ecomaine
Organics Recycling Feasibility Study

Andrew Carpenter, *Northern Tilth* – Belfast, Maine

The Northern Tilth Team

Northern Tilth
Andrew Carpenter
Project Manager

- Northern Tilth
  Andrew Carpenter
- Coker Composting and Consulting
  Craig Coker
- Integrated Waste Management Consulting
  Matt Cotton
- Tech Environmental
  Mike Lannan, P.E.
  Dana Buske, PhD

TASK 1 - Waste Composition and Current Status of Organics Recycling in ecomaine Service Area

2011 Maine Residential Waste Characterization Study

School of Economics Staff Paper #601

by Professor George K. Criner and student Travis L. Blackmer

Existing Collection Systems

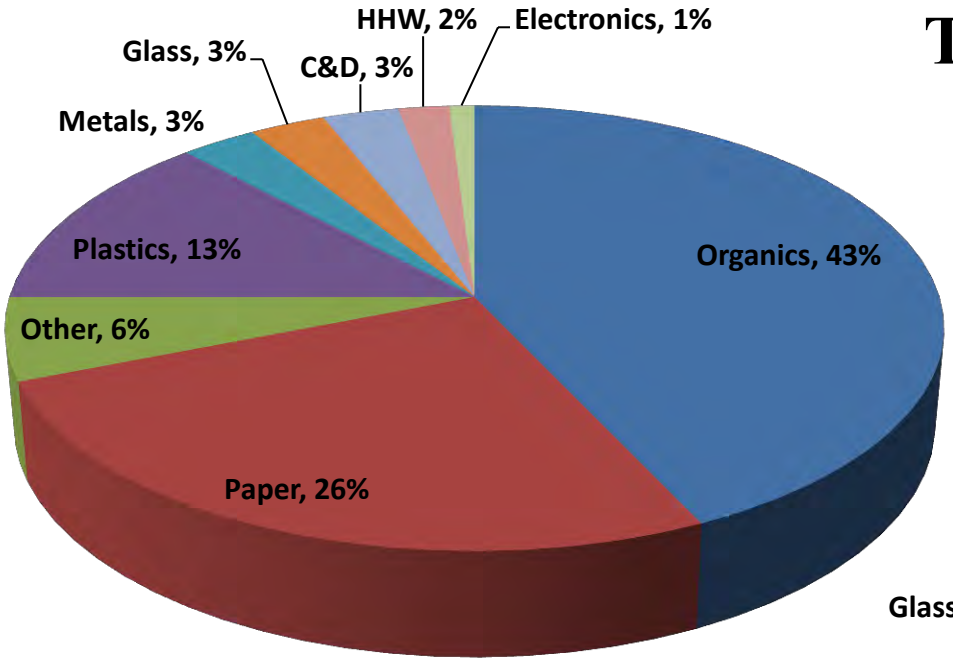
- Determine the current capacity for organics collection with haulers that are servicing ecomaine communities

Waste Composition

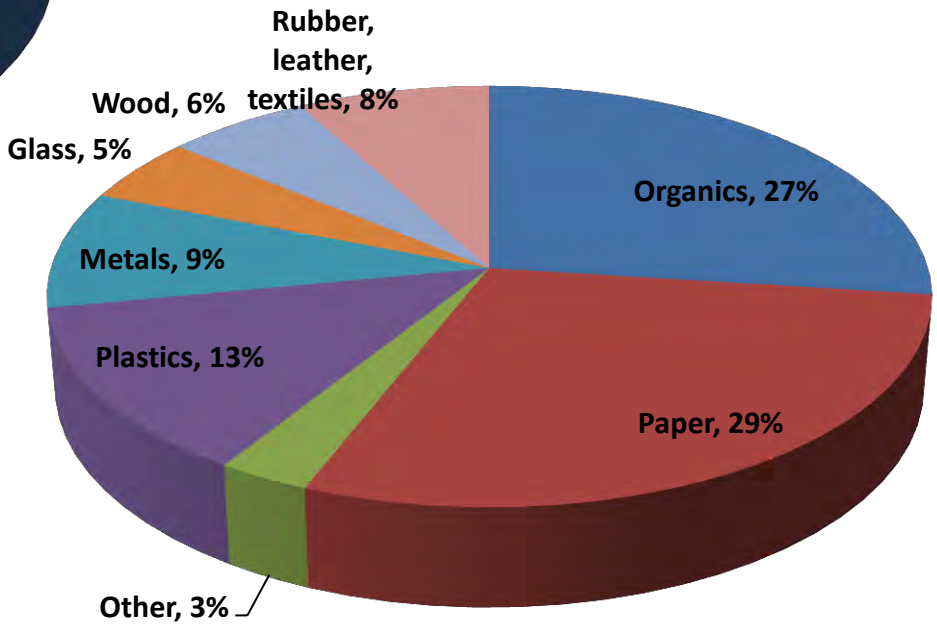
- Use existing data to provide an informed estimate of the waste composition that ecomaine is currently receiving
  - No new research, but a reconciliation of existing knowledge, nationally and locally
  - Account for organics collection programs in place, including Resurgam, institutional, and drop off programs and leaf and yard waste collection already in place
- Report will include high and low range estimates and influence of processing choice on potential diversion rates

