

# Public Consultation Appendix

## Presentation Materials

Includes

Presentations to Kingsville Council

Open House Display Panels

Public Meeting Presentations

# REMASCO Formal Updates To Kingsville Council

Feb /'11

Sep /'10

Nov /'08

July /'08

Oct /'07

# Renewable Energy Management & Services Company (REMASCO) & The Leamington & Kingsville Greenhouse Industry

(Update to Kingsville Council – Oct 15, 2007)

## REMASCO MANDATE

To secure, transport, store, distribute and beneficially utilize quantities of engineered fuel pellets (eg: Enerpax) and agricultural residues under long term contract. All to be done in an environmentally and socially responsible manner.

### ASSESSMENT OF FUEL OPTIONS AVAILABLE TO THE LEAMINGTON/KINGSVILLE GREENHOUSE INDUSTRY

FUEL	Cost	Units	LHV Energy Content BTU/lb	Moisture	Ash	Delivered Fuel Cost \$/GJ	Typical Combustion Efficiency	Cost \$/GJ of Delivered Hot Water
Natural Gas	\$0.50	Tg	25,000	N/A	N/A	\$8.00	90%	\$16.00
#6 Fuel Oil	\$0.55	Libre	20,000	N/A	N/A	\$12.12	87%	\$13.94
Wood Chips	\$40.00	Ton	5,000	25%	1%	\$8.45	64%	\$5.39
Coal	\$100.00	Ton	10,000	10%	7%	\$5.70	86%	\$6.63
Com	\$100.00	Ton	5,000	20%	1%	\$9.48	75%	\$12.64
Baled Agricultural Residues	\$40.00	Ton	3,500	20%	3%	\$5.42	71%	\$7.22
Pelletized Agricultural Residues	\$50.00	Ton	3,500	15%	3%	\$6.77	73%	\$9.03
Potential Volumes within 300km (tonnes)								
<b>WASTE FUELS ASSESSED</b>								
Clean Waste Wood	\$55	Tonne	6,000	25%	3%	\$3.94	75%	\$5.75
Virgin Waste Wood	\$75	Tonne	3,250	35%	3%	\$9.92	75%	\$13.23
C&D Waste	\$45	Tonne	6,000	20%	5%	\$3.22	75%	\$4.39
Old Corrugated Cardboard	\$75	Tonne	7,500	10%	3%	\$4.50	75%	\$5.73
Old Newspapers	\$67	Tonne	7,500	10%	3%	\$4.99	75%	\$6.65
Handpack	\$44	Tonne	8,000	5%	2%	\$2.66	75%	\$3.15
Waxed Cardboard	\$35	Tonne	12,000	5%	1%	\$1.25	75%	\$1.67
Polyethylene Film	\$25	Tonne	17,000	2%	0.5%	\$0.63	75%	\$0.84
Treated Woods	\$30	Tonne	8,000	10%	1.0%	\$1.81	75%	\$2.15
<b>AG RESIDUES &amp; ENERGY CROPS</b>								
Switchgrass 3rd Yr +	\$80	Tonne	5,000	20%	2%	\$8.68	75%	\$9.17
Henp	\$100	Tonne	5,000	20%	2%	\$8.77	75%	\$11.89
Wheat Straw	\$120	Tonne	5,000	20%	10%	\$10.32	75%	\$13.76
Short Rotation Willow	\$170	Tonne	5,000	20%	1%	\$14.62	75%	\$19.49
Poplar	\$170	Tonne	5,000	20%	1%	\$14.62	75%	\$19.49
Miscanthus 3rd Yr +	\$98	Tonne	5,000	20%	2%	\$5.67	75%	\$7.57
Com Straw	\$45	Tonne	5,000	20%	7%	\$3.70	75%	\$4.93
Sorghum Sudin	\$95	Tonne	5,000	20%	3%	\$8.17	75%	\$10.89
Big Bluestem	\$93	Tonne	5,000	20%	2%	\$8.00	75%	\$10.66
Reed Canary Grass	\$93	Tonne	5,000	20%	6%	\$7.14	75%	\$9.51
Soybean Straw	\$25	Tonne	5,000	20%	10%	\$2.15	75%	\$2.87

GreenhouseEnergyAssessments.xls FuelAssessment

3/5/2007

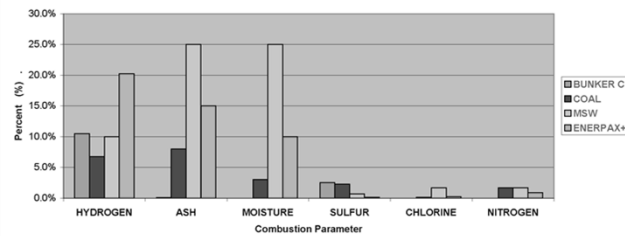
### FUEL ASSESSMENT OF ENERPAX VS OTHER FUELS

Parameter	#6 Fuel BUNKER C	US BITUMINOUS COAL	TYPICAL MUNICIPAL SOLID WASTE	ENERPAX
ENERGY (HHV BTU/lb)	18,000	12,000	5,400	8,000
ASH	0.1%	8.0%	25.0%	15.0%
MOISTURE	-	3.0%	25.0%	10.0%
HYDROGEN	10.5%	4.5%	3.0%	9.0%
SULFUR	2.5%	1.5%	0.20%	0.05%
CHLORINE	-	0.10%	0.5%	0.10%
NITROGEN	-	1.10%	0.5%	0.40%
mg/kg (or ppm)				
Barium		40	52	4.5
Cadmium		100	13	0.075
Chromium		9.6	92	0.9
Lead		100	163	2.7
Mercury		0.093	0.733	0.005

### ASSESSMENT OF FUELS NORMALIZED TO ENERGY DELIVERED

	BUNKER C	COAL	MSW	ENERPAX+
HYDROGEN	10.5%	6.8%	10.0%	20.3%
ASH	0.1%	8.6%	25.0%	16.0%
MOISTURE	-	3.0%	25.0%	10.0%
SULFUR	2.5%	2.3%	0.7%	0.1%
CHLORINE	-	0.15%	1.67%	0.23%
NITROGEN	-	1.7%	1.7%	0.9%

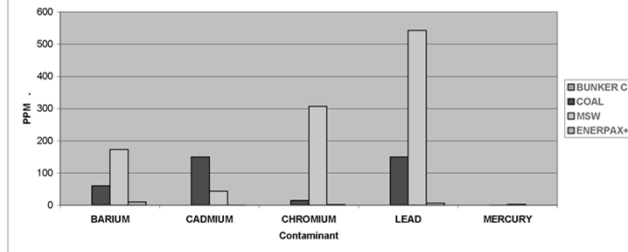
#### ENERPAX COMBUSTION CHARACTERISTICS



### ASSESSMENT OF FUEL CONTAMINANTS NORMALIZED TO ENERGY DELIVERED

	BUNKER C	COAL	MSW	ENERPAX+
BARIIUM	60	173	10	10
CADMIUM	150	43	0.169	0.169
CHROMIUM	14	307	2	2
LEAD	150	543	6	6
MERCURY	0.14	2.44	0.01	0.01

#### ENERPAX FUEL CONTAMINANTS COMPARISON

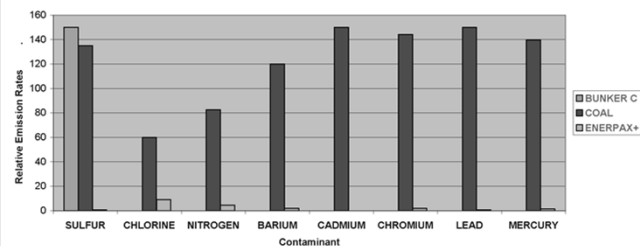


### ENVIRONMENTAL IMPACT OF A7 ENERPAX VERSUS UNABATED COAL & BUNKER C

	BUNKER C	COAL	ENERPAX+	Coal/Enerpax Impact Ratio	450hp Mass Emissions* (Kgs/Yr)	
SULFUR	150.0000	135.0000	0.6750	200	99.526	498
CHLORINE		60.0000	9.0000	7	6.635	995
NITROGEN		82.5000	4.5000	18	72.986	3,981
BARIIUM		120	2.0	59	265	4.5
CADMIUM		150	0.02	8889	964	0.1
CHROMIUM		144	2.0	71	64	0.9
LEAD		150	0.6	247	664	2.7
MERCURY		140	1.350	103	0.62	0.006

\* = 84,000 Gt/yr

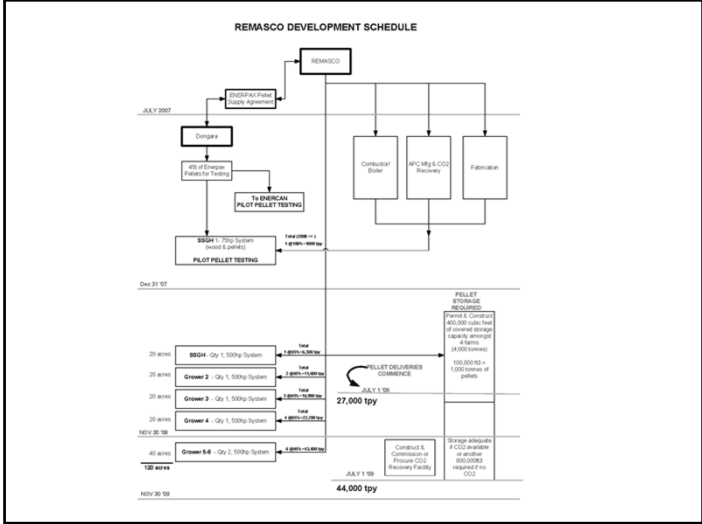
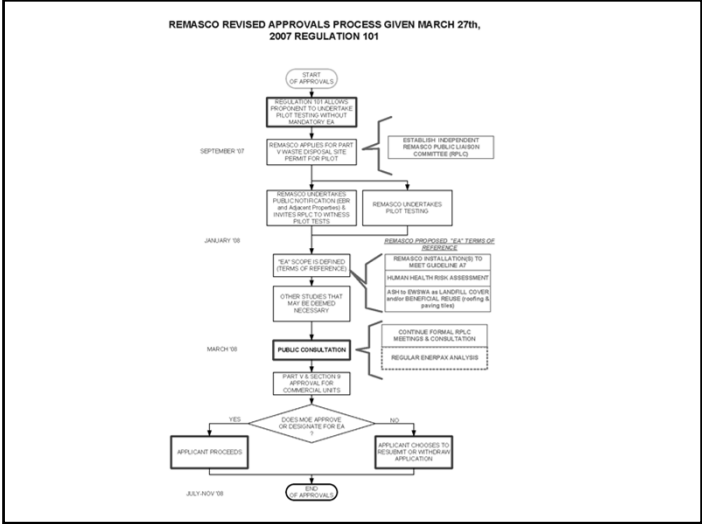
#### RELATIVE ENVIRONMENTAL BENEFIT OF ENERPAX



## EMISSIONS COMPARISON

Contaminant	Coal	Enerpax
Particulate (mg/Rm3)	250	17
SO2 (mg/Rm3)	1500	56
NOx (mg/Rm3)	500	207
CO (mg/Rm3)	50	35





### **APPROVALS OVERVIEW (1 of 3)**

REMASCO wishes to undertake complete emissions and environmental testing using the Enerpax pellets and vine/rockwool residues before commencing its public consultation process for the proposed REMASCO facilities.

