Tri-Municipal Organics Facility Feasibility Project

December 6th, 2016

Overview

- Origin
- Project Partners
- Funding Sources
- Project Components
  - Organic Waste Composition
  - Economic Model – Location
  - Governance Review
  - Technology Review
  - Pre-FEED Study

Origin

- Tri-Municipal MOU on Environmental Sustainability Initiatives and Planning
  - Signed by Spruce Grove, Stony Plain, and Parkland County in Summer of 2012
- Organic waste stream identified as an issue/concern/priority by all three municipalities
  - Increase diversion of organic waste from landfill
  - Address uncertainties and long term viability of municipal organics programs
  - Explore value-added processing options
- Tri-Municipal organics feasibility study

Partners

- City of Spruce Grove
- Town of Stony Plain
- Parkland County
- Alberta Innovates
- University of Alberta
- City of Leduc (Observer)

Funding

Funding	Source
$65,000	Regional Collaboration Program
$225,000	Alberta Innovates
$225,000	Alberta Community Partnership
$515,000	**TOTAL**

Organic Waste Composition Study

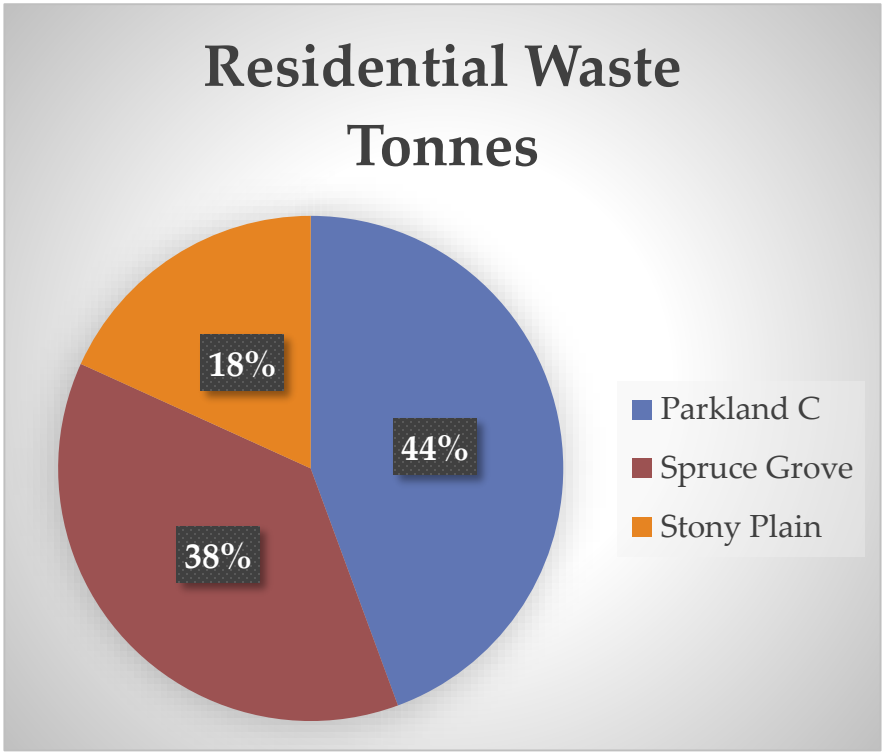
Goal:

Identify the amount and type of organic waste in the Tri-Municipal Region.

Results:

Source	Population	Residential Tonnes (T)/ Year	Avg. Per Capita Residential Waste Disposal (T)	Select ICI Sector Tonnages (T/Year)	Average Food/ Hospital Sector ICI output (T/Capita/ Year)
Tri Region	78,731	20,163	256	9,063	115

Organic Waste Composition



- Single family residential and residential drop off 17,387 tonnes/year
  - 35.8% Organics
- Multi Family Residential 2,776 tonnes/year
  - 35.3% Organics
- Industrial, Commercial and Institutional 9,063 tonnes/year
  - 56% Organics

Economic Model

Goal:

Develop a comprehensive decision-making model to help municipalities make informed decisions on the disposal and use of their wastes.

Results:

Economic modeling tool developed by U of A which:

- Helps to best locate facilities
- Economic decision making tool for waste to energy projects.