TASK 1 – Waste Composition

MSW Composition from 2011 U Maine Study



2010 U.S. Total MSW Generation (by Material)
250 Million Tons (Before Recycling)

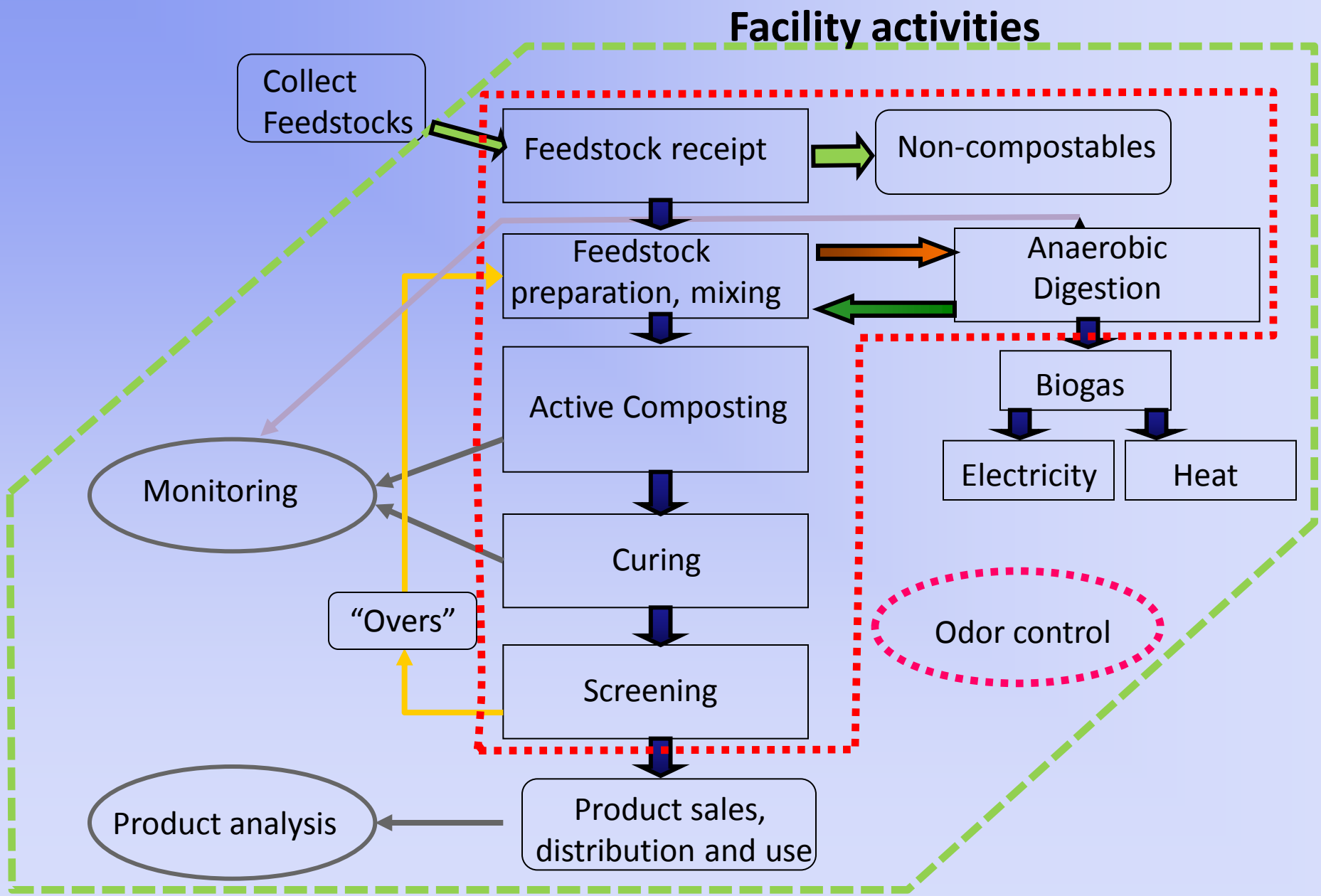


TASK 2 - Collection Systems

TASK 3 - Technology Alternatives Evaluation

- **Organics recycling = biological manufacturing**
  - Inputs – food scraps, green wastes, organics portion of the MSW stream
  - Outputs – recovered energy (biogas), soil amendments (composts)
  - Byproducts – heat, water vapor, CO_2 (biogenic)
- **Goal**
  - Produce the desired amount of marketable product(s) at the needed rate at the lowest cost