### **APPROVALS OVERVIEW (2 of 3)**

All REMASCO facilities using the Enerpax pellets within Essex County will be required to secure approval from the Essex Windsor Solid Waste Authority.

### **APPROVALS OVERVIEW (3 of 3)**

REMASCO, as part of its public consultation process will consult with neighbours of the proposed sites for its thermal/cogeneration facilities and invite them to participate in an ongoing community RESCO Liaison Committee.

### **MUNICIPAL SUPPORT REQUEST**

REMASCO, is asking the Municipalities of Leamington and Kingsville to support the described, step-by-step approvals process in REMASCO's quest to receive its Environmental Permits.

**Renewable Energy Management &  
Services Company (REMASCO)  
&  
The Kingsville & Leamington  
Greenhouse Industry**

(Update to Kingsville Council – July 28, 2008)

## REMASCO UPDATE (1 of 2)

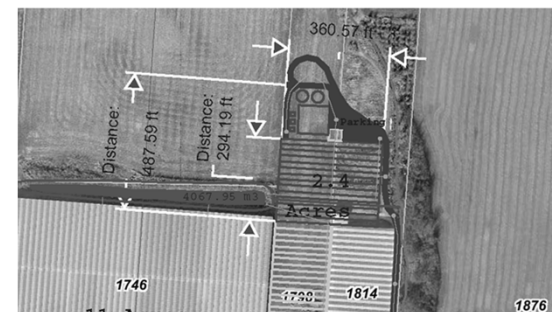
Process Testing conducted during March '08 were sufficiently encouraging to warrant a scale-up of the 100hp Pilot.

REMASCO has submitted application for amendment to allow our existing pilot approval to be expanded and extended. Such amendment request has been publicized on EBR as well as through the Remasco Public Liaison Committee.

The expanded Pilot, also to be conducted at SSGH will be comprised of three 400hp units, scheduled for commissioning late this year. Southshore is presently seeking site plan approval from the municipality to construct a facility to house the expanded pilot in addition to a proposed 2.4 acre expansion of the SSGH greenhouse facility.



## SOUTHSHORE GREENHOUSES PROPOSED EXPANSION



# REMASCO UPDATE (2of2)

The MOE is seeking comment from the County and Municipality. The County has granted approval subject to REMASCO committing to provide ongoing reporting of all environmental tests.

Upon receipt of the results from testing scheduled for Spring '09, REMASCO will undertake a comprehensive public consultation process of its own before constructing of any further MOE approved facilities.

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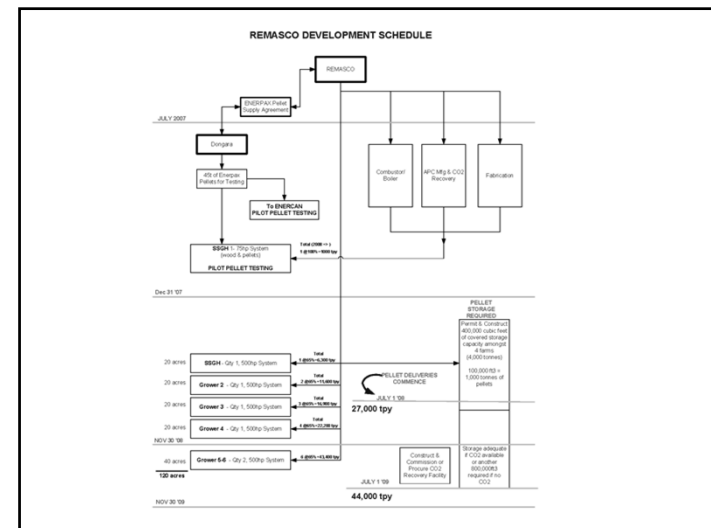
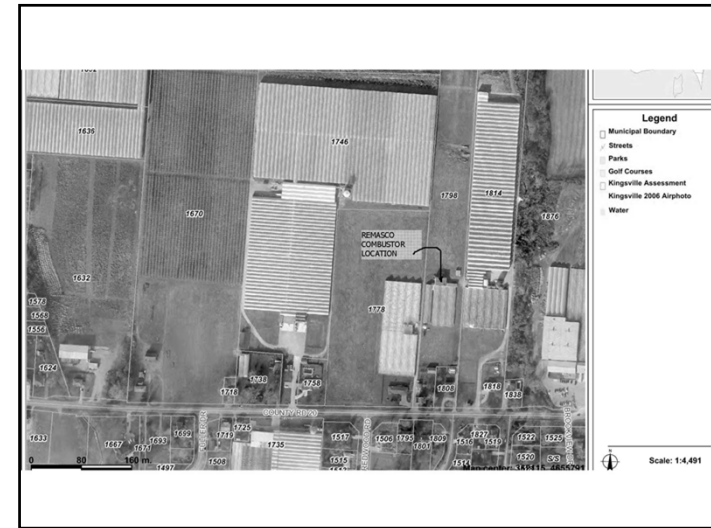
graph TD
    Start([START OF APPROVALS]) --> Step1[REGULATORY UNIT ALLOWS PROPOSITOR TO ADVERTISE PILOT TESTING WITHOUT MANDATORY EA]
    Step1 --> Step2[REMASCO APPLIES FOR PART V(4) AND PART V(1) PERMIT FOR PILOT]
    Step2 --> Step3[REMASCO PRIORITIZES PUBLIC CONSULTATION (BIR and Agency's Presence & Invites to Witness PILOT TESTS)]
    Step2 --> Step4[ESTABLISH INDEPENDENT REMASCO PUBLIC-OWNERS COMMITTEE (RPLC)]
    Step3 --> Step5[REMASCO UNDERTAKES PILOT TESTING]
    Step5 --> Step6[REMASCO PROPOSES "FIT" TERMS OF REFERENCE]
    Step6 --> Step7["FIT SCORE (BASED ON TERMS OF REFERENCE)"]
    Step6 --> Step8[REMASCO INSTALLATION TO MEET GUIDELINE #2]
    Step7 --> Step9[OTHER STUDIES THAT MAY BE REQUIRED NECESSARY]
    Step8 --> Step10[HUMAN HEALTH RISK ASSESSMENT]
    Step10 --> Step11[APPROPRIATE AND LOGICAL CONSIDER BENEFICIAL, REDUCE (Dwelling & Living Time)]
    Step9 --> Step12[PUBLIC CONSULTATION]
    Step11 --> Step12
    Step12 --> Step13[CONTINUE FORMAL RPLC MEETINGS & CONSULTATION]
    Step12 --> Step14[REGULAR ENERGY ANALYSIS]
    Step13 --> Step15[PART V(4) SECTION 9 APPROVAL FOR COMMERCIAL UNITS]
    Step15 --> Decision{CODE MAKE APPROVE OR DESIGNATE FOR EA}
    Decision -- YES --> Step16[APPLICANT PROCEEDS]
    Decision -- NO --> Step17[APPLICANT CHOOSES TO RESUBMIT OR WITHDRAW APPLICATION]
    Step16 --> End([END OF APPROVALS])
    Step17 --> End
  
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**SEPTEMBER '07**

**JANUARY '08**

**MARCH '08**

**JULY NOV '08**



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### **MUNICIPAL SUPPORT REQUEST**

