

# Biosolids Proviso Report

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Alternative Uses and  
Market Opportunities  
for Biosolids

***MWPAAC***  
***May 27, 2009***

# Today's Presentation

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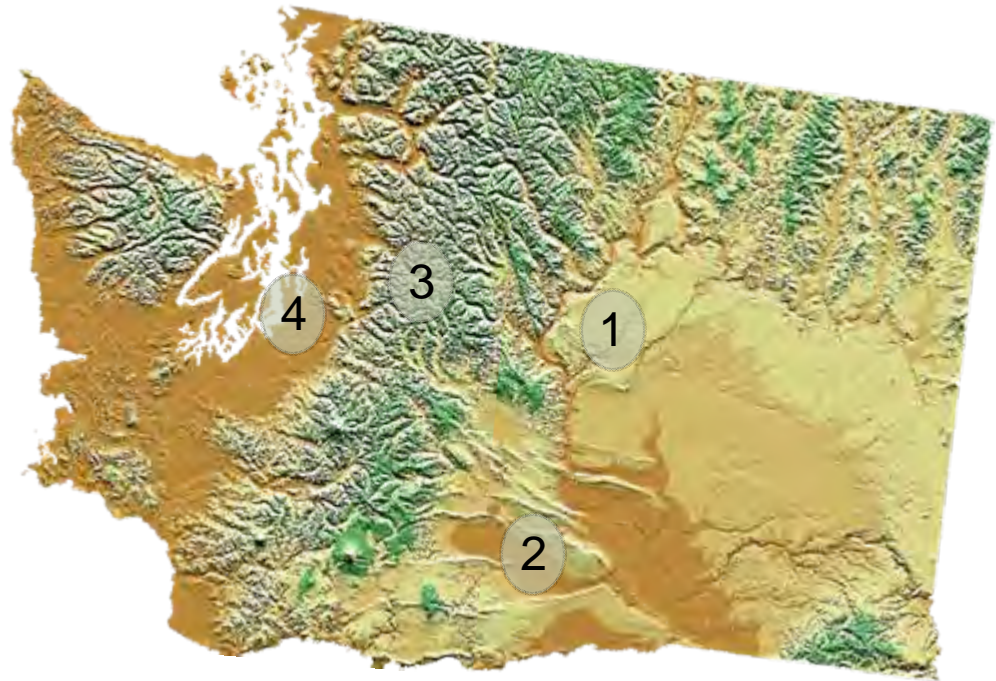
- King County's current biosolids program
- Purpose of *Request for Information - 2008/09*
- Contents of evaluation report
  - Analysis of alternative uses & market opportunities, including:
    - Relative costs
    - Carbon and greenhouse gas impacts
- Overall findings
- Next steps

# Biosolids Policies - RWSP

- Strive for *beneficial use* -- defined as environmentally safe, economically sound and uses advantageous qualities of the material.
- Consider new technologies; *continue R&D*
- Strive to produce highest quality biosolids economically achievable.
- Produce Class B; evaluate Class A
- *Minimize impacts* of noise and odor on neighboring communities
- Base decisions about technology, transportation and distribution on *marketability* of biosolids products
- Maximize reliability, minimize risk through *diversity and reserve capacity*
- Work with *local sponsors* when biosolids are distributed outside King County.



# Current Customers



	Project Name	Uses/Crops	County	Tons	% of Total
1	Boulder Park	Dryland wheat	Douglas	60,000	52%
2	Natural Selection Farms	Canola, hops	Yakima	20,000	18%
3	Snoqualmie Forest	Commercial forests	King	30,000	26%
4	GroCo	Compost	King	5,000	4%
Total Annual Production				115,000	

# Why the County's Customers Like Biosolids

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- Adds nutrients (slow release) and organic matter
- Increases crop yields
- Improves soil structure
- Enhances water retention and reduces irrigation requirements
- Protects soils against wind erosion
- Improves wildlife habitat

# Biosolids Safety and Quality

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- Decades of research demonstrate safety of using biosolids on food crops and soils
- EPA and state DOE encourage use of biosolids
- KC's biosolids are excellent quality:
  - Source control has reduced metals by 70-90% since 1980s.
  - Dental waste program has reduced mercury by 50% since 2000.
  - Average concentration of metals in KC biosolids is 80% *below* federal and state regulatory limits.

