2018 Budget Considerations

Metropolitan Water Reclamation District of Greater Chicago

Committee on Budget and Employment

Honorable Kari K. Steele, Chairperson

Budget Considerations: Session 3 – Resource Recovery and Strategic Plan Goals

June 15, 2017

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2018 Budget Considerations

Budget Considerations

- Three Budget Sessions
  - Session 1: Financial Overview
  - Session 2: CIP Fund and Stormwater
  - Session 3: Resource Recovery and Strategic Plan Goals

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2018 Budget Considerations

Vision Statement

Recovering Resources, Transforming Water

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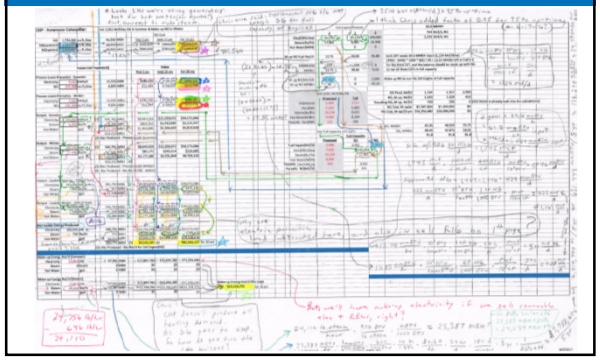
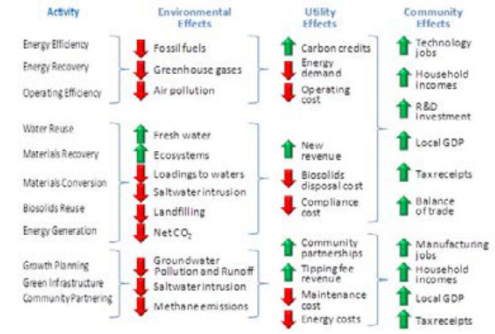


2018 Budget Considerations

Utility of the Future



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2018 Budget Considerations

Utility of the Future

Key Components

- Sustainability
- Efficiency (Operations and Maintenance)
- Green House Gas Reduction
- Renewable Energy
- Promoting Partnerships
- Increasing GDP

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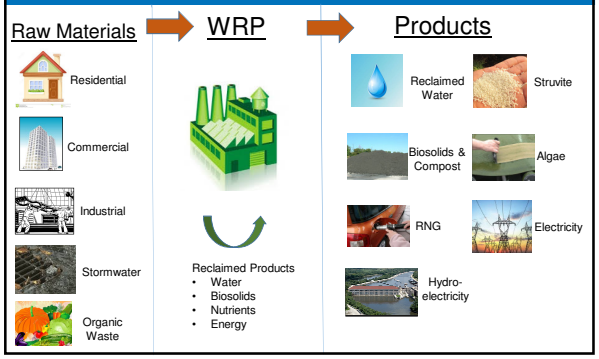
Resource Recovery and Strategic Plan Goals



Resource Recovery General Activity

Legal Groundwork

- July 2014 - Resource Recovery legislation
- Sept 2016 – USEPA approved resource recovery approach
- Oct 2016 - Oct 2016 - MWRD Board of Commissioner adopts Resource Recovery Ordinance

Water Recovery at District WRPs

Enough water for 274,000 people[1] Carbon equivalent ~ 175 acres of forest[2]

WRP	Million Gallons/ Year	Carbon Footprint Million Tons eCO_2
Stickney	2,555,000,000	8,936
Calumet	1,103,760,000	3,860
Egan	985,500,000	3,448
Hanover Park	227,395,000	794
O'Brien	62,780,000	220
Kirie	57,670,000	203
Total	4,993,000,000	17,461

[1] Annually, based on 50 gallons per capital per day; [2] http://www.arborenvironmentalalliance.com/carbon-tree-facts.asp

Water Recovery

Water Recovery

- Provide Water to Calumet Industrial Corridor $0 – American Water Partnership
  - Create Jobs
  - Lower Carbon Footprint
  - Stabilize Water Rates for Industry
  - Promote Conservation and Reuse
- Provide Water to Koppers - $800k
  - Plant Expansion and Job Creation
  - Lower Carbon Footprint
  - Stabilize Water Rates
  - Promote Conservation

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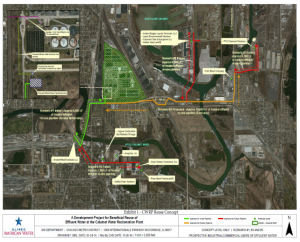
Water Recovery Update - ILAWC

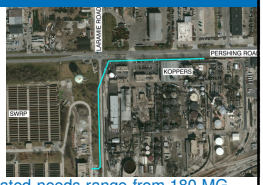
- Contract of Commitment was signed with Illinois American Water Company (IAWC) in April 2015 to design and build a polishing plant and distribution system in the CWRP service area.
- IAWC has developed a distribution plan to serve an area east of the CWRP and is in negotiations with various potential end users, including Ford Motor Company, to supply the treated effluent.