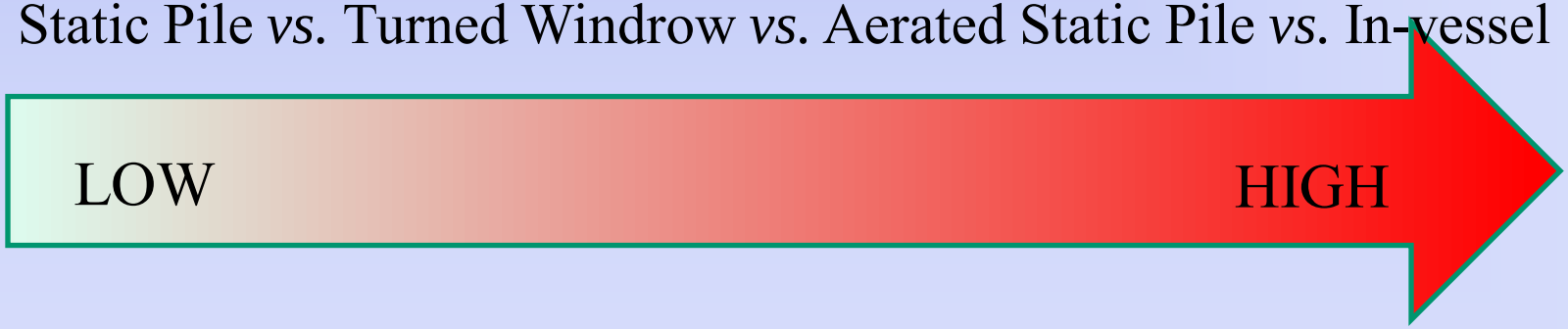
Composting/Anaerobic Digestion Process Flow Diagram



TASK 3 - Technology Alternatives Evaluation

- **Composting**
  - Approach selection depends on:
    - Risk tolerance
    - Feedstock
    - Budget
    - Site and neighbors
  - Approaches vs. technology risk/costs:

Static Pile *vs.* Turned Windrow *vs.* Aerated Static Pile *vs.* In-vessel



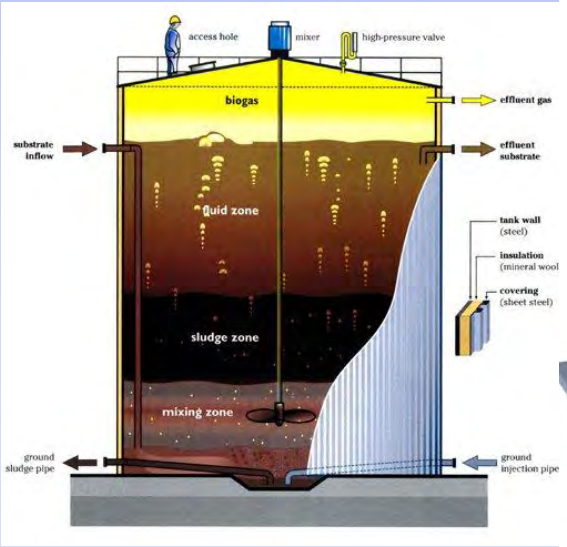

Open-air Windrow

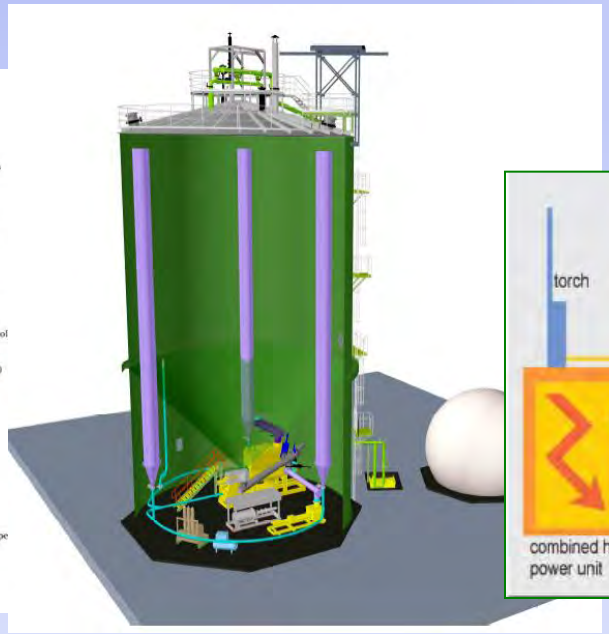

Aerated Static Pile

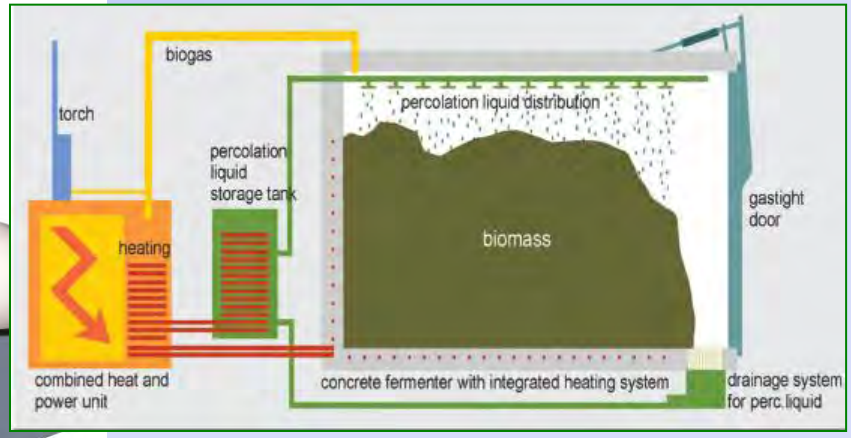

In-Vessel

TASK 3 - Technology Alternatives Evaluation

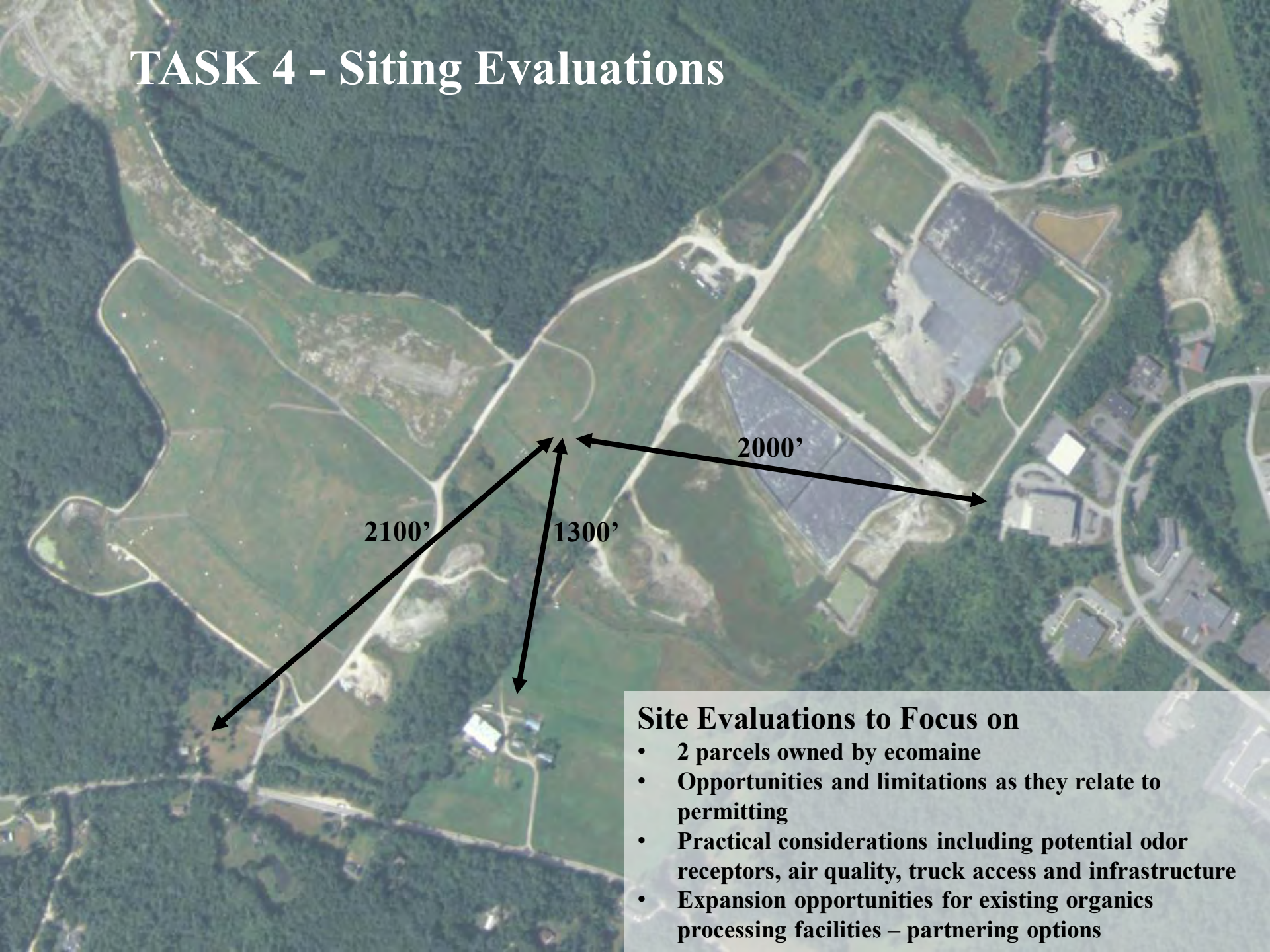
- **Anaerobic Digestion (AD)**
  - A resource extraction step prior to composting
  - Approaches
    - Traditional Liquid Digester – wastewater plants
    - High Solids Slurry Digester – e.g. OWS/Dranco
    - Dry Fermentation Reactor – e.g. BioFerm







