



Managing Biosolids to Protect the Climate

**A review of GHG impacts for two
northeastern wastewater facilities**

*NYSASWM Federation Conference
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A black and white photograph of two men standing in front of a Casella's truck. The man on the left is wearing a dark sweater over a collared shirt and light-colored pants. The man on the right is wearing a dark jacket over a collared shirt, dark pants, and a baseball cap with the 'CAT' logo. The truck behind them has 'CASELLA'S' written on the front. The background is dark, suggesting an indoor or nighttime setting.

CASELLA'S

WHO WE ARE

Casella was founded in 1975 as a single truck operation in Rutland, Vermont. In 1977, Casella opened the first recycling facility in the state. From our Vermont roots, we've grown through a commitment to making a difference in our local communities.

Together with our communities and our customers, we work to deliver environmental and economic value. At Casella, we see waste as a valuable resource, an opportunity for thoughtful and disciplined innovation.

- \$768.0mm of revenues for the 12-months ended 9/30/20; publicly traded on NASDAQ:CWST
- Operations in MA, ME, NH, NY, PA, and VT
- 2,500 employees serving over 300,000 customers and 550,000 households
- Recover over 600,000 tons of recycling and over 400,000 tons of organics for beneficial use each year
- Provide professional resource management services to over 10,000 business locations in over 45 states
- Since 2005, cut companywide carbon emissions by 50%
- Stock price has increased by 1,000% since January, 2015

Biosolids Background

- Casella manages over 300,000 tons per year of biosolids from municipal wastewater treatment plants
- Roughly 1/3 goes to beneficial use via composting, alkaline stabilization, or direct land application
- In addition to biosolids, we manage other organics like food processing residuals, short paper fiber, biomass ash, etc. Total beneficially used organics >400,000
- Regional capacity for managing biosolids is declining
 - Landfills: handling issues, requires bulking for placement, concerns about odors
 - Incinerators: Aging, require capital investments, already at capacity, long haul distances
 - Beneficial use: Pressure to eliminate or restrict loading rates due largely to incomplete science and concern around PFAS