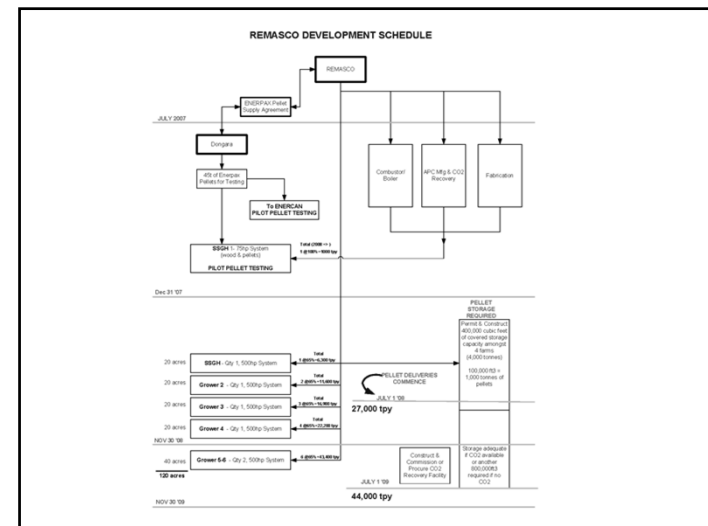
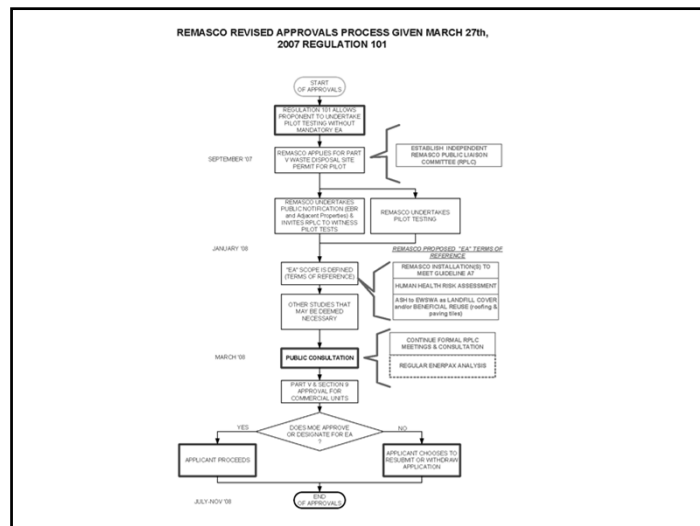
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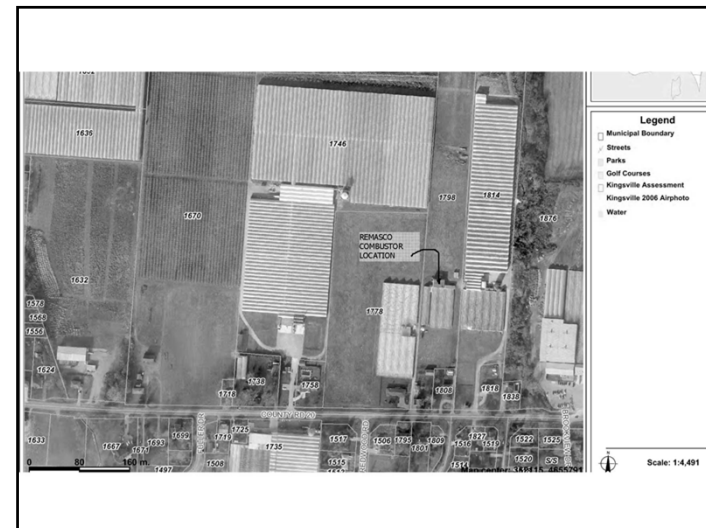
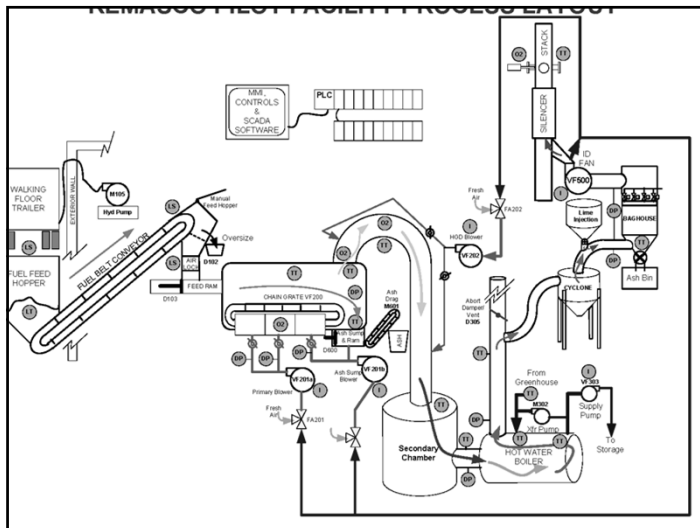
**Renewable Energy Management &  
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&  
The Leamington & Kingsville  
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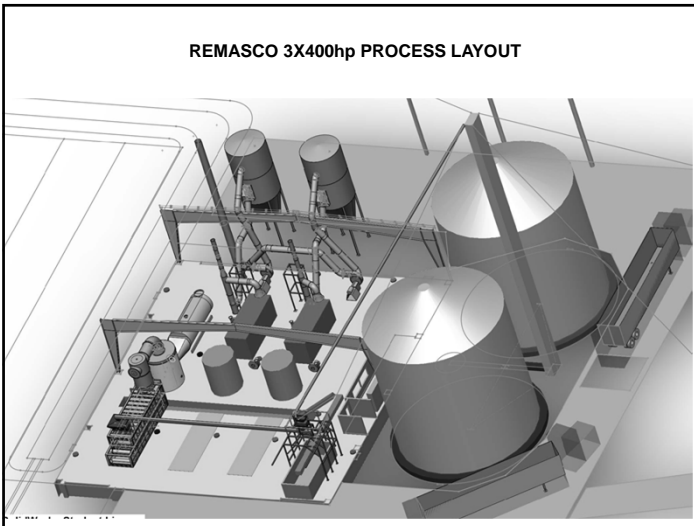
**(Update to Kingsville Council – Nov, 2008)**

## REMASCO MANDATE

To secure, transport, store, distribute and beneficially utilize quantities of engineered fuel pellets (eg: Enerpax) and agricultural residues under long term contract. All to be done in an environmentally and socially responsible manner.







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**Renewable Energy Management &  
Services Company (REMASCO)  
&  
The Leamington & Kingsville  
Greenhouse Industry**

(Update to Kingsville Council – October 12, 2010)

**REMASCO - SSGH**



*Unit 2 Recirculated Flue Gas & Steam Injection*

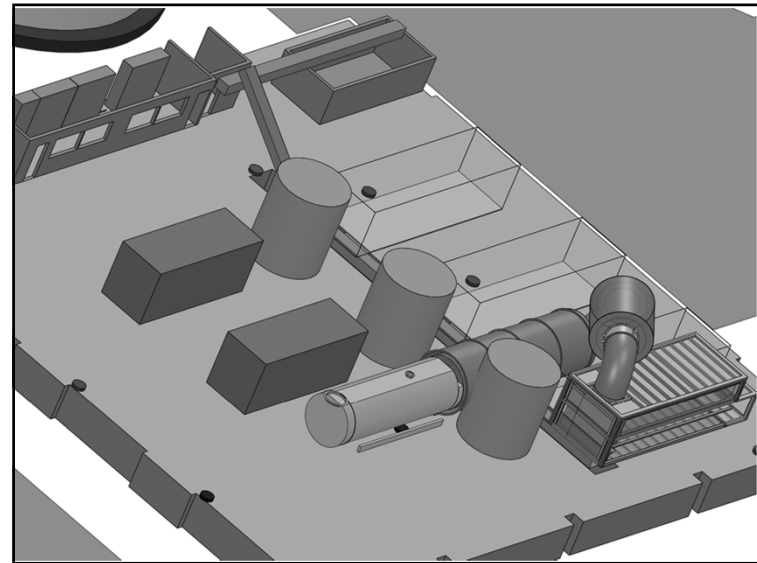
*Dongara – Enerpax Fuel Supplier*

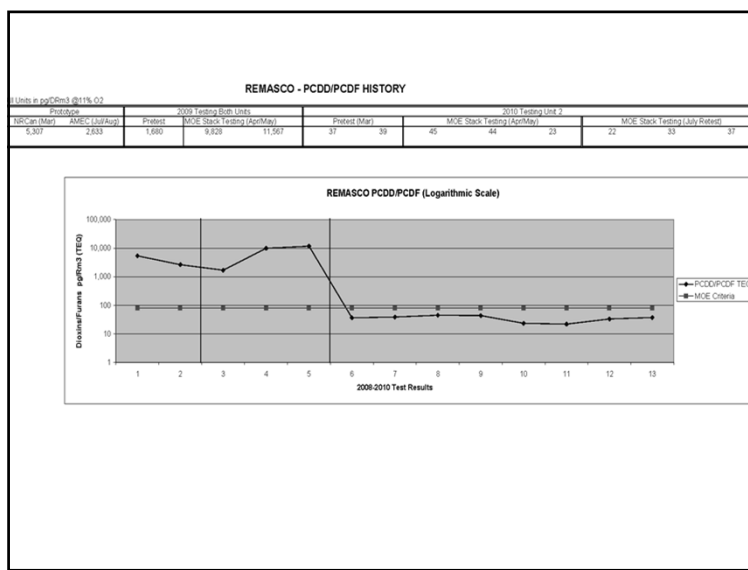
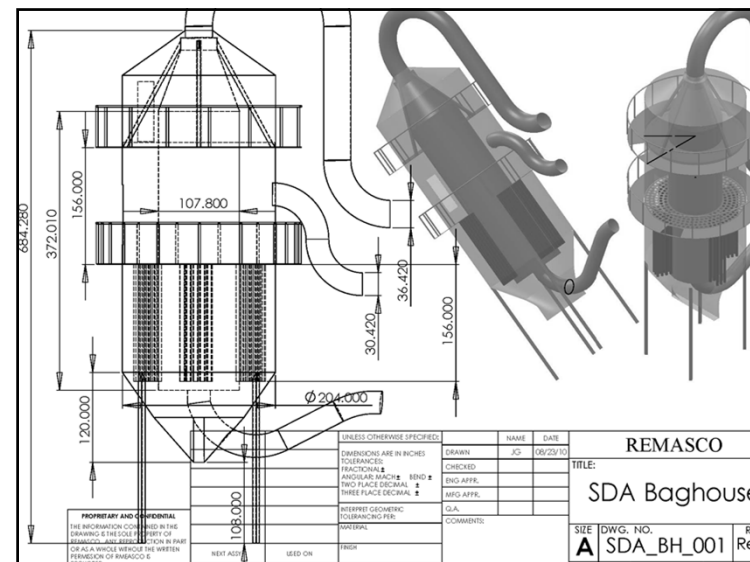
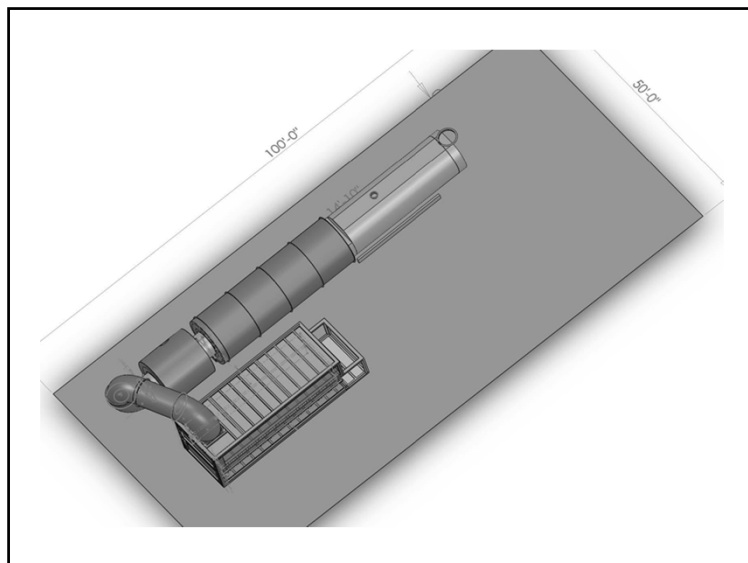
**DONGARA –** 7251 Hwy 27,  
Woodbridge, ON,  
L4L 0C2  
ph: (905) 851-9552  
Contact: Domenic Stalteri, P.Eng - VP Operations