- Upon securing a sufficient customer, the District & IAWC will negotiate a final agreement for the supply and distribution of the water.
- Goal 10 MGD => 12,764 MT eCO_2

Water Recovery Update – Koppers

- IGA with the Village of Stickney: allows for the sale of effluent water while protecting a critical revenue stream for the Village
- Agreement with Koppers will be finalized and construction of a ~2,000 ft pipeline ~$800k (2% cost of capital ~$50k)



- Koppers is expanding the plant and estimated needs range from 180 MG to 300 MG per year
- District portion of water charge ~$1 per 1000 gallons: Annual revenue of $180k to $300k
- **Project is cash positive and covers the cost of capital**

Biosolids Recovery

Biosolids Recovery

- Provide value to Cook County
- Promote zero waste sustainability
- Lower carbon footprint
- Recycle nutrients and organics
- Realize efficiencies in operation
- Possible job creation
- $0 cost for process (Regulatory: Odor)

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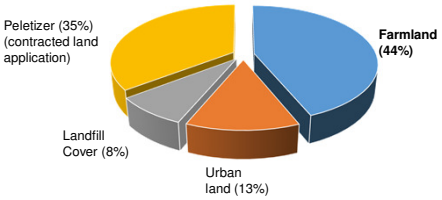
Biosolids Recovery

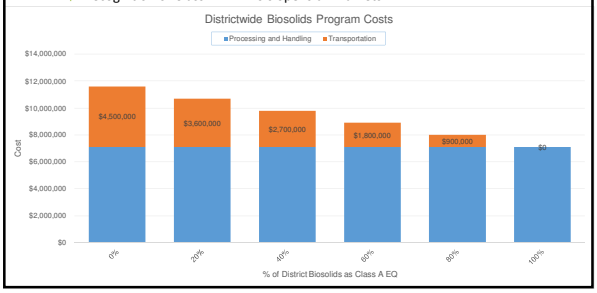
Current Biosolids Distribution Programs



2016 Biosolids Utilization (total 105,000 DT)
2017 Goal – Class A: 50,000 DT

Biosolids Recovery

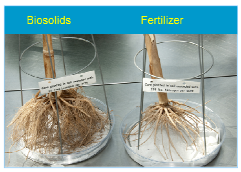
- Class A EQ classification increases the value of the final biosolids product
- Keeping Class A biosolids in Cook County benefits our customers not farms outside of our region
- Recognition of Class A in Illinois opens all markets



Biosolids Recovery

Every year, MWRD recovers and returns to the soil approximately:

- *3,400 tons of phosphorus*
- *5,200 tons of nitrogen*
- *31,300 tons of carbon/organic matter*



Corn Roots grown with Biosolids

Crystal Green product

Nutrient Recovery

- Regulatory driver – 1 mg/l
- Implement nutrient reduction in cost and environmentally effective manner
- Recover depleting resource: phosphorus
- Promote environmentally friendly phosphorus fertilizer
- Ostara at Stickney
- Anticipate additional recovery at Calumet and Egan (evaluate other technologies)
- Algae at O'Brien

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Nutrient Recovery - Ostara

- Stickney Cost - ~$35 million
- Plant performance - < 0.5
- pH balance and acid cleaning process underway
- Struvite buildup
- Without Ostara – Feb 2017: 1.3 mg/l average
- With Ostara – May 2017: 0.45 mg/l average
- Phosphorus recovery effective

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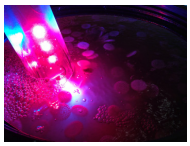
Nutrient Recovery - Algae

Revolving Algae Biofilm Reactor (RAB) at O'Brien Algae Research Facility



Floating Media with Submerged Artificial Lighting Research Pilot, ISTC

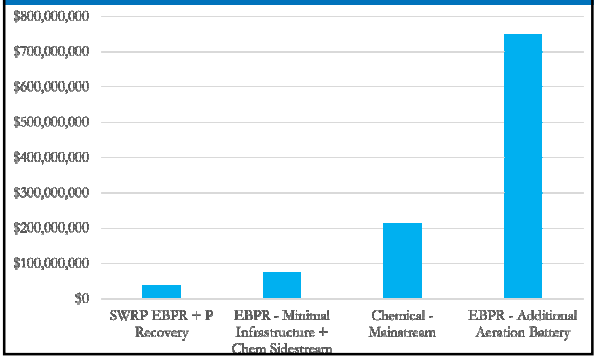
Fertilizer pellets made from harvested algae