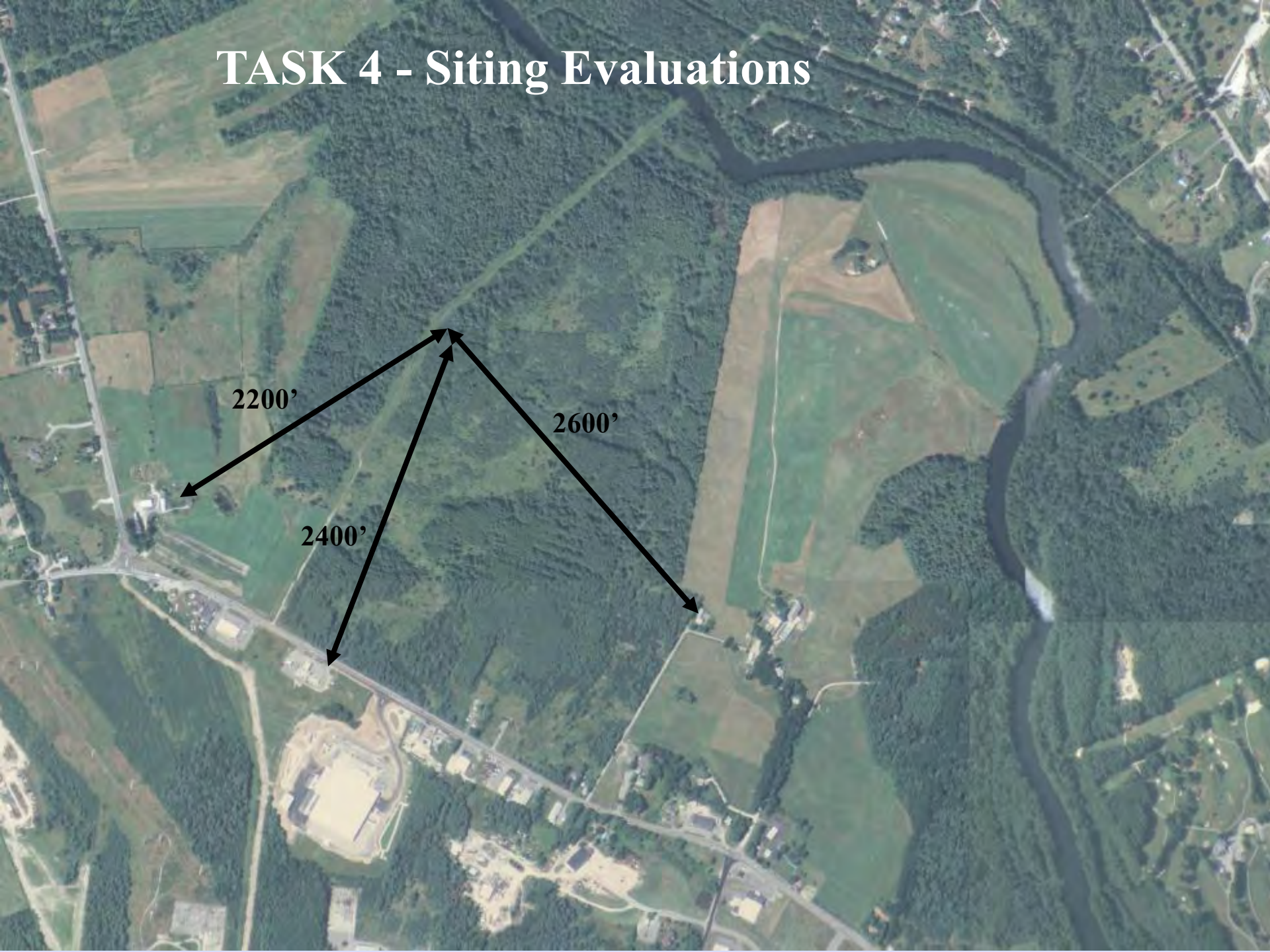
TASK 4 - Siting Evaluations



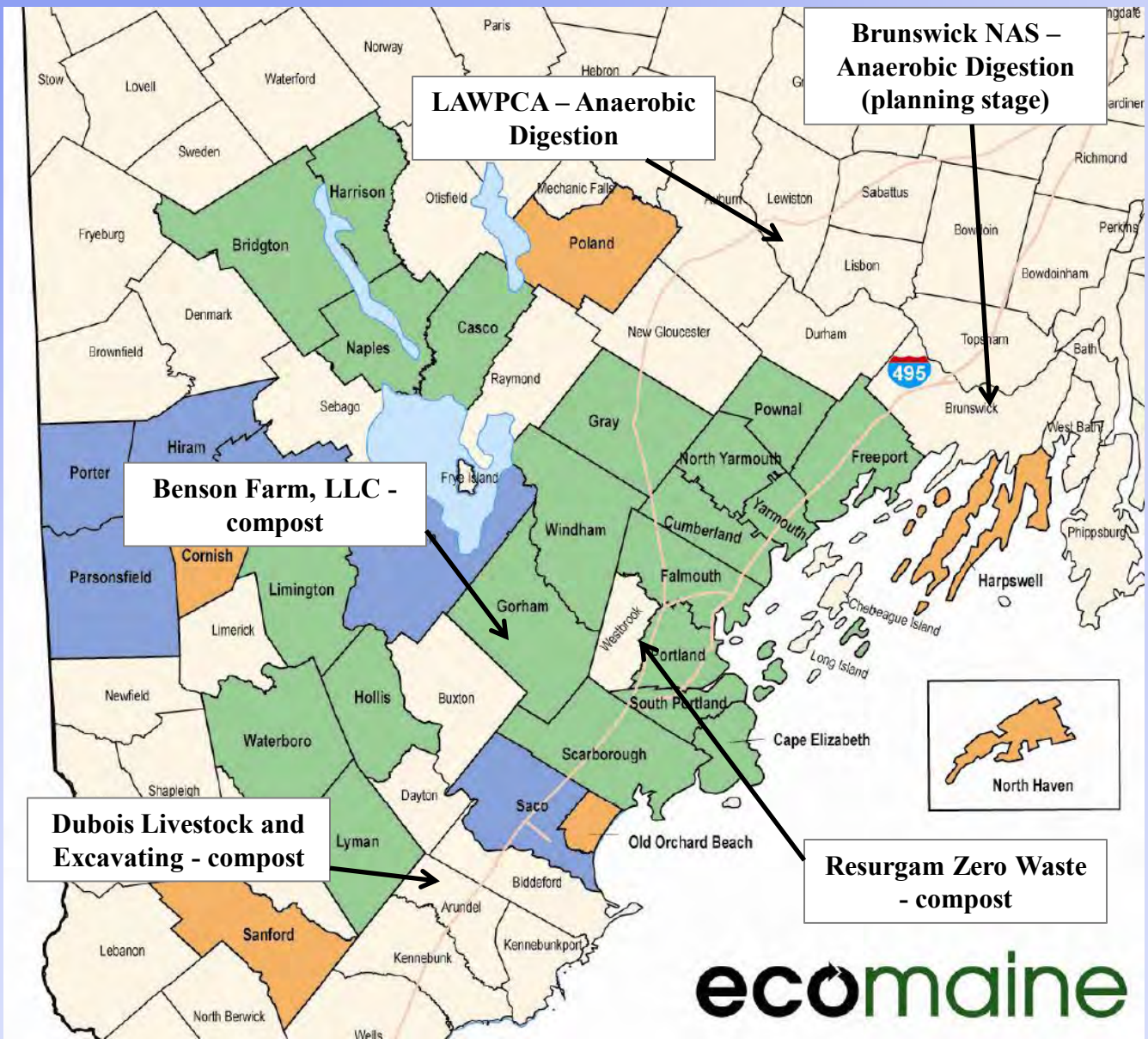
Site Evaluations to Focus on

- 2 parcels owned by ecomaine
- Opportunities and limitations as they relate to permitting
- Practical considerations including potential odor receptors, air quality, truck access and infrastructure
- Expansion opportunities for existing organics processing facilities – partnering options

TASK 4 - Siting Evaluations



TASK 4 -Organics Processing in ecomaine service area



- Some capacity is already in place for organics processing, and it is continuing to grow
- We will provide an estimate on current and future capacity

TASK 5 – WTE Impact Analysis

WTE Changes Related to Organics Diversion

Net Energy Comparisons for ..

- The existing WTE process
- The "new" WTE process with diversion
- The new WTE process - Waste stabilization
- The new WTE process + Anaerobic Digestion Process - Waste stabilization

WTE Diversion Considerations…