# 35 Years of Biosolids Recycling

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- Emphasizing markets
- Working with respected community spokespersons
  - Farmers in E. WA
  - Mtns to Sound Greenway Trust in W. WA
- Networking with regional agencies
  - NW Biosolids Management Association
- Building trust with regulators, communities
- Staying diverse & reliable - locations and uses
- Continually improving - ISO EMS
- Supported by university research



# Investigating Biosolids Options

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## *Request for Information (RFI)*

- Purpose: to learn about options for supplementing, strengthening or diversifying current program.
- Particularly interested in options that could:
  - Avoid or manage impact of pass closures
  - Reduce amount of fuel used for transportation
  - Use biosolids as tool to reduce emissions of greenhouse gases (GHG)
- Twelve proposals received 10/08
- Evaluation team included specialists in: biosolids management, finance and economics, technology, air quality, carbon and GHG accounting, soils, and energy

# RFI Evaluation Criteria

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- *Reliability*
- *Competitive cost*
- *Year-round access*
- *Flexibility*
- Strong local sponsor
- Community/agency support
- Storage capacity
- Low risk
- Additional diversity
- Demonstrable benefits (including carbon)
- Quality control program
- Social justice/equity
- Innovation

# Respondents to the RFI

Type of Proposal	Biosolids Use	Location	Crops/Products
<b>Energy</b>	<b>Fuel</b>		
Polaris Renewable Energy		Not identified	Dried biosolids fuel for co-combustion with coal
EnerTech Environmental		Not identified	
<b>Composting</b>	<b>Compost</b>		
Cedar Grove		Everett	Compost
GroCo		Kent	
Ekotek Bio-Technologies		eastern WA	
Cascade Materials		Snohomish Cty	
<b>Land Application</b>	<b>Fertilizer</b>		
Boulder Park, Inc		Douglas Cty	Dryland wheat
Natural Selection Farms		Yakima Cty	Wheat, canola, hops, others
Ramco, Inc.		King Cty	Commercial forests
Cascade Materials		Snohomish Cty	Dairy feed, canola
<b>Land reclamation</b>	<b>Soil builder</b>		
Ramco, Inc.		Not identified	Gravel pit reclamation
Sylvis Environmental		Not identified	Gravel pit reclamation, landfill caps

# Energy Proposals



Vendors dry biosolids into pellets and sell to local industries as a coal supplement.

## Advantages

- Uses biosolids locally, unaffected by weather, reducing fuel costs
- Would mitigate air emissions for coal-burning customer; innovative
- Could provide option for other wastewater utilities in region
- Long-term (20-25 year) contracting
- Operating cost to KC, no capital
- Storage of 1-2 weeks of biosolids production
- Likely to generate verifiable, tradable carbon credits of ~\$50K/yr in current market

## Disadvantages

- Reduces program diversity; requires use of all biosolids produced, eliminating current customers
- Difficult to back up with land-based options, which are not viable on standby
- High processing fees of \$55 to \$90/ton
- Significant history of risks in US with first-time technologies
- Rated low on flexibility and risk; unknown on community support and reliability

# Compost Proposals

Vendors compost biosolids with other residual materials and sell to public.



Cedar Grove compost

## Advantages

- Composting is proven, successful technology
- Requires only portion of annual production
- Westside proposals provide winter option with lower fuel use
- Some proposers have well-known local brands
- Operating cost to KC, no capital
- Rates highly for reliability, flexibility, year-round availability, environmental benefits, community support, storage, quality control and diversity.

## Disadvantages

- Some uncertainty about size of local market for compost, primarily if large amounts of biosolids used
- Higher processing fees than land application but less expensive than drying & combustion; estimated costs range from \$40-\$64/ton

# Land Application - Agriculture



Douglas County wheat

Proposers store, market and apply biosolids to various farms and crops.

## Advantages

- Agricultural application is proven, successful option for KC
- Strong community support in E. WA
- Local project management and control; many local spokespersons
- Numerous, well-dispersed environmental and financial benefits
- Low processing fees; small capital cost for equipment replacement
- High carbon storage/low GHG emissions even with long haul
- Rates highly for reliability, flexibility, demonstrable benefits, local sponsor, low risk, community support, storage, quality control and social justice/equity.