The Dongara pellet plant is owned by OMERS, Lakeside Energy (Chicago), Jim Degasparis (Condrain) and Mark Muzzo (Greenpark). The facility is an \$80M, 100,000 tonne/yr waste processing facility with a 20yr contract with the Region of York. It uses state of the art technology to pre-process and sort post-source-separated municipal solid waste (MSW) into recyclable and non-recyclable streams. This involves the automated identification and separation of ferrous and non-ferrous metals, electronic wastes and 5 types of plastic wastes, including PVC which is 50% chlorine and must be removed from the non-recyclable stream before pelletizing. In June, Dongara commissioned a new \$10M addition to their front-end sorting system and have reduced chlorine levels in the pellets to less than 25% from prior.



**DONGARA PELLET PLANT**





## Apr/May 2010 Test Results



**TABLE ES-3 SUMMARY OF COMPLIANCE – IN-STOCK CRITERIA**

Compound	In Stock Criteria and Units	Condition 1	% of Criteria (%)	Condition 2	% of Criteria (%)	Condition 3	% of Criteria (%)
Oxygen	Min 6 % v/v dry	6.20	-	5.99	-	6.96	-
Nitrogen Oxides	Max 110 ppmd	152	138%	155	141%	155	141%
Sulphur Dioxide	Max 56 mg/Drm <sup>3</sup>	40.5	72.3%	35.9	64.0%	17.0	30.4%
HCl	Max 27 mg/Drm <sup>3</sup>	172	637%	230	851%	120	445%
PCDD/PCDF, TEQ	Max 80 pg/Drm <sup>3</sup>	44.9	56.1%	48.5	60.6%	28.3	35.4%
Mercury	Max 20 µg/Drm <sup>3</sup>	1.26	6.28%	0.599	3.00%	1.55	7.75%
Cadmium	Max 14 µg/Drm <sup>3</sup>	-	-	-	-	0.565	4.03%
Lead	Max 142 µg/Drm <sup>3</sup>	-	-	-	-	1.24	0.874%

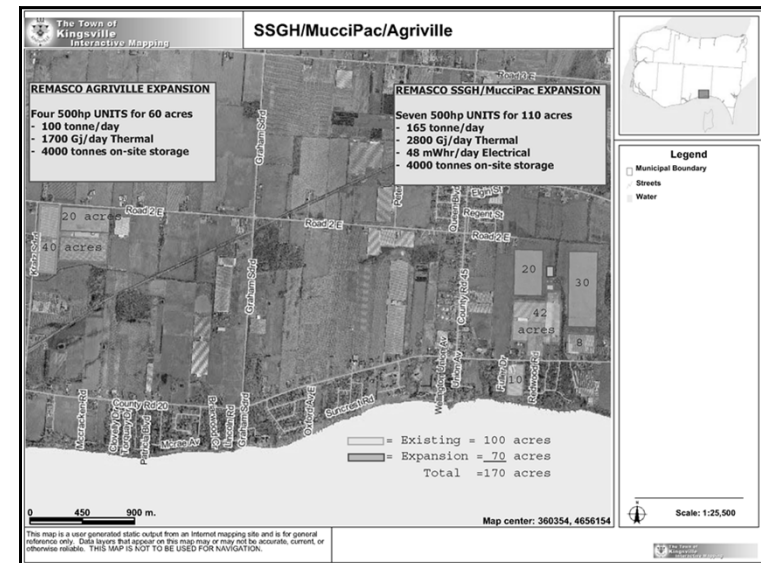
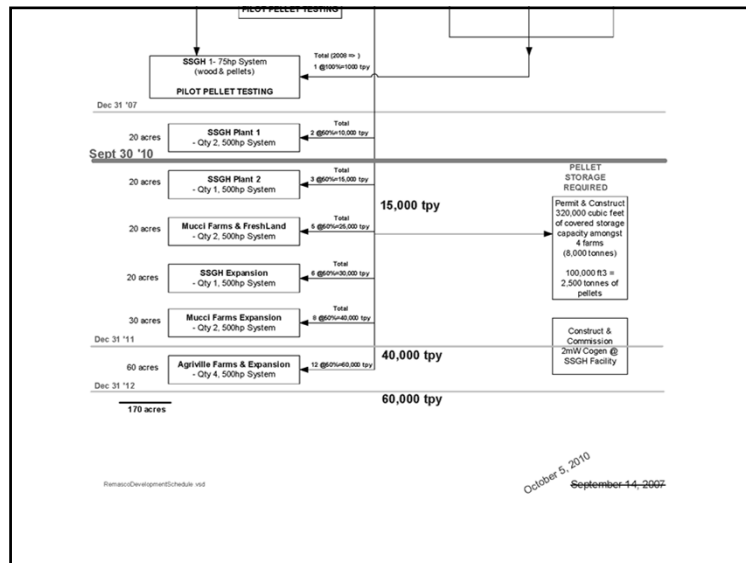
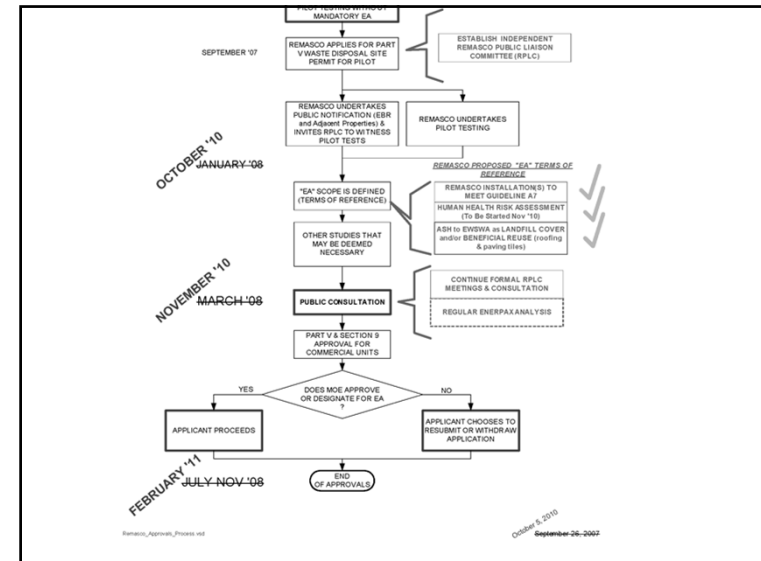
All values are corrected to 11% O<sub>2</sub> at 25°C and 101.3 kPa and average of all three tests per condition unless otherwise noted  
 \*Drm<sup>3</sup> = Dry reference cubic metres (25°C, 101.3 kPa)

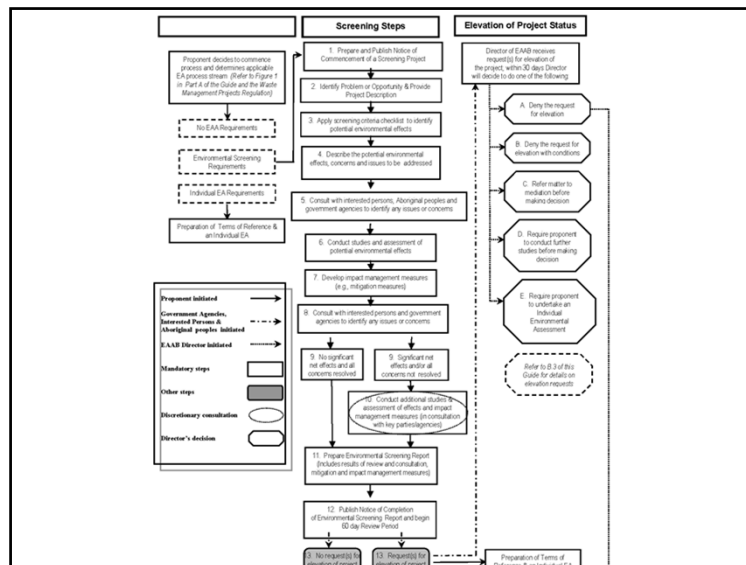
# July 2010 Retest Results

TABLE ES-3 SUMMARY OF COMPLIANCE – IN-STOCK CRITERIA

Compound	In Stock Criteria and Units	Test 1	Test 2	Test 3	Average	% of Criteria (%)
Nitrogen Oxides (NO+NO <sub>2</sub> )	110 ppm	95.7	96.1	106.1	99.3	90.3
Total Hydrocarbons	100 ppm as CH <sub>4</sub>	0.683	0.628	0.907	0.739	0.739%
HCl	27 mg/DRm <sup>3</sup> * Or >90% Removal Efficiency	44.2	54.6	44.3	47.7	97.2% Removal Efficiency

All values are corrected to 11% O<sub>2</sub> at 25°C and 101.3 kPa and average of all three tests per condition unless otherwise noted  
 \*DRm<sup>3</sup> = Dry reference cubic metres (25°C, 101.3 kPa)







**Renewable Energy Management &  
Services Company (REMASCO)  
&  
The Kingsville Greenhouse Industry**

(Update to Kingsville Council – February 28, 2011)



**REMASCO MANDATE**

To secure, transport, store, distribute and beneficially utilize renewable solid fuels (eg: Energy crops, agricultural residues, and engineered fuels) under long term contract. Such fuels are only to be employed in an environmentally and socially responsible manner to provide sustainable, long term energy solutions for REMASCO and its customers.