- Changes to Criteria Pollutants:
  - Nitrogen oxides
  - Particulate
  - Sulfur dioxide
- Formation of dioxins and furans
- Increased Corrosion potential

TASK 6 – Market Evaluation: Compost/Digestate

Existing Market and Estimates of Value

- Realistic approach to the potential markets for the finished compost
- Don't assume that the first year of composting will produce a high-end compost for bagging

Guidance on Final Product

- Quality, Quality, Quality
- USCC Compost Seal of Testing Assurance
- Risk Reduction through production management and rigorous testing program

TASK 6 – Market Evaluation: Biogas

Uses

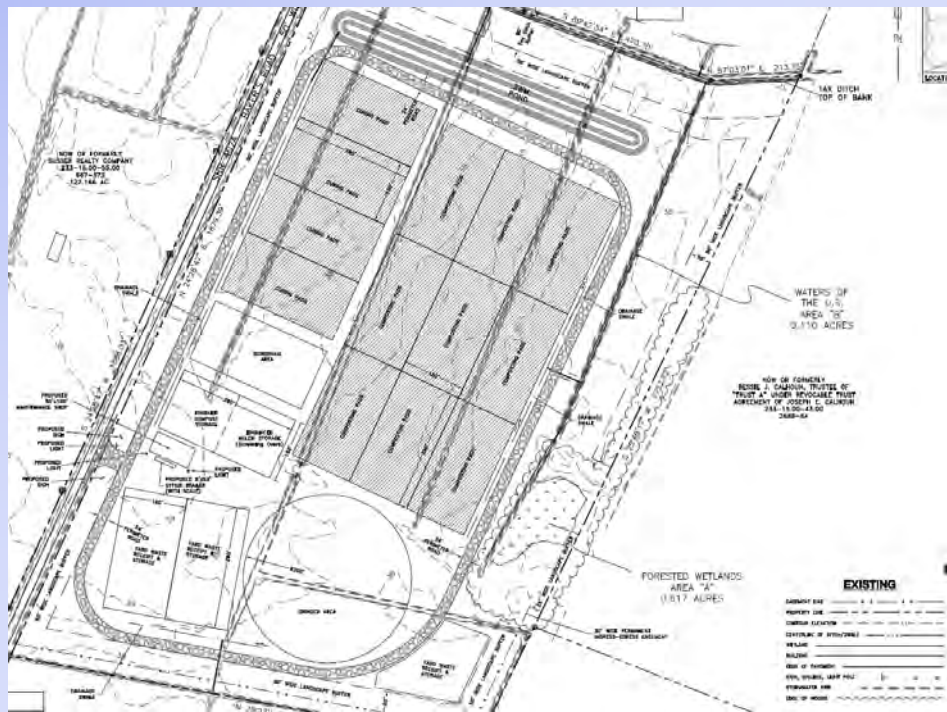
- Electricity production
- Natural gas pipeline injection
- Compression for vehicle fuel

Considerations

- **ecomaine** only gets $0.039/kWh for WTE electricity production in FY13
- Pipeline gas – low natural gas prices (and expected to stay low)
- Vehicle fuel – Some Metro buses and school buses already converted – expansion opportunities?