Methodology

- Consider a base case
- Make a site selection for a waste conversion facility
- Economic comparison of waste conversion scenarios with landfilling
- Final decision for waste management

Site Selection

All lands are
NOT equally preferable

Pictures collected from:
www.corbisimages.com

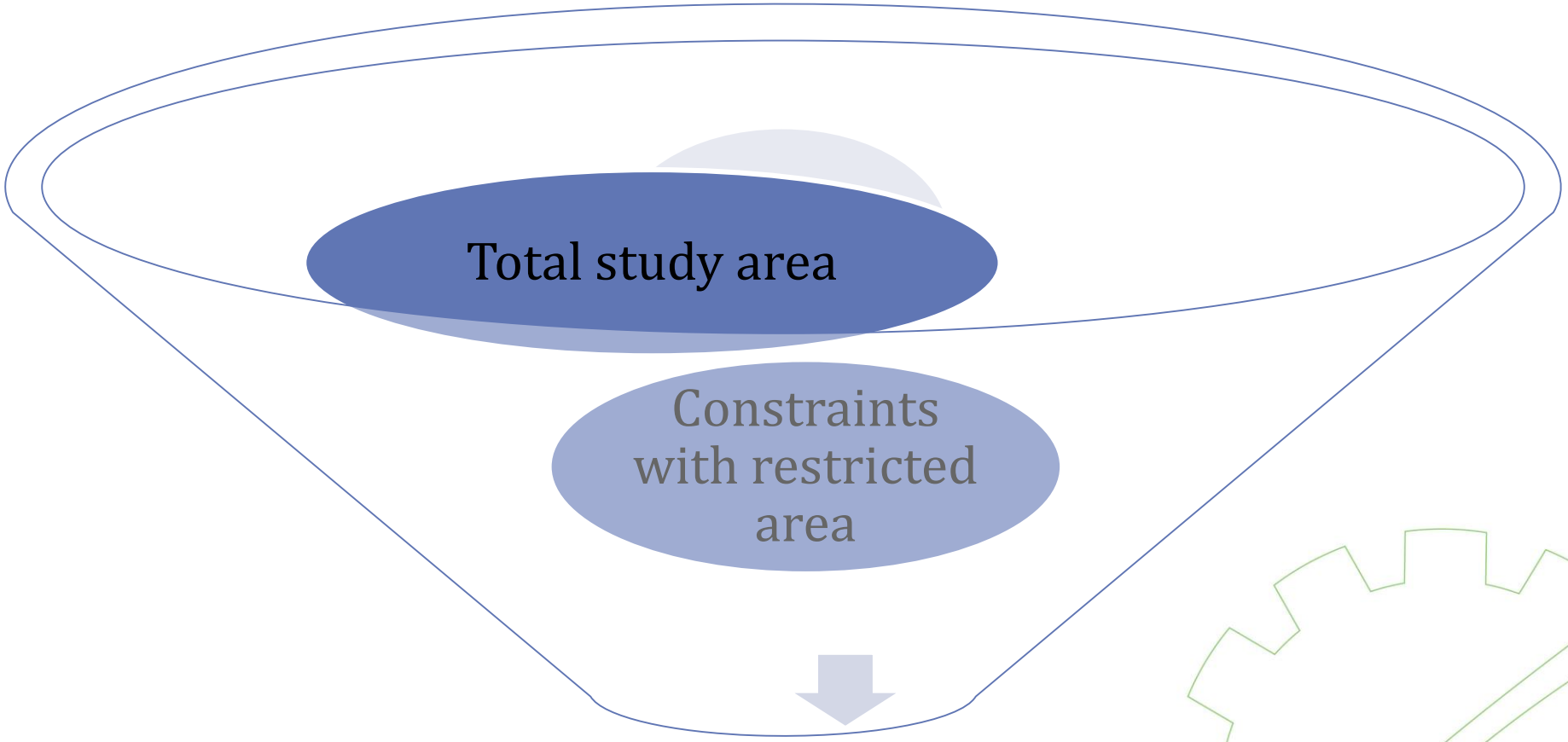
Step 1:
Screen out
unsuitable
lands

Step 2:
Relative
preference
of lands

Result:
Candidate
Sites for
facility
siting

Pictures collected from:
www.corbisimages.com

Screening out unsuitable lands

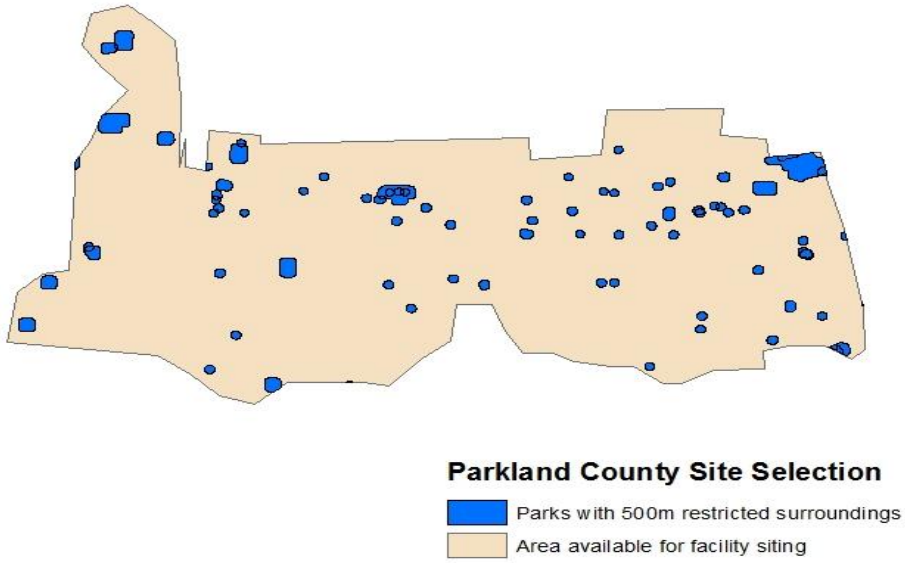


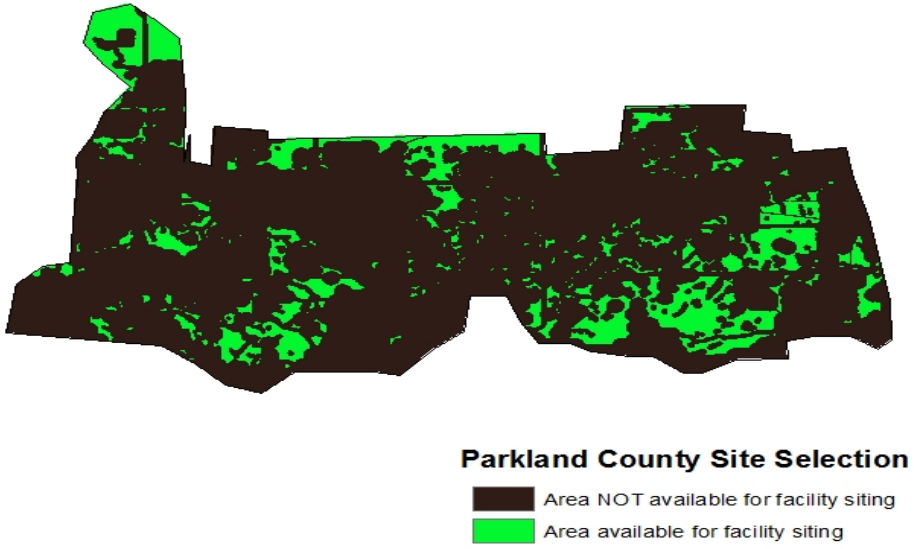
Area available for facility building

Scenarios

- Scenario 1: Landfilling
- Scenario 2: Composting
- Scenario 3: Anaerobic digestion
- Scenario 4: Gasification producing biofuel
- Scenario 5: Gasification producing electricity
- Scenario 6: Gasification (producing biofuel) integrated with anaerobic digestion
- Scenario 7: Gasification (producing electricity) integrated with anaerobic digestion
- Scenario 8: Gasification (producing biofuel) integrated with composting
- Scenario 9: Gasification (producing electricity) integrated with composting

Excluding area from study area





Governance Model

Goal:

Evaluate different governance and funding models that could be used to build and operate a facility.