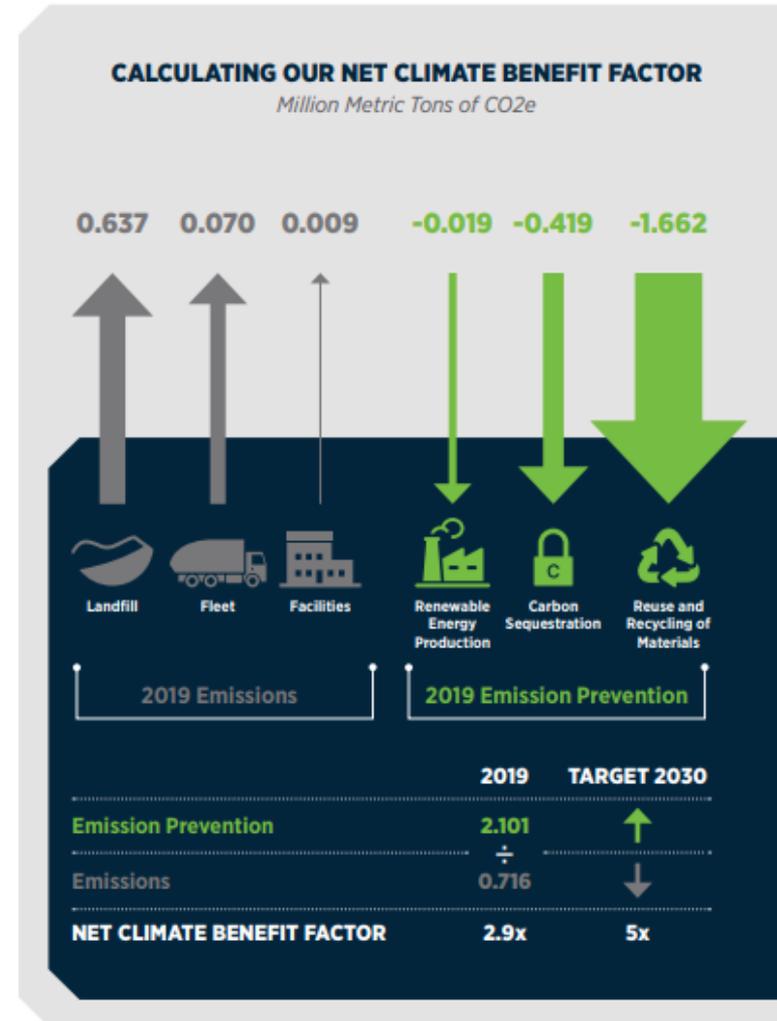


Biosolids & Climate – what’s best?

- If new biosolids solutions and infrastructure will be required in our region, what will be best for the climate?
- What is the full greenhouse gas impact of Casella’s biosolids management practices?
- Where are the carbon “hot spots” in the management of biosolids?
- How can Casella best help wastewater customers reduce their carbon footprint?

Casella and Climate Leadership

- Founding partner of voluntary EPA Climate Leaders program
- Reduced Scope 1 and 2 emissions by 45% between 2005 and 2010
- **Goal: Reduce to 40% below 2010 by 2030**
- Beyond our immediate footprint, our work has a net climate benefit
- Drivers = recycling, renewable energy production, and carbon sequestration
- **Goal: Grow our net climate benefit from 2.9x today to 5.0x by 2030**



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Study: 2 Customers, 2 Models

Customers

1. Maine Wastewater Facility
 - On-Site: Conditioning, Digestion, Dewatering
 - Off-Site: 63% landfilled; 37% land applied
 - 4,100 short tons managed per year
2. New York Wastewater Facility
 - On-Site: Conditioning, Digestion, Dewatering
 - Off-Site: 100% land applied
 - 4,800 short tons managed per year

Models

1. BEAM: Biosolids Emissions Assessment Model
 - Developed by Sylvis for Canadian government
 - Quantifies cost-benefits of different biosolids process and end-use practices
2. USDA COMET: Carbon Management and Emissions Tool
 - Official GHG quantification tool of USDA, developed by NRCS and Colorado State University
 - Uses spatially-explicit climate and soil info to quantify on-field GHG impacts of different practices, not specific to biosolids

*Analysis completed in-house by Kelly O'Connell and Shahbaz Soofi using publicly available tools; then reviewed and replicated by Northern Tilth.