## Disadvantages

- Markets and customers are 200 miles distant
- Occasional pass closures in winter require westside alternatives and backup.
- Westside proposer relatively new to biosolids; needs to develop community program and support
- Likely would not qualify for verifiable, tradable carbon credits because is a long-established practice

# Land Application - Forestry



Tiger Mountain State Forest

Proposer applies biosolids to private and public forests in eastern KC.

## Advantages

- Forest application is proven, successful option for KC
- Low application and hauling costs; in-county use of biosolids
- Numerous environmental benefits verified by 35 years of research and monitoring
- Strong local spokesperson: Mountains to Sound Greenway Trust
- High carbon storage/low GHG emissions
- Rates highly for reliability, flexibility, demonstrable benefits, local sponsor, low risk, additional diversity, innovation, quality control.

## Disadvantages

- Contributes no storage capacity to program
- Capital costs include specialized equipment and ongoing costs to design and construct application trails
- Likely would not qualify for verifiable, tradable carbon credits because is a long-established practice in KC

# Land Reclamation



Gravel pit, King County

Proposers create biosolids/woody mixtures to

- (1) rebuild topsoil and establish vegetation on disturbed areas or
- (2) close out landfills and trap methane emissions.

## Advantages

- Reclamation with biosolids is proven & successful in many states and countries
- Environmental benefits verified by numerous researchers
- Amount of biosolids needed depends on size of area to be restored; not likely to require large amounts.
- High carbon storage/low GHG emissions, especially if located in-county
- Rates highly for demonstrable benefits, low risk, additional diversity, year-round availability
- Likely to qualify for verifiable carbon credits

## Disadvantages

- Potential project sites and partners not yet identified
- Provides discrete project opportunities, not daily, long-term option



New vegetation on copper mine tailings, B.C.