Nutrient Recovery - Algae

- Algae uptakes phosphorus and nitrogen for growth
- Once harvested and dewatered, algae can be sold as feedstock for a variety of renewable products:
  - Bioplastics
  - Biosuccinic acid
  - Aquaculture feed
  - Fertilizer
- 2nd phase of test study at O'Brien
- Potential for production of ~20 tons per day at O'Brien WRP
- Effective nutrient uptake
- Shows promise for cost effective approach

Nutrient Recovery

Fully loaded cost comparison for 1 mg/l permit limit



Energy Recovery

- Regulatory driver – carbon needed for phosphorus uptake ($6.0 M chemical offset)
- Greenhouse gas reduction
- Renewable energy
- Gained efficiency in operation
- Recycle and zero waste model
- Project returns cover cost of capital and operation

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Energy Recovery - Calumet
Organic Receiving Station

Capital Costs: $8,500,000
Annual O&M Costs: $325,000
Organic Waste Received: 150,000 gal/d
Annual Tipping Fees: $2,737,500*
Pay Back Period: 3.5 years

Excess Digester Gas Capacity (Mcf/d)
Current: Summer – 597; Winter – 0
Future: Summer – 1095; Winter – 125

*$0.05/gallon

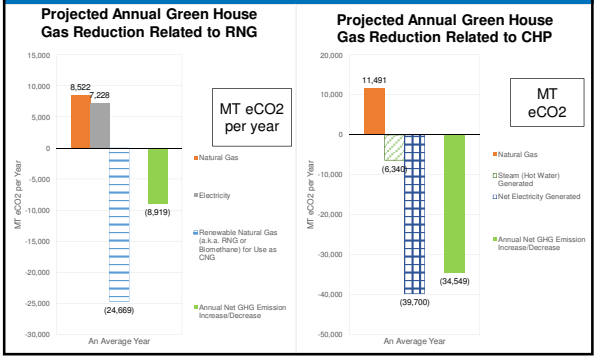
Energy Recovery - Calumet
Energy Use Options

Over Course of 20 Years	RNG	CHP
B&I Fund Financing Cost[1]		
RNG (Cap. Cost: $32 M); CHP (Cap. Cost $21 M)	($2.0 M)	($1.3 M)
Expenses		
Maintenance	($0.2 M)	($1.3 M)
Net Energy Cost/Benefit[2]	($1.3 M)	$4.2 M
Revenue		
Natural Gas[3]	$2.0 M	Not Applicable
RINs[4]	$7.5 M	Not Applicable
Net Annual Benefit	$6.0 M	$1.6 M

1. Assumes SRF Funding, 20-Yrs, 2% Int. Combined Heat & Power (CHP) includes 2 engine generators.
2. Includes electricity/natural gas (elec/NG) for RNG and CHP facilities, and make-up NG for CWRP.
3. Projected average annual revenue over a 20-year period.
4. Projected average annual revenue based on recent market price for RINs.
5. Table does not include cap. costs, maint. costs, or elec/NG for Organic Waste Receiving Station itself.

Renewable Identification Number (RIN) – Market Prices

Energy Recovery - Calumet
Greenhouse Gas Reduction



Energy Recovery – Stickney
New Primary Tanks

New primary tanks will double gas production

- Evaluated current infrastructure demand
- Gas production can support:
  - All boiler demands
  - Existing turbine
  - MBM plant demand
- Value to operation - $1,343,555
- No further investment on energy outputs recommended until feedstock market grows
- Recommend receiving station – carbon offset value and feedstock market growth

Energy Recovery – Expert Panel

EcoEngineers: EcoEngineers guides energy companies through the maze of clean energy regulations and improves their bottom line by ensuring access to fuel and carbon markets. Our core strengths are audit, compliance management and consulting services. We combine these strengths to support projects that promote energy recovery and reuse.

Energy Systems Group: ESG offers a full range of sustainable infrastructure solutions including waste-to-energy, distributed generation, and renewable energy. ESG is an industry leader in developing and implementing projects under Utility Energy Services Contracts and through public/private partnerships such as Enhanced Use Leases.

Argonne Labs: Argonne is poised to help our nation build an economy fueled by safe, clean, renewable energy and free from dependence on foreign oil. When achieved, this will have a tremendous impact on the American economy, while significantly reducing our carbon footprint.

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