TASK 7 - Organics Plan & Economic Analysis

- Based on work from Tasks 1 through 6, we will develop up to 6 configurations of collection, processing and marketing organics recycling systems, including a macroeconomic level analysis of the configurations
- After workshop with ecomaine representatives, we will select one configuration and develop a Conceptual Organics Recycling Plan
- Plan Components
  - Recommended SSO diversion/collection strategy
  - Recommended SSO processing system
  - Recovered product(s) markets
  - Site layout & manufacturing process flow
  - Process steps sizings
  - Equipment and Utilities Plan



Economic Analysis

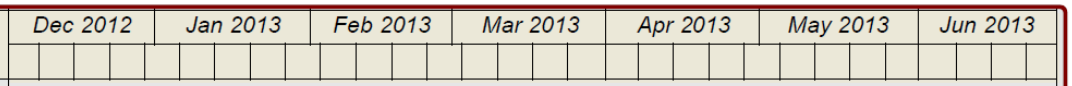
- **Capital Cost Estimate**
  - Site development
  - Utility infrastructure (power/data, water, sewer, storm water)
  - Facility construction
  - Equipment
- **Operating Cost Estimate**
  - Purchased feedstocks (if needed)
  - Labor
  - Maintenance
  - Power/Fuel

TASK 8 - Final Report and Presentations

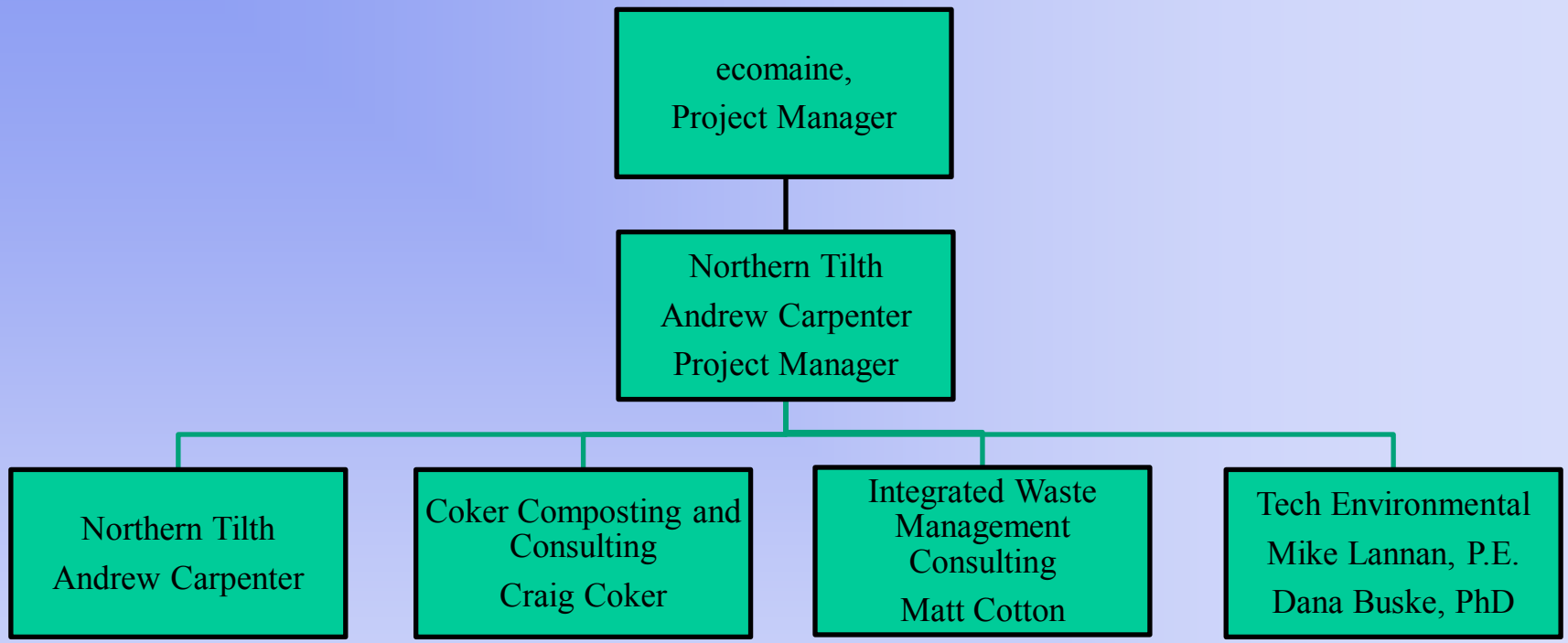
- Final report to include
  - Summary of findings from each task in the feasibility study
  - Conceptual Organics Recycling Plan
  - Stand-alone summary of the organics plan including
    - Facility plan level costs
    - Rationale for technology choices
    - Summary of national and international programs with similar operations and constraints
    - A summary of permitting requirements for implementing the plan
    - Risks related to the plan and how they will be addressed
  - Detailed recommendations for initiating the program, from pilot to full scale implementation
- The Northern Tilth team will develop and give a presentation summarizing the findings from all of the steps from the feasibility study and a thorough explanation of the organics recycling plan
  - The presentation will be designed for ecomaine Board members and other important stakeholders