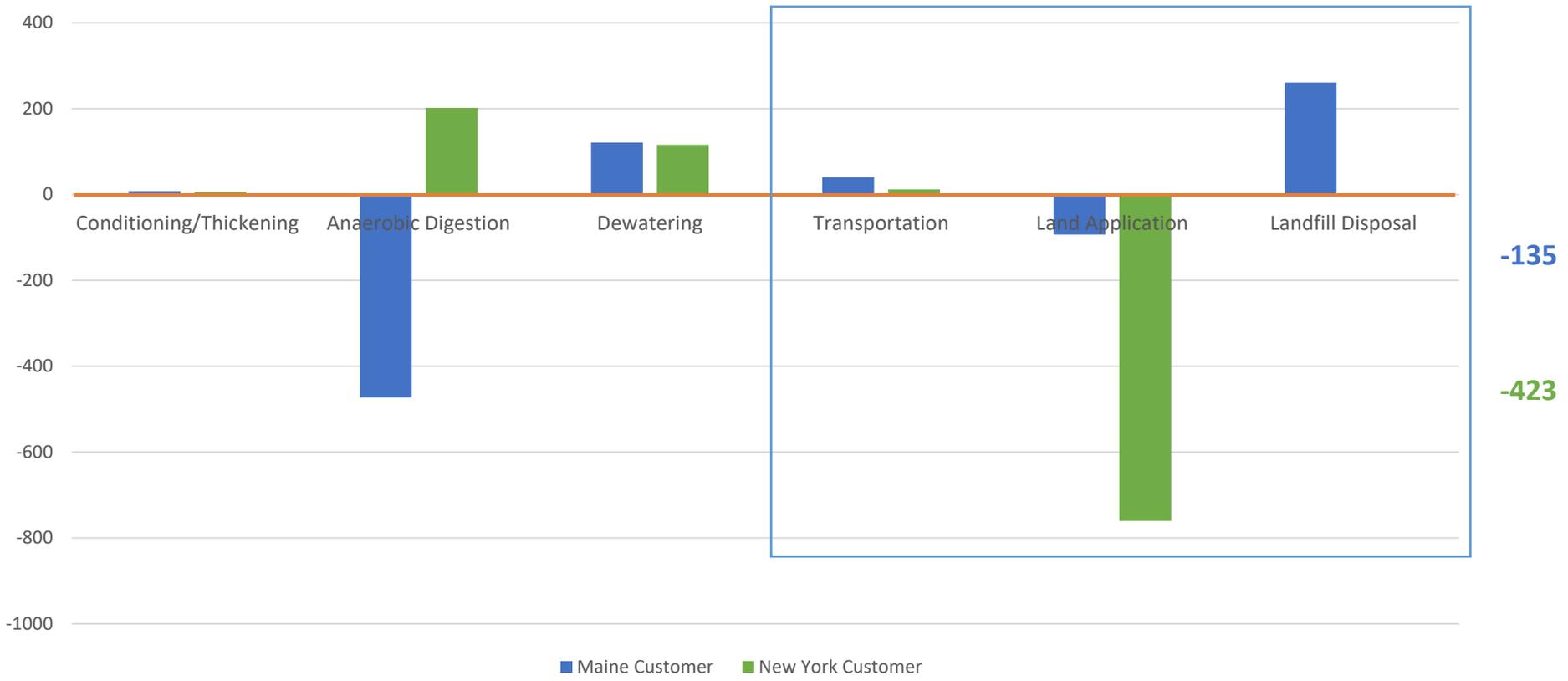
BEAM Results

- Both biosolids management programs yield a net reduction in GHG emissions, meaning they benefit the climate
- Emissions of N₂O, CH₄, and CO₂ are outweighed by benefits of carbon sequestration and avoided use of fossil energy and fertilizer

	Maine Customer	New York Customer
Wet tons managed per year	4,131	4,838
Overall GHG impact per year (MTCO ₂ e)	-135	-423
Overall GHG Impact per wet ton (MTCO ₂ e/ton)	-0.033	-0.087

BEAM Results (cont.)

GHG Emissions per Year (MTCO2E)