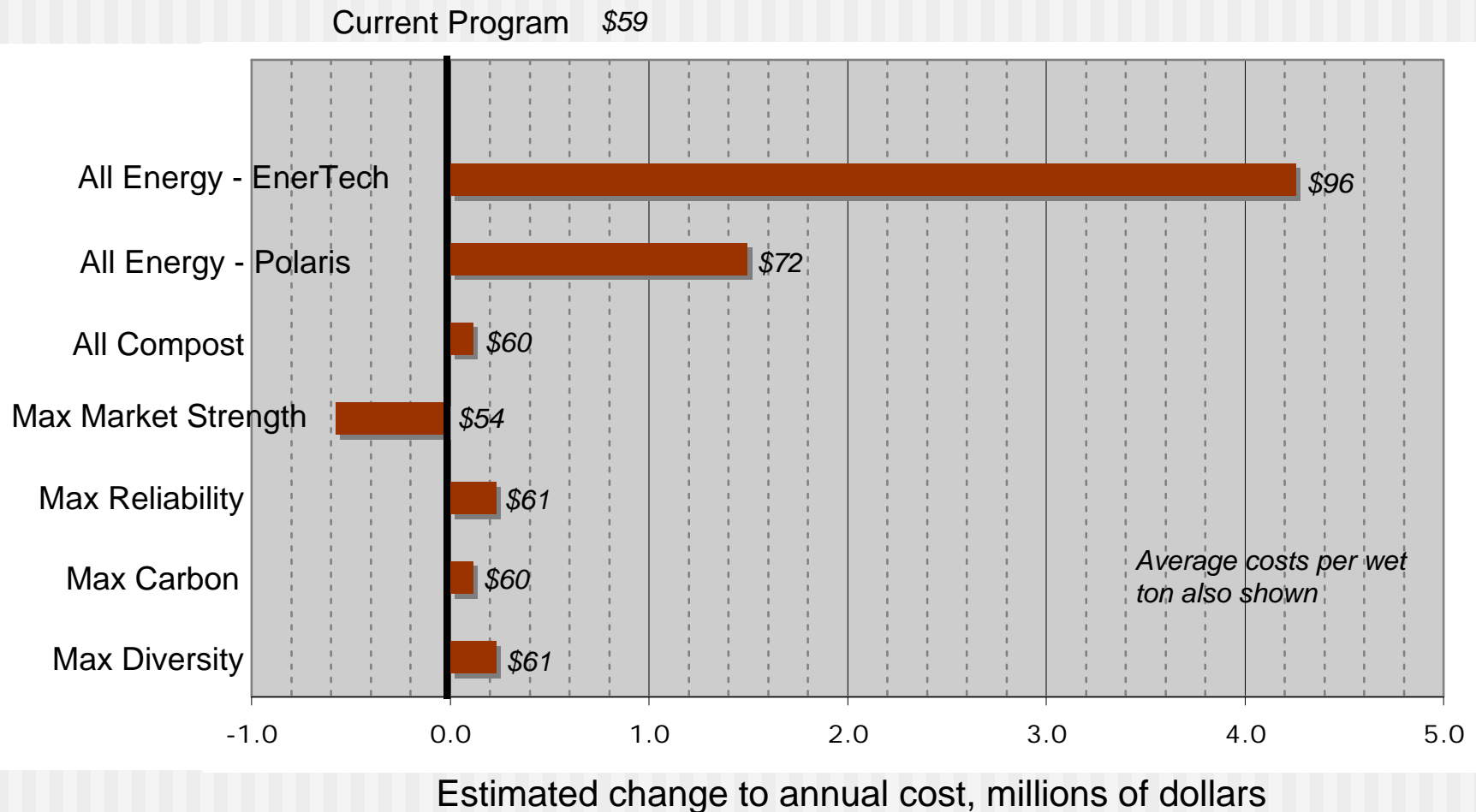
# Evaluating Program Costs

Proposals grouped into program scenarios for more complete and realistic cost estimating:

<i>Scenario</i>	<i>Description</i>
Baseline	Current program 2008
All Energy – Alt. A	EnerTech
All Energy – Alt. B	Polaris
All Compost	Ekotek, eastside w/ rail haul
Max Market Strength	Eastside agriculture
Max Reliability	East & west, proven reliability with storage
Max Carbon Storage	Westside land app and composting
Max Westside Diversity	Ag, forestry, composting, reclamation

# Estimated Changes to Annual Cost

compared to current program



# A Quick Review: Greenhouse Gases and Climate Change

Some gases can absorb energy from the earth's surface and keep that heat energy in the atmosphere, making the earth warmer.

In order of concern, these "greenhouse gases" are:

**Nitrous oxide (N<sub>2</sub>O)**

**Methane (CH<sub>4</sub>)**

**Carbon dioxide (CO<sub>2</sub>)**

We want to manage biosolids without emitting these gases (greenhouse gas avoidance).



Carbon accounting: summing emissions (debits) and avoidance (credits) of all management activities, standardized to tons of CO<sub>2</sub>.