**REMASCO TRANSPARENCY  
COMMITMENT**

- From its inception in April 2007, community and Kingsville Council support has been THE critical factor in allowing REMASCO to proceed.
- Since 2007, REMASCO has maintained the RPLC and kept the Kingsville Council current on both REMASCO's progress **AND** difficulties.
- The owners & operators of REMASCO are local residents and business owners who need to uphold and protect their good and valuable reputations.
- Unlike any other greenhouse energy producers, the MOE permanently oversees all REMASCO facilities and requires regular emissions testing to ensure facilities & equipment are properly operated and maintained.

**REMASCO - SSGH**



*Unit 2 Recirculated Flue Gas & Steam Injection*



## REMASCO TECHNOLOGY

- REMASCO gasification technology is unique in its size range and ability to viably process many different types of difficult-to-process fuels, including most energy crops and crop residues. It can be applied to a close-coupled boiler (as at SSGH) or the syn-gas can be captured, cleaned and used to fire a reciprocating engine (future).
- The REMASCO gasification technology can vary the degree of gasification from very aggressive (high temperature in an oxygen rich atmosphere) to very gentle pyrolysis (low temperature in an inert environment) to produce char.
- The REMASCO facility and technology is the only existing gasification facility in Ontario capable of converting biomass into a synthetic coal for use at OPG's existing coal-fired facilities.
- The owners of REMASCO have spent more than \$6.5M and 4yrs developing and proving their technology. More than \$400K has been spent on independent, environmental testing alone.

## Dongara

*Dongara - Enerpac Fuel Supplier*

DONGARA – 7251 Hwy 27,  
Woodbridge, ON,  
L4L 6C2  
ph: (905) 851-9552  
Contact: Domenic Stalteri, P.Eng - VP Operations

The Dongara pellet plant is owned by ONERS, Lakeside Energy (Chicago), and two prominent Toronto based real estate developers. The facility is an \$80M, 100,000 tonne/yr waste processing facility with a 20yr contract with the Region of York. It uses state of the art technology to pre-process and sort post-source-separated municipal solid waste (MSW) into recyclable and non-recyclable streams. This involves the automated identification and separation of ferrous and non-ferrous metals, electronic wastes and 5 types of plastic wastes, including PVC which is 50% chlorine and must be removed from the non-recyclable stream before pelletizing. In June '10, Dongara commissioned a new \$10M addition to their front-end sorting system and have thereby reduced chlorine levels in the pellets considerably. Their efforts to improve pellet quality are ongoing.



DONGARA PELLET PLANT

## Dongara Update (1 of 2)

- Dongara invested another \$10M on process capital upgrades during summer 2010 to improve pellet quality by increasing electronic waste removal.
- Result was to reduce average chlorine content from >1.5% to less than 1%. They are continuing to strive to reduce chlorine levels further.
- They are only now beginning to focus on achieving plant process design throughputs.

## Dongara Update (2 of 2)

- The DONGARA concept incorporates the ability to manage each piece of post-source-separated waste individually, to tailor the process around existing and future recycling markets and/or re-use opportunities.
- The Dongara concept is sound and consistent with the practical, long term objectives of society's waste management practices and environmental sustainability; much more so than landfill.

## York still patient with Dongara

By David Fisher  
February 20, 2013

Despite ongoing setbacks at a Vaughan waste processing company, 75 per cent of your household garbage is being diverted from landfill.

The region has yet to decide what to do about Dongara's continuing failure to meet its obligations.

Closed-door discussions about possible legal action were on the agenda yesterday.

Under the terms of a 20-year contract, the Vaughan company is expected to process 120,000 tonnes a year of garbage.

Upgrades made last year have led to steady increases and the company is now collecting about 5,400 tonnes of garbage a week.

Dongara's chief executive Duncan McTear said the company is on track to reach its full 120,000 tonnes a year commitment by May.

The company converts garbage into pellets that can be burned as a coal substitute. That means less of York's garbage is being shipped to landfill.

When combined with York's green and blue bin programs, the region's diversion rate will reach about 80 per cent once Dongara meets its 120,000 tonnes target.

In the meantime, the company is asking the region for more time to get its ducks in a row. The company made a similar plea in June.

"We've had some success, but we know it's not there yet ... This has been harder and is taking longer than expected," Mr. McTear said.

Regional chairperson Bill Fish and it's still a win-win situation for the region since Dongara pays the price for any shortfall.

His only concern was regulations about the company creating its aggressive targets.

"We have nothing to lose by being patient," Fish said. Regional Councillor John Taylor agreed.

Dongara's issues aren't the only challenges the region has faced in its efforts to keep trash out of landfill.

The two plants that process the region's green bin waste shut down completely in the summer, forcing the region to find a third contractor, in Mississauga, and to send thousands of tonnes of organic waste to landfill instead of compost.

Staff report a full recovery this year as about 60 per cent of waste will be diverted into blue and green bins.

Meanwhile, privately owned Dongara is estimated to have spent in the tens of millions on upgrades, including operational equipment and Dongara's waste.

Things were scaled back to no more garbage as sent to Dongara than it could process while its owners installed upgrades.

Midland Regional Councillor Jack Heath and Vaughan Regional Councillor Deb Schulte were more circumspect yesterday about the company's progress.

Mr. Heath expressed concerns only over the waste Dongara took in - as turned into pellets, with the rest sent to incinerators in Buffalo. He also wondered how the company is dealing with a regional side shift that sees no trash being collected or delivered to Dongara on Mondays.

It's not another change with which the company is dealing, Mr. McTear said, reminding councillors it is still early in a long contract.

And what will happen if those months pass and they're still not meeting their targets, Mr. Heath asked.

"It's not healthy," Mr. McTear replied. "It's not negatively impacting York Region from an economic standpoint."

Regional staff is concerned about the situation, but York's diversion rate is promising, environment commissioner Erin Mahoney said.

Council is committed to meeting energy recovery by turning trash into pellets and that is happening if not in the quantity initially envisioned, she said.

The company has a proprietary pellet, called BioEnergy.

Test runs of the pellets were conducted at greenhouses on Red Bank Road and Remasco and results have been promising.

Emerson and Environment Ministry standards will be used to select the province to which to export through July.

Another round of testing was completed in December and the province expects to see results in spring.

About 10 per cent of the waste at Dongara is glass, electronics, large items or other garbage that cannot be pelletized, Mr. McTear said.



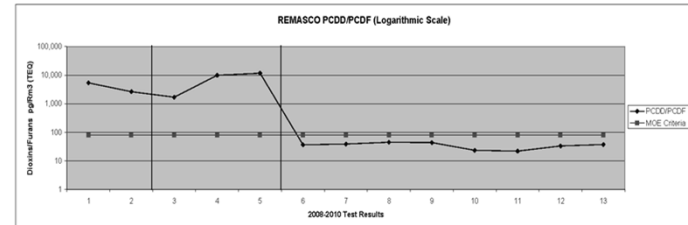
Trying to get on track, the region is still waiting to decide on what to do about Dongara's failure to meet its obligations. The Vaughan waste processing plant is making its way to about 75 per cent of your waste from landfill. The company wants more time to get its ducks in a row. The company made a similar plea in June.

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## REMASCOC - PCDD/PCDF HISTORY

Units in pg/dm<sup>3</sup> (at 11% O<sub>2</sub>)

2008 Testing (Both Units)		2010 Testing Unit 2	
Pretest (Mar)	AMEC (Jul/Aug)	Pretest (Mar)	AMEC (Stack Testing (Apr/May))
5,307	2,833	1,980	9,828
		11,567	



## Apr/May 2010 Test Results



TABLE ES-3 SUMMARY OF COMPLIANCE – IN-STOCK CRITERIA

Compound	In Stock Criteria and Units	Condition 1	% of Criteria (%)	Condition 2	% of Criteria (%)	Condition 3	% of Criteria (%)
Oxygen	Min 6 % v/v dry	6.20	-	5.99	-	6.96	-
Nitrogen Oxides	Max 110 ppm	152	138%	155	141%	155	141%
Sulphur Dioxide	Max 56 mg/DRm <sup>3</sup>	40.5	72.3%	35.9	64.0%	17.0	30.4%
HCl	Max 27 mg/DRm <sup>3</sup>	172	637%	230	851%	120	445%
PCDD/PCDF, TEQ	Max 30 pg/DRm <sup>3</sup>	44.9	56.1%	48.5	54.4%	28.3	29.1%
Mercury	Max 20 µg/DRm <sup>3</sup>	1.26	6.28%	0.599	3.00%	1.55	7.75%
Cadmium	Max 14 µg/DRm <sup>3</sup>	-	-	-	-	0.565	4.03%
Lead	Max 142 µg/DRm <sup>3</sup>	-	-	-	-	1.24	0.874%

All values are corrected to 11% O<sub>2</sub> at 25°C and 101.3 kPa and average of all three tests per condition unless otherwise noted.  
\*DRm<sup>3</sup> = Dry reference cubic metres (25°C, 101.3 kPa)

## July 2010 Retest Results

TABLE ES-3 SUMMARY OF COMPLIANCE – IN-STOCK CRITERIA

Compound	In Stock Criteria and Units	Test 1	Test 2	Test 3	Average	% of Criteria (%)
Nitrogen Oxides (NO+NO <sub>2</sub> )	110 ppm	95.7	96.1	106.1	99.3	90.3
Total Hydrocarbons	100 ppm as CH <sub>4</sub>	0.683	0.628	0.907	0.739	0.739%
HCl	27 mg/DRm <sup>3</sup> * Or >90% Removal Efficiency	44.2	54.6	44.3	47.7	97.2% Removal Efficiency

All values are corrected to 11% O<sub>2</sub> at 25°C and 101.3 kPa and average of all three tests per condition unless otherwise noted.  
\*DRm<sup>3</sup> = Dry reference cubic metres (25°C, 101.3 kPa)