Results:

- Case studies from other operational waste and waste to energy facilities
- Review of various governance models used for projects in the Tri-Municipal region

Governance Models

- Municipally Controlled Corporation
- Regional Services Commission
- Cooperative
- Part 9 Company
- Federal Non-Profit
- Inter-Municipal Agreement
- Co-ownership
- Unincorporated Committee/Board
- Private Ownership
- Public-Private Partnership (P3)

Governance Models

- Developed a matrix to assess three categories of criteria against each governance type.
- Category A - Of Critical importance – 7 criteria
- Category B – Advantageous to have - 8 criteria
- Category C – Not significant

- Results based upon the evaluation:
  - Municipally Controlled Corporation and Regional Services Commission
  - Cooperative and Part 9 Company

Governance Model Selection

	Separate Legal Entity					Not a Separate Legal Entity		
Criteria	Municipally Controlled Corporation	Regional Services Commission	Cooperative	Part 9 Company	Federal Non-Profit	Intermunicipal Agreement	Co-Ownership	Unincorporated Committee or Board
Category A - Of Critical Importance								
Adequacy of governance model for an organic waste processing facility								
Ease of administration of the governance structure								
Ease of going through the environmental approval/permit process								
Ability of entity to operate independently, hire staff, etc								
Ability of municipality to provide strategic, high level input								
Ability to obtain financing								
Ability to set/adjust reasonable and predictable user fees and operational costs								
Category B - Advantageous to Have								
Ease of making changes to the governance structure once it has been established								
Clear accountability to the municipalities								
Ability to obtain financing from the Alberta Capital Financing Authority								
Ability to limit municipal liability								
Ability to provide services to outside municipalities								
Income tax exemption								
Ease to contract directly with private companies								
Ability of organization to own land								
Category C - Not Significant								
Ease of implementation of the governance structure								
Allowance for proportional ownership								
Ability of facility to generate profit and distribute profit to its members								

Technology Review

Goal:

Evaluate different available technologies for processing organic waste given the current and expected volume of organic waste generation.

Results:

- Case studies, criterion development, comparisons and recommendations.

Technology Review

Technologies reviewed included:

- Wet anaerobic digestion
- Dry anaerobic digestion
- Gasification/Pyrolysis
- Refuse derived fuel
- Hydrothermal carbonization
- Bio-Battery
- Traditional In-Vessel composting (baseline comparison)

Technology Review

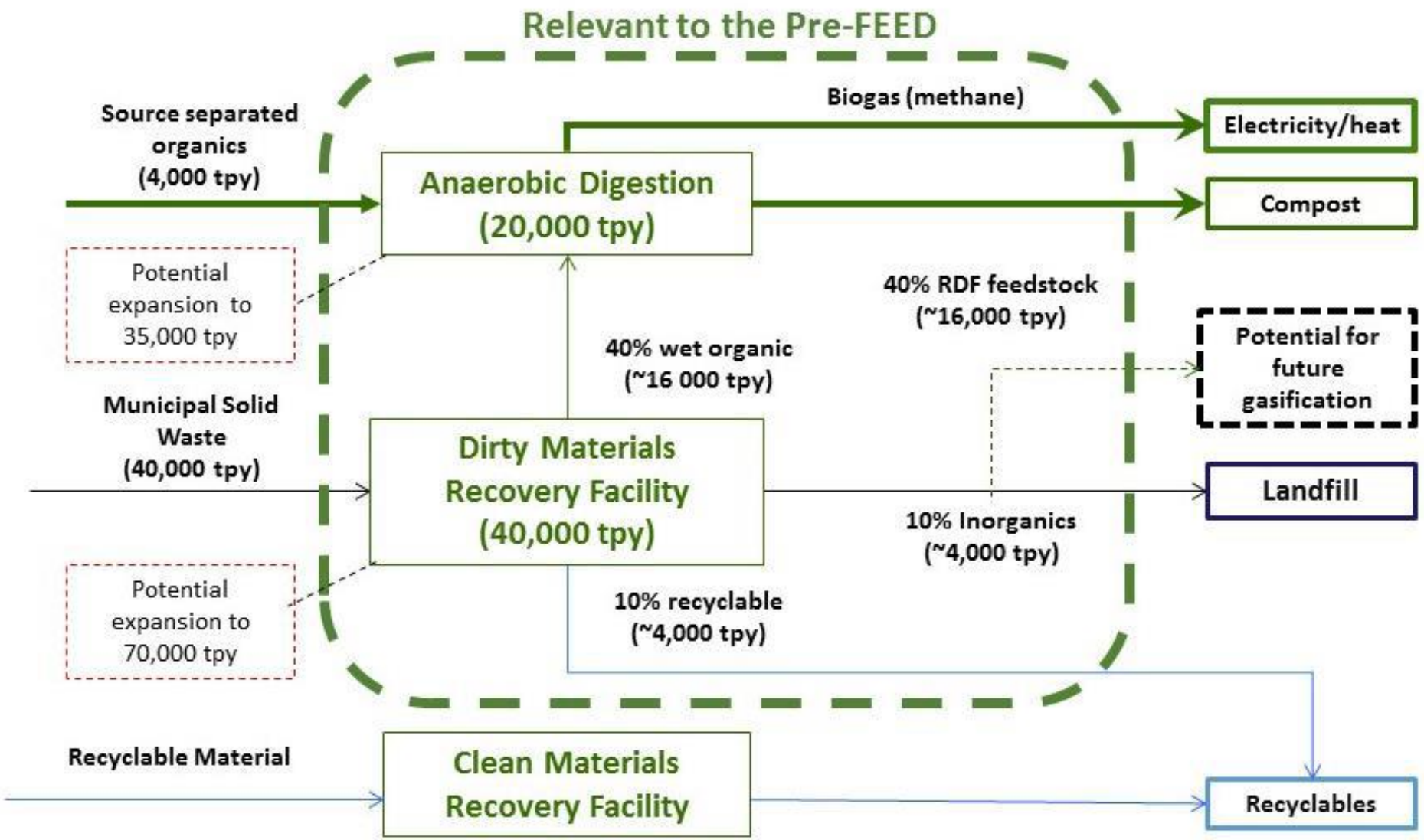
Two best:

- Dry Anaerobic Digestion (AD)
- Refuse Derived Fuel (RDF)

Most acceptable:

- Dry Anaerobic Digestion
- Added to the final technology- a dirty Material Sorting Facility (MRF) to increase diversion from landfill

parkland county



Pre-Front End Engineering Design (Pre-FEED)

Goal:

Provide a 30% blueprint and class C financial estimate for capital cost and estimate for operational costs.

Results:

- Integrated facility design to include AD and dirty MRF
- Future expansion by 75% incorporated into design
- Generation of gas = combined heat and power= internal use plus 540 Kw sold to the grid (enough power for 660 Alberta households)

Pre-Front End Engineering Design (Pre-FEED)

Pre-Front End Engineering Design (Pre-FEED)

- Financial Estimates
- Total capital cost for the facility is $55 million (includes 10% contingency)
  - AD facility - $15.5 million
  - MRF Facility - $9.8million
  - Balance of plant - $24.8 million
  - Site cost and permits - $5.8 million
- Annual operating costs:
  - AD Facility -$0.67 million
  - MRF facility - $1.06 million

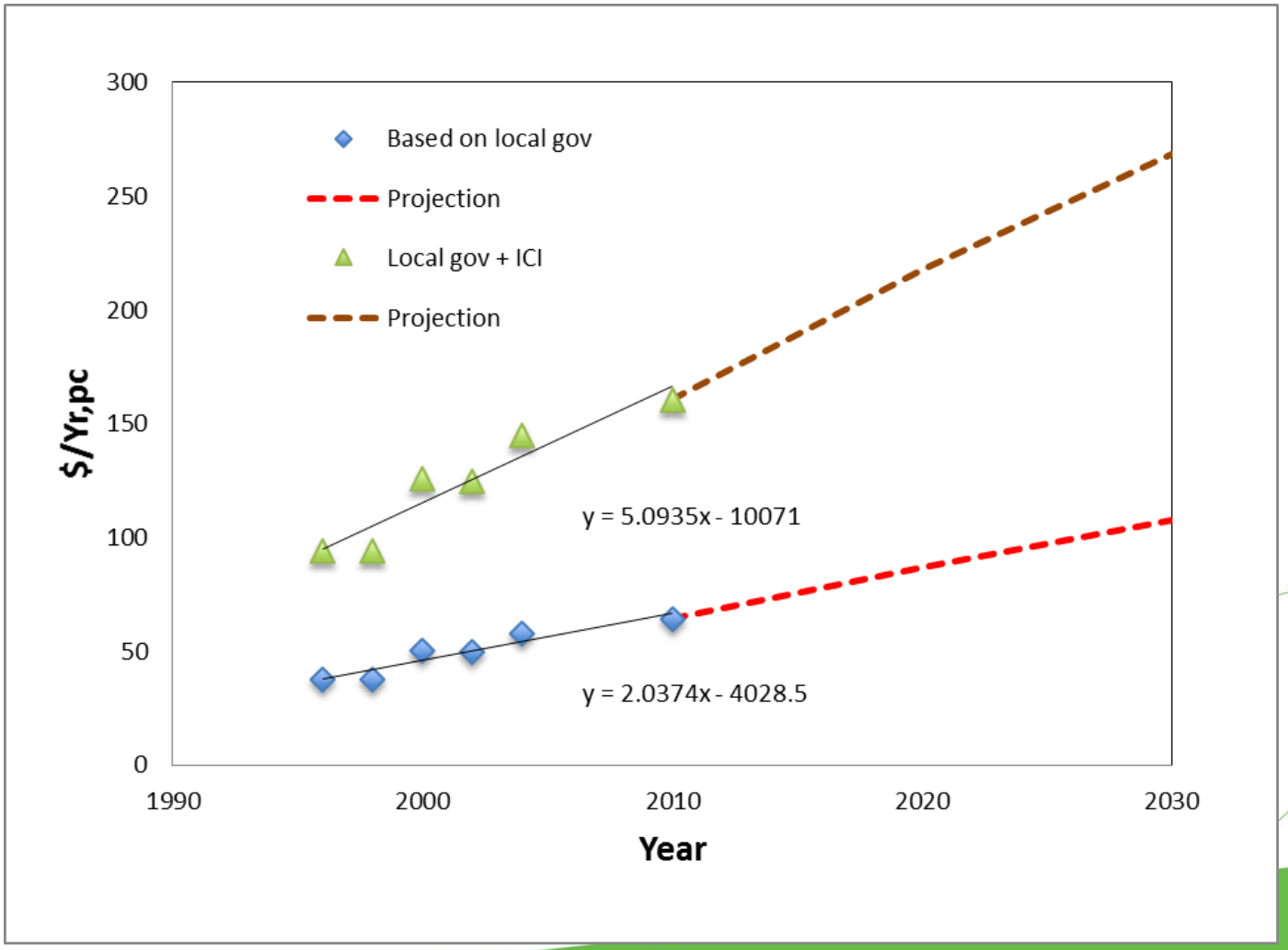
Pre-Front End Engineering Design (Pre-FEED)

Cost Component	Annual Cost no Grants	Annual Cost 25% Grant	Annual Cost 50% Grant	Annual Cost 75% Grant
Annual capital costs	$4,478,970	$3,359,227	$2,239,485	$1,119,742
Annual operating costs AD	$617,781	$617,781	$617,781	$617,781