Proposed Project Schedule

ID	Task Name	Start	Finish	Duration
1	Waste Composition & Current Status	12/10/2012	3/1/2013	60d
2	Feedstock Collection Plan	1/14/2013	4/5/2013	60d
3	Technology Alternatives Evaluation	1/28/2013	3/29/2013	45d
4	Siting Analysis	3/4/2013	4/19/2013	35d
5	WTE Plant Impacts Analysis	3/4/2013	4/19/2013	35d
6	Markets Evaluation	4/22/2013	5/31/2013	30d
7	Conceptual Organics Recycling Plan and Economic Analyses	5/13/2013	6/21/2013	30d
8	Final Report & Presentations	6/21/2013	7/12/2013	16d



The Northern Tilth Team



- **Waste Composition and status of Organics Collection and Diversion**
- **Site Evaluations**
- **Compost/Digestate Market Evaluations**
- **GHG Emissions Analysis**
- **Facility Plan**
- **Final Report and Presentations**

- **Technology Alternative Evaluations**
- **Biogas Market Evaluations**
- **Facility Plan**
- **Economic Analyses**
- **Final Report and Presentations**

- **Feedstock Collection Alternatives**

- **WTE Impact Analysis**
- **Air Quality Impact Analysis**

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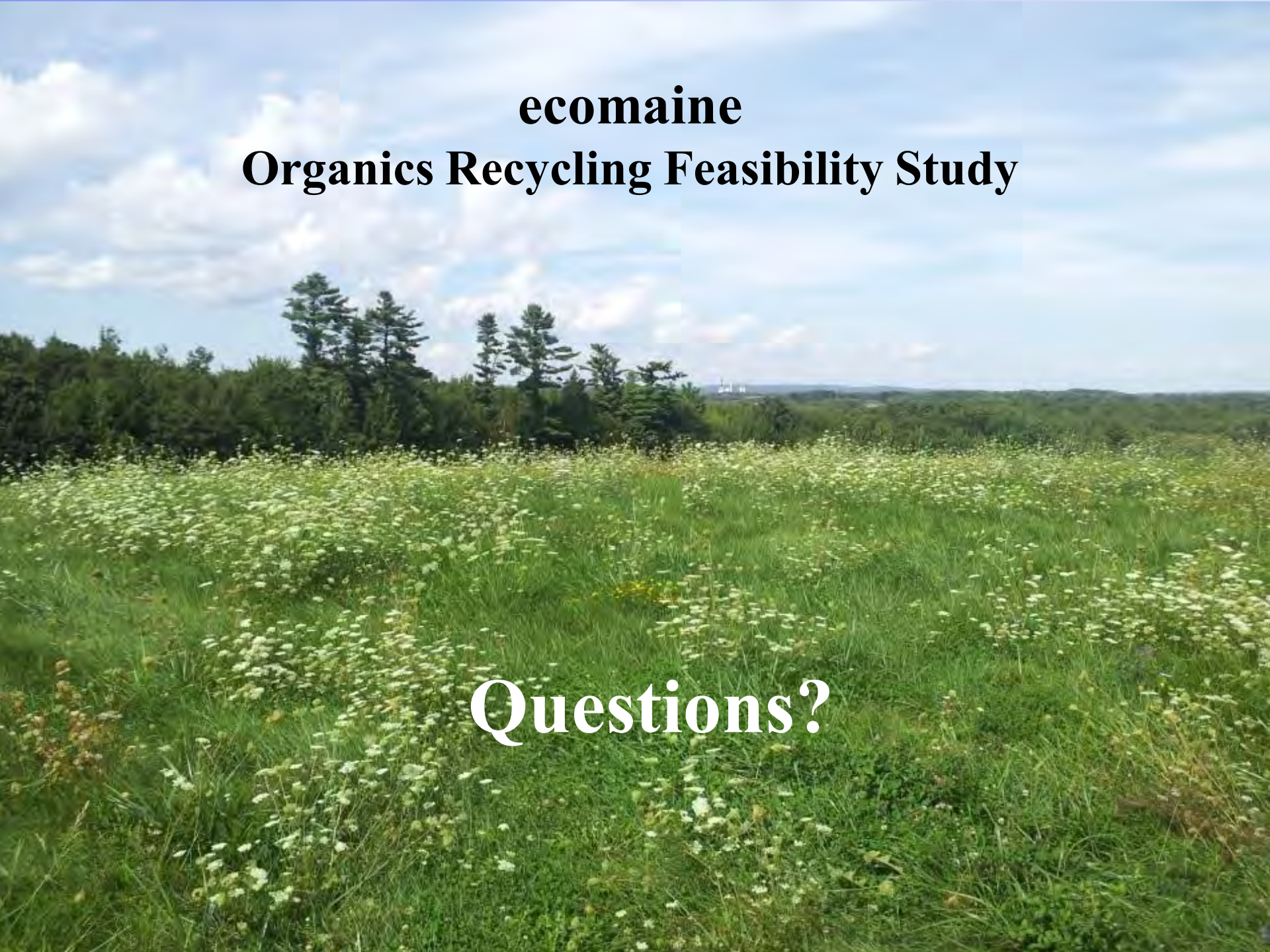

Questions?