## REMASCO Outstanding Technical Uncertainties

### ▪ NONE

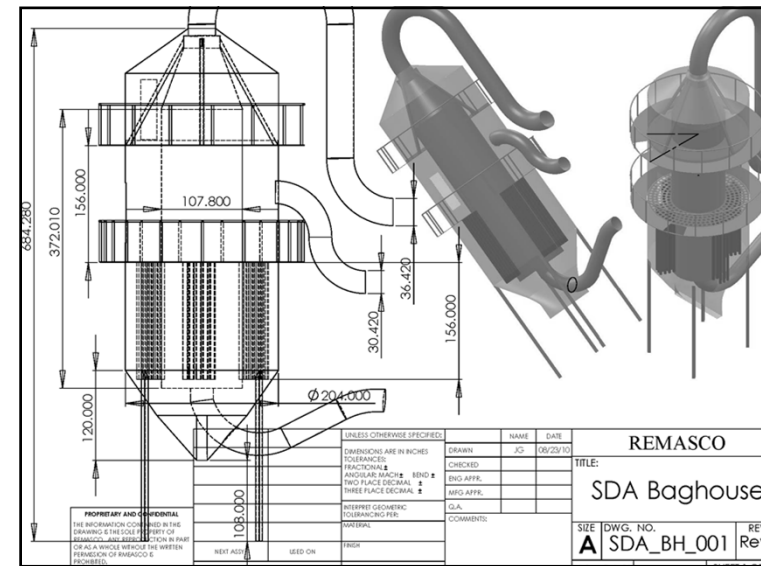
- Operationally, the REMASCO units have performed very well. They have amply demonstrated their ability to reliably produce rated output for weeks on end without requiring a shutdown.
- Economically, the units have performed according to the REMASCO business model (although natural gas is presently cheaper).
- Environmentally, the units and air pollution control systems have demonstrated their ability to meet all of the very stringent MOE compliance criteria.

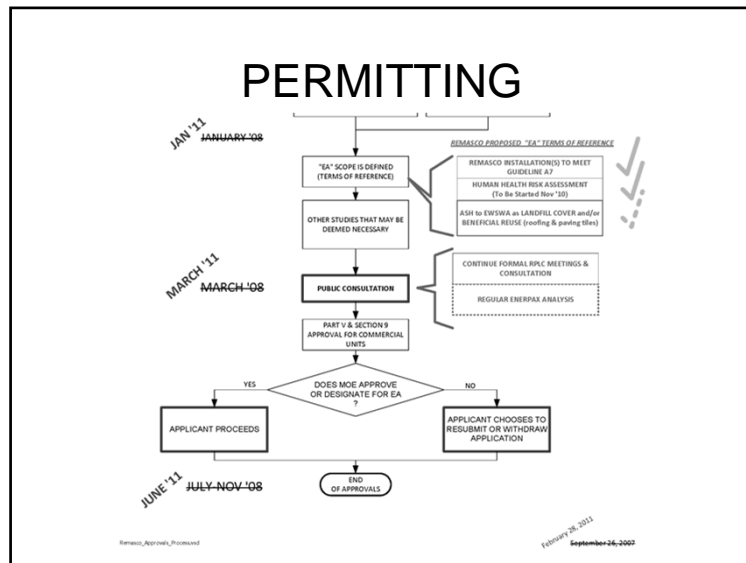
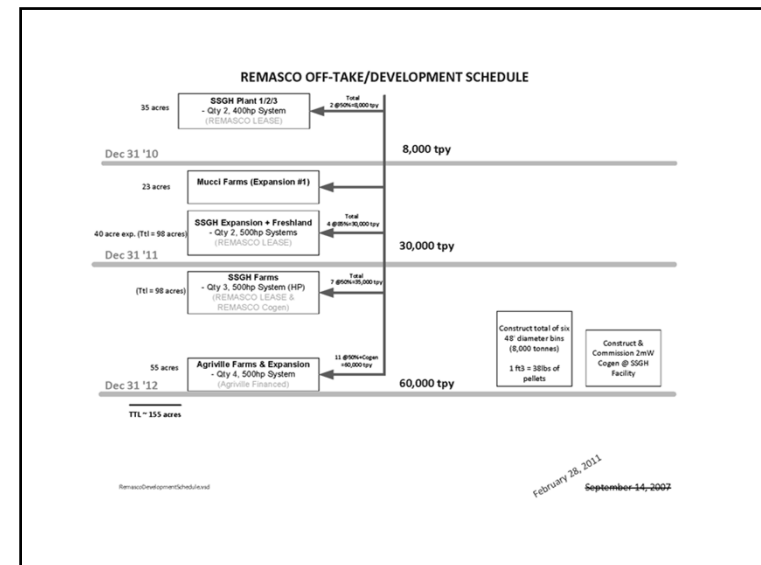
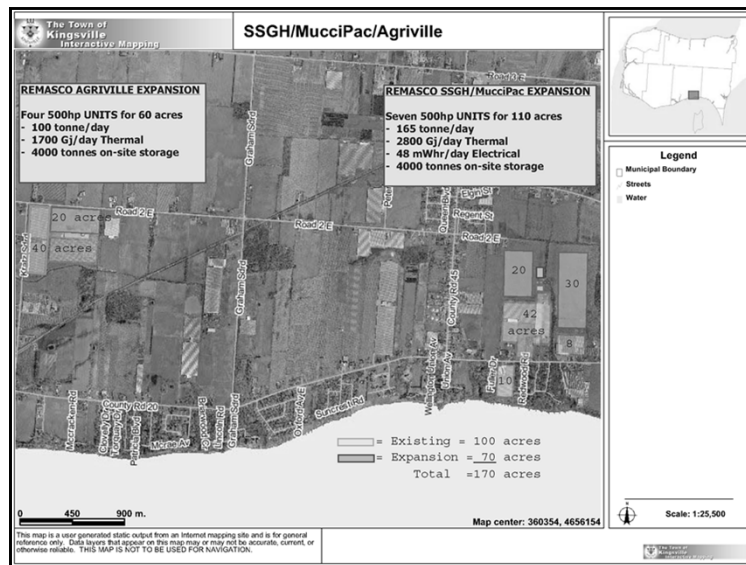
## REMASCO Outstanding Technical Improvements (1 of 2)

1. REMASCO has developed and proven a proprietary system to clean its boilers during normal operation. This cleaning system is unique and innovative and is only applicable to fire-tube boilers. It can easily be further enhanced to dynamically block off sections of boiler tubes to allow the boiler capacity to always match the current output of the gasifier (ie: reduced load operation). This will allow REMASCO to guarantee that PCDD/PCDF emissions remain as low as has been measured during full load operation, throughout all gasifier operating ranges.

## REMASCO Outstanding Technical Improvements (2 of 2)

2. REMASCO cools the flue gas exhausted from the boilers prior to entry into the baghouses. For its future installations, REMASCO has incorporated a more effective temperating method in a proprietary, combined spray-dryer-baghouse design. The new baghouse will inject a lime slurry ahead of the bag filtration system.
3. REMASCO must modify its existing two baghouses to allow more even distribution and control of the thickness of the lime cake on the bags. To do so a second set of pulse-cleaning solenoid valves is to be added to each baghouse. This will simultaneously increase the effective capacity of the baghouses while increasing HCl removal efficiency.

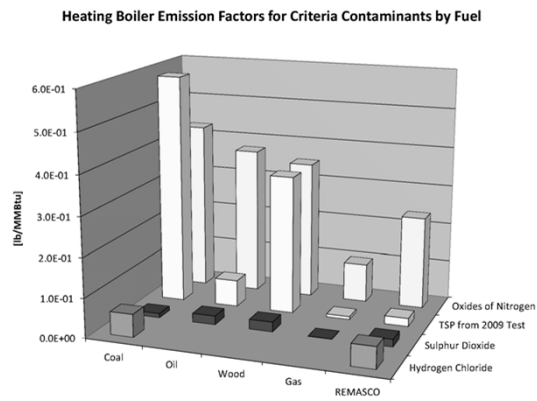




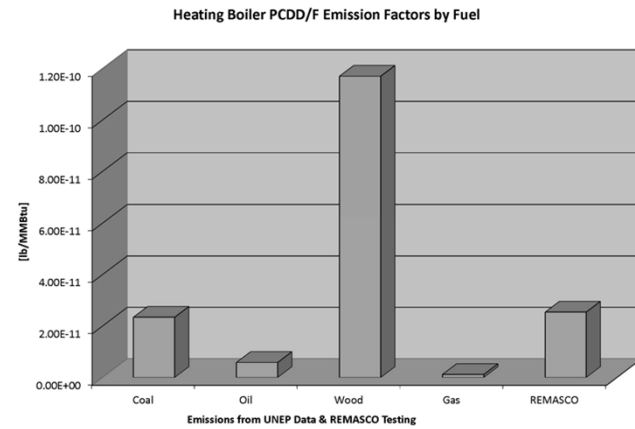
## REMASCO EA Screening Process Studies

- Air Emissions – Dispersion Modelling and Cumulative Effects & Ambient Air
- Human Health Risk Assessment
- Ground Water – Storm Water Mgmt
- Noise/Odour
- Traffic
- Land Use
- All studies & ESP scope subject to municipally controlled peer review, funded by proponent.

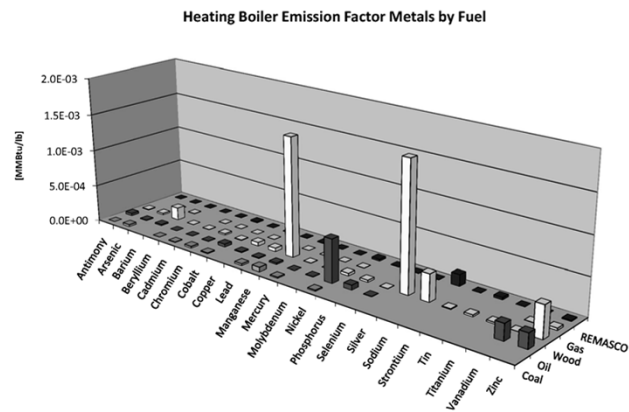
## HHRA Fuel Performance Comparison 1 of 4



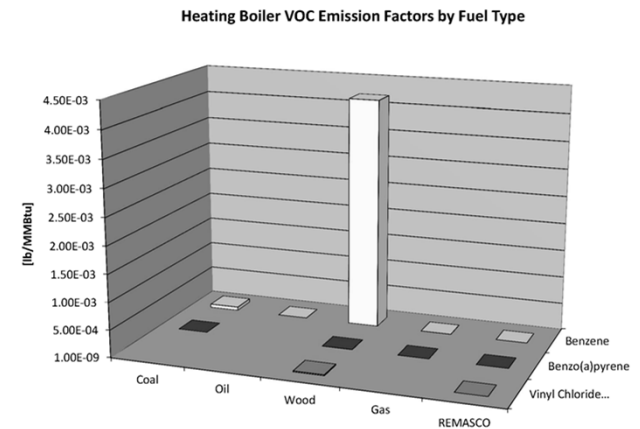
## HHRA Fuel Performance Comparison 2 of 4



## HHRA Fuel Performance Comparison 3 of 4



## HHRA Fuel Performance Comparison 4 of 4



## REMASCO HHRA EMISSIONS DISPERSION MODELLING FOR SSGH



## REMASCO HHRA EMISSIONS DISPERSION MODELLING FOR AGRIVILLE



## REMASCO HHRA EMISSIONS DISPERSION MODELLING FOR SSGH & AGRIVILLE

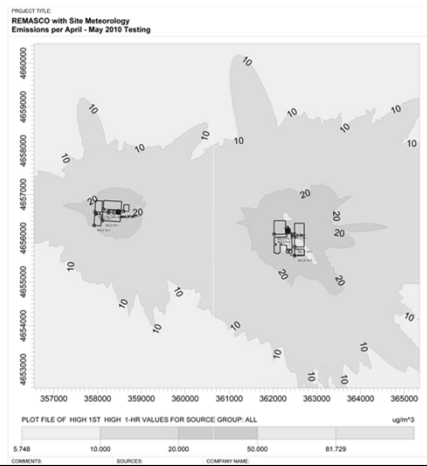
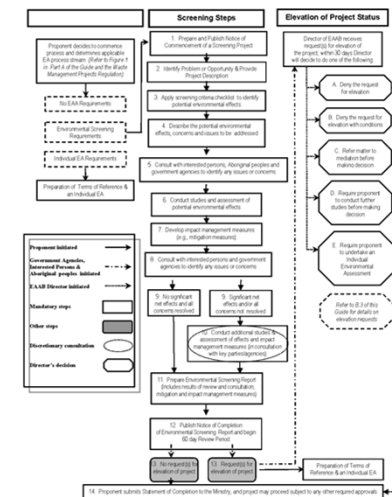


Figure 1: Details of Environmental Screening Process



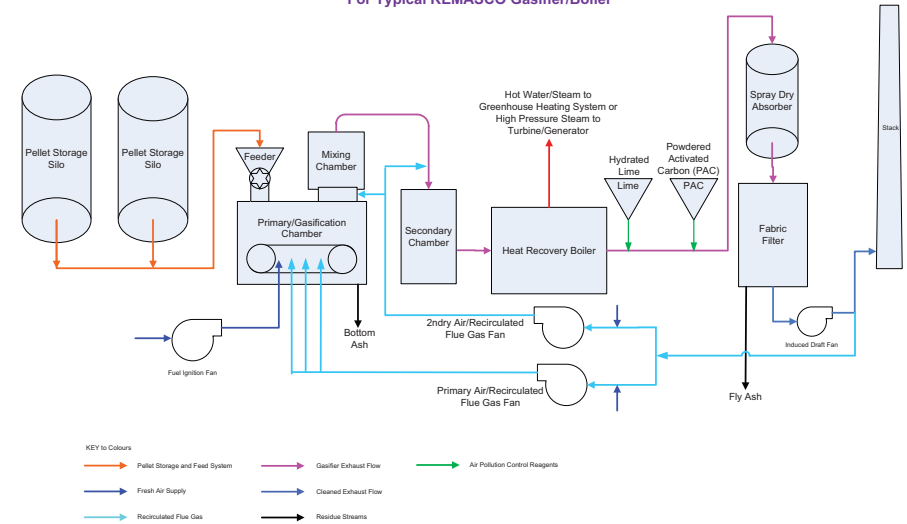


## REMASCO ENVIRONMENTAL ASSESSMENT SCREENING PROCESS (ESP) SCOPE

- 1.) AIR EMISSIONS MODELLING CONSERVATIVELY BASED ON MINISTRY OF ENVIRONMENT'S GUIDELINE A7 PERFORMANCE CRITERIA
- 2.) HUMAN HEALTH RISK ASSESSMENT
- 3.) REMASCO FUNDING MUNICIPALITY TO RETAIN AN INDEPENDENT ENGINEERING FIRM TO PEER REVIEW REMASCO ESP STUDIES
- 4.) NOISE / ODOUR / DUST IMPACT ASSESSMENT
- 5.) TRAFFIC IMPACT ASSESSMENT
- 6.) SURFACE & STORM WATER IMPACT ASSESSMENT
- 7.) CONTINUATION OF REMASCO PUBLIC LIAISON COMMITTEE (RPLC)
- 8.) PUBLIC CONSULTATION INCLUDING LOCAL NEWSPAPER ADVERTISING & DIRECT MAILINGS TO ~300 FAMILIES

## Open House Display Panels - Mar 30/11

PROCESS FLOW DIAGRAM  
For Typical REMASCO Gasifier/Boiler



## WHY IS THE REMASCO TECHNOLOGY UNIQUE AND ENVIRONMENTALLY BENEFICIAL

- 1.) REMASCO technology is unique. Within the REMASCO size range of 400-600hp, there are no systems in existence capable of achieving the very stringent performance standards achieved by the REMASCO gasifiers.
- 2.) Many aspects of the REMASCO design are only possible as a consequence of meeting the very stringent environmental standards. The extent to which recirculated flue gas is used to regulate the rate of gasification is only possible if the recirculated flue gas is very clean and free of particulate.
- 3.) The consistency of the Dongara fuel pellets facilitates material handling by minimizing jams and breakdowns caused by foreign materials in the fuel. It also facilitates combustion control as the air/fuel ratio process settings are more stable and predictable.
- 4.) Many of the design attributes that allow the REMASCO technology to process the Dongara pellets are equally applicable to many difficult to burn agricultural residues and energy crops such as miscanthus and switch grass. The best means of utilizing such fuels is through gasification, not typical excess air combustion systems.
- 5.) The REMASCO technology and systems are **designed and built locally**.

## CONTINUING & ONGOING OVERSIGHT OF ALL REMASCO OPERATIONS

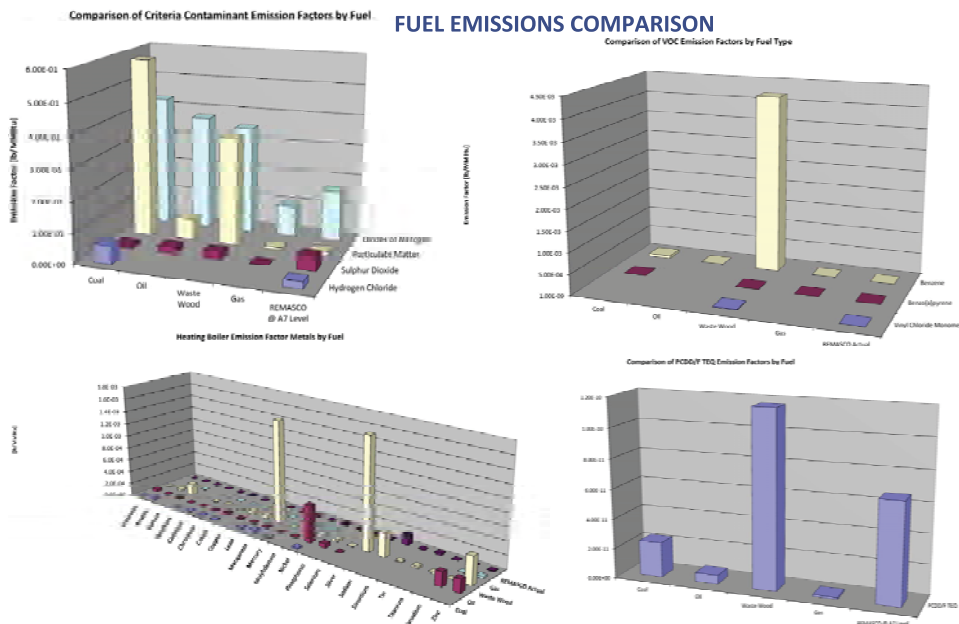
- 1.) All REMASCO installed units will be subjected to MOE approved **ANNUAL** testing, thereby confirming ongoing and proper maintenance and operation of the units throughout the life of the project.
- 2.) All REMASCO process/operating parameters must be logged and recorded during **EACH MINUTE** of process operation. Such data must be stored on site for a minimum of two years and must be made available to the MOE on demand.
- 3.) REMASCO is required to submit an **ANNUAL** report to the MOE, detailing all operating periods throughout the year, all exceedance conditions and process upsets, including
  - a.) Reason(s) for the exceedance or upset.
  - b.) Measures taken to correct the exceedance or upset.
  - c.) Steps and/or procedural changes implemented to mitigate the risk of the exceedance or upset from happening again.
- 4.) REMASCO will be maintaining and inviting the continued oversight of the **REMASCO Public Liaison Committee (RPLC)**. The RPLC is to be administered as an independent, volunteer committee of interested community members and stake holders. It is to operate independently from REMASCO but with the continued support of REMASCO.

## DONGARA PELLET PLANT (Region of York)

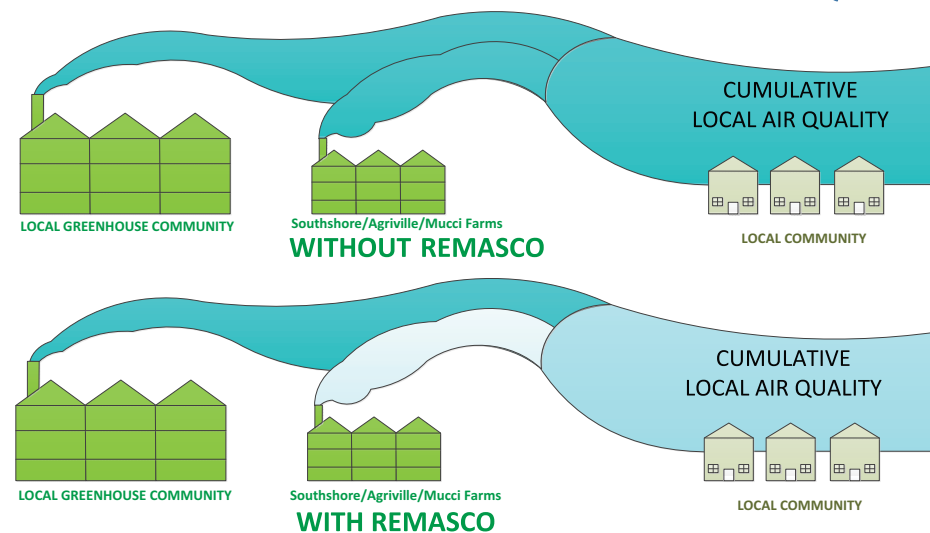
### INTERESTING FACTS

- 1.) Located at the corner of Hwy 407 and Hwy 27 in Vaughn (Region of York).
- 2.) Commenced Operation in Aug 2008
- 3.) Cost in excess of \$80M including \$10M upgrade during summer of 2010
- 4.) Owned in part by OMERS (Ontario Municipal Employees Retirement Savings)
- 5.) First plant of its kind in North America.
- 6.) Dongara has 20yr, 100,000 tonne/yr waste supply contract with Region of York.
- 7.) Pellet consistency and quality have continually improved over the past 2yrs.
- 8.) Proprietary and advanced technology identifies and classifies each piece of post-source-separated waste to divert it for further recycling or divert it away from pellet manufacturing.
- 9.) Dongara and its technological approach may come to play a very important role in allowing municipalities across North America implement a truly integrated waste management strategy.

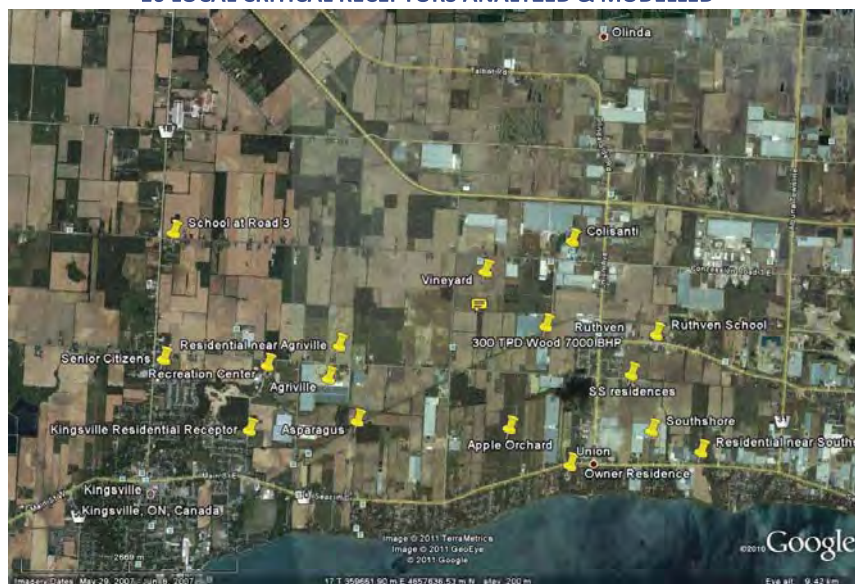




## IMPACT OF REMASCO OPERATIONS ON LOCAL AIR QUALITY



## 16 LOCAL CRITICAL RECEPTORS ANALYZED & MODELLED

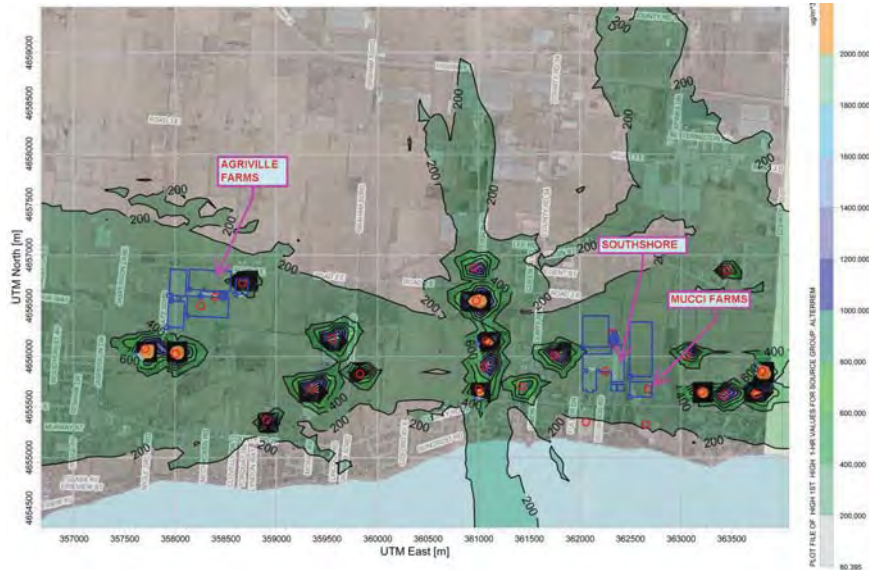


## CUMULATIVE AIR QUALITY (NOx) WITHOUT REMASCO (ug/m3)





## CUMULATIVE AIR QUALITY (NO<sub>x</sub>) WITH REMASCO (ug/m<sup>3</sup>)



## PROBLEM FORMULATION



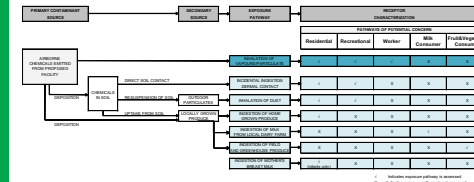
### Sensitive Receptor Locations

Agriville Residential  
Southshore Residential S  
Kingsville Residential  
District School  
Ruthven School  
Southshore Residential N  
Recreation Complex  
Seniors Residence  
Colasanti Facility  
Asparagus Crop Land  
Apple Orchard  
Vineyards  
Residence S of Seaciff



### Exposure Pathways

The ways that people may be exposed to chemicals in the environment and may include:



### Chemicals of Concern Selected for the HHRA

Criteria Air Contaminants	Inorganics	Volatile Organics	Carcinogenic PAHs
Sulphur Dioxide (SO <sub>2</sub> )	Arsenic	Vinyl Chloride	Dioxins & Furans
Nitrogen Oxides (NO <sub>x</sub> )	Cadmium	Benzene	
Hydrogen Chloride	Chromium (III)		
PM10	Lead		
PM2.5	Mercury (inorganic)		

### Human Receptors

Hypothetical individuals (people) that may be exposed to the chemicals of concern:

- Have access to potentially contaminated media;
- May be likely to experience higher rates of exposure than other receptors;
- May be especially susceptible to the toxicity of the chemicals of concern;
- Are the subject of concern of the general public



## HUMAN HEALTH RISK ASSESSMENT REMASCO GASIFIER INSTALLATIONS KINGSVILLE ON



Human health risk assessment is a scientific process that is used to estimate the likelihood that a population may experience adverse health effects as a result of exposure to particular chemicals in the environment.

It considers the following factors:

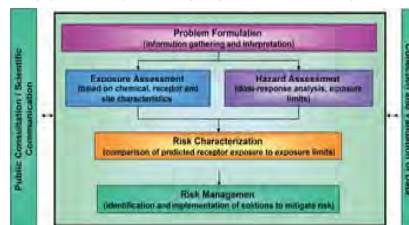
- How dangerous a chemical is known to be;
- How sensitive people are to the chemical;
- How a person might come into contact with the chemical such as swallowing, breathing, or skin contact as well how often and how long they are exposed; and,
- How much of the chemical a person is exposed to.

### HHRA Study Objectives

**Objective:** The primary goals of the current assessment were to evaluate the potential incremental impacts of projected emissions (i.e., from stack) from the gasification facilities proposed for the Kingsville area, and to determine the health implications to potentially sensitive individuals living, working, or playing in the surrounding communities, under "worst case" exposure conditions. While this assessment has focused primarily on inhalation risks related to ground-level air concentrations predicted throughout the area, it also evaluated the potential risks associated with deposition of particulates onto soils and home gardens in the surrounding area.

### HHRA Study Scope

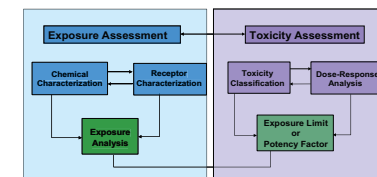
- Exposure to 14 chemicals of concern (criteria air contaminants, metals, dioxins, volatile organic compounds and PAHs);
- Three exposure routes (oral, dermal, inhalation);
- Several exposure scenarios including workers at the greenhouse facilities, residential (with vegetable gardens); milk consumers; greenhouse vegetable consumer
- Multiple sources of exposure (air, soil, diet);
- Both cancer and non-cancer health effects;
- Five life stages (infant, toddler, child, adolescent, adult) and lifetime;
- Thirteen (13) sensitive receptor locations (nearby residential, schools, farms).



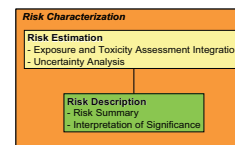
## COMPONENTS OF THE HHRA



### Exposure and Hazard Assessment



### Risk Characterization and Risk Management



### Preliminary Inhalation Assessment Results