# Carbon Accounting for Biosolids Management

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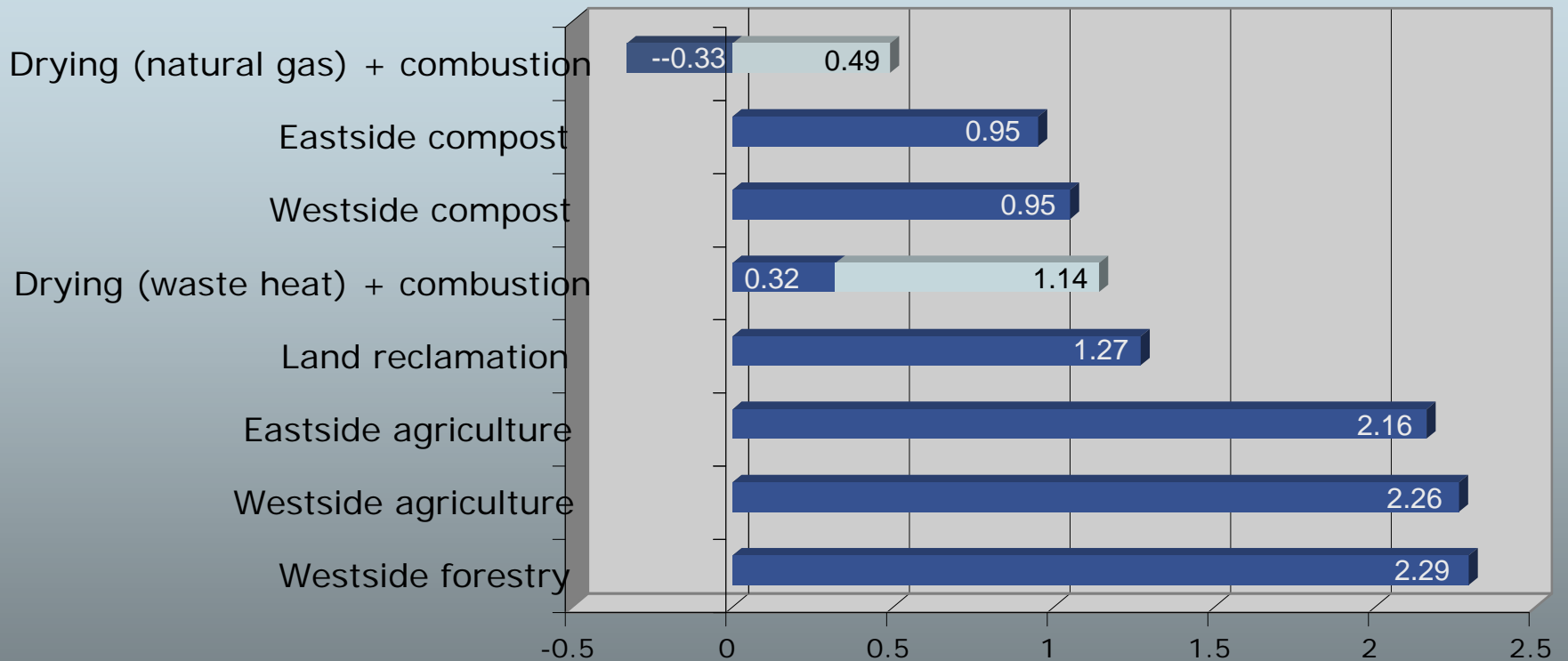
## *Credits*

- Replacing synthetic fertilizer
- Accumulating carbon (organic matter) in the soil
- Replacing fossil fuels
- Displacing materials in cement manufacturing



## *Debits*

- Burning diesel to transport biosolids
- Burning diesel to land apply biosolids
- Using energy to dry biosolids
- Emitting nitrous oxide or methane gases

# Calculated Carbon Benefits by Type of Use



Metric tons of carbon dioxide (CO<sub>2</sub>) per dry ton of biosolids

 Calculated using published data and research results  
 Calculated using information supplied by proposers

# Overall Findings

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**Proposals varied in proven reliability and level of risk.**

**Less processing = lower cost.**

- Land application scenarios averaged \$60/ ton; all-energy options ranged from \$72-96/ton.
- Energy projects are innovative and may be good option for cities with no land-based opportunities. High daily tonnage requirements, good regional/multi-city option.

# Overall Findings

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## **Beneficial uses of biosolids reduce GHG emissions.**

- Trucking emissions (debits) are very small compared to credits from land application and not significant in overall analysis.
- Energy/biofuel alternatives have slightly less carbon benefit than land-based alternatives.
- Recent research reveals carbon storage in soil is significant and larger than expected.
- Tradable carbon credits are not a significant cost offset with current market prices on Chicago Climate Exchange.

# Overall Findings

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## **Technologies and practices are available to capture all types of benefits from biosolids:**

- An energy source and replacement for fossil fuels
- A fertilizer and soil-builder for crops
- A tool to restore disturbed lands
- A tool to reduce GHGs and store carbon

Biosolids can produce multiple environmental, economic and social benefits. A diverse program allows the county to optimize the value of this resource. **The current program has all these elements, but can be enhanced.**

# Next Steps and Schedule

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## **Continue operations, develop strategic plan over next 2 years**

- Consult with customers & interested parties.
- Further examine options and emerging opportunities.
- Develop strategies for responding to changes in marketplace.
- Maintain existing program (with modifications) during strategic planning.
  - Seek an additional westside option (most likely composting) specifically for winter season.
  - Implement land reclamation pilot project on Vashon Island and other R&D efforts. Will provide carbon storage data and will inform strategic plan.