Annual operating costs dirty MRF	$1,069,468	$1,069,468	$1,069,468	$1,069,468
TOTAL ANNUAL COSTS	$6,166,219	$5,046,476	$3,926,734	$2,806,992
Annual tonnage received	44,000	44,000	44,000	44,000
Cost per tonne	$140	$115	$89	$64

Spruce Grove Business Case

- Waste diversion from landfill in the residential sector would increase from 32% to 73%
- Annual costs would increase by about 15% from $ 1.56 million to $1.79 million, or by about $230,000;
- The per tonne cost would rise from current $179 per tonne to $208 per tonne (these costs include collection and processing of waste);
- With a 50% Capital Grant the cost would be reduced to about $157 tonne a saving over current costs of $22 per tonne. Additional savings are possible for utilizing the composted product and utilizing of the residual waste for RDF. Diversion to 90% is possible.

Risks – Increasing costs to landfill



Benefits

- Local job creation
- Stabilizing the cost of handling MSW
- Reducing GHG emissions
- Greening our operations
- Building sustainable and resilient communities

Next Steps Required

Spruce Grove and Stony Plain Council motions:

- Discussion with Edmonton about utilizing their facilities
- Additional financial analysis is required for each municipality
- Consideration of risks and benefits
- Grant availability
- Identifying a facility location

Recommendation: Complete engineering design to allow quantifiable costing for the project