Lowest 20-year present worth
  - Energy expense offset with co-digestion
  - Flexibility with accepting different wastes
  - Lowest O&M costs

Next Steps

- Customer Working Group Discussion (mid-October)
- October Commission meeting – alternative recommendation
- Public Outreach (e.g. public informational meetings, fact sheets, website updates, email blasts, newsletters, etc.)
- Public Hearing
- Design (mid 2012)
- Construction (2014)

SMP Customer Working Group Meeting #3

September 27, 2011

Green Bay Metropolitan Sewerage District
Cleaning Water Today For Tomorrow's Generations