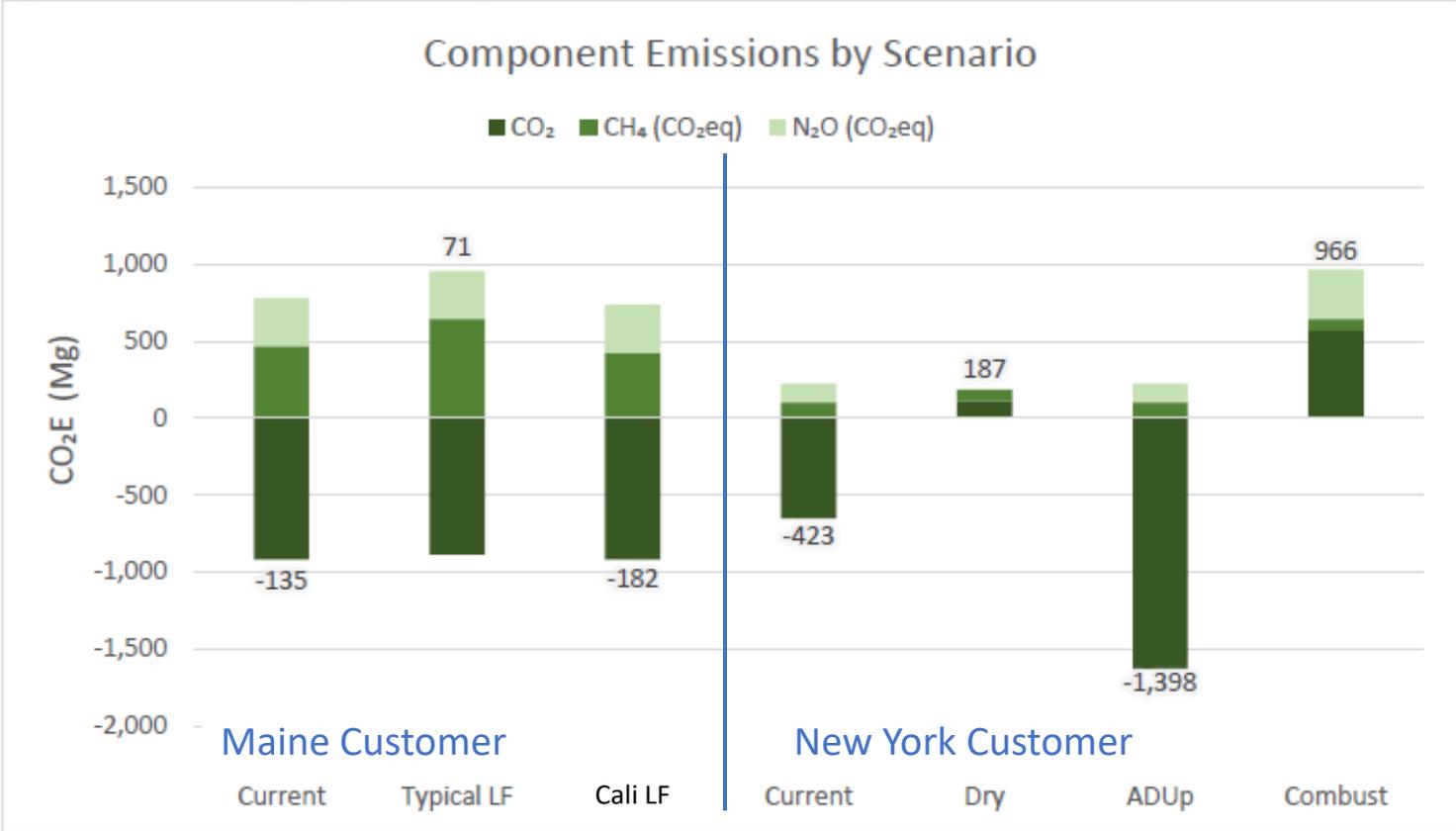
Activities operated or influenced by Casella



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BEAM Results (cont.)

Figure 4.1: Summary of Results for BEAM Alternative Scenarios



Source: Northern Tilth



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Biosolids & Climate – what’s best?

Back to these questions... (extrapolating from our 2 case studies)

- If new biosolids solutions and infrastructure will be required in our region, what will be best for the climate? **More land application, Low emission landfill, Less incineration of biosolids**
- What is the full greenhouse gas impact of Casella’s biosolids management practices? **NY example 0.155 MTCO₂e/wet ton land applied. 130,000 x 0.155 = 20,000 MTCO₂E reduced**
- Where are the carbon “hot spots” in the management of biosolids? **Variable, but the biggest take-away is that land application is a significant net reducer of emissions.**
- How can Casella best help wastewater customers reduce their carbon footprint? **Enable land application, Low emission landfill when land app is not an option, Look at upstream opportunities such as AD and dewatering stages.**



COMET Results

- USDA COMET: Carbon Management and Emissions Tool
- “Official GHG quantification tool of USDA,” developed by NRCS and Colorado State University
- Uses spatially-explicit climate and soil info to quantify on-field GHG impacts of different practices, not specific to biosolids

What we learned:

- The tool has no defaults for use of biosolids on fields
- When we manually set factors, it shows land application of biosolids has a carbon benefit
- However, the model shows an even greater carbon benefit for fields that use conventional fertilizer – this is because of dated assumptions and accounting for N₂O emissions
- Conclusion: COMET could be revised to do a better job communicating the carbon benefits of biosolids land application.

What's next?

- Quantify the net GHG impact of our other biosolids customers using the BEAM
- Conduct similar analyses for our other beneficially used organics
- Spark more conversation about biosolids beneficial use as an important regional climate solution
- Perhaps approach USDA about revisions to their COMET model

Thank you!

To learn more, please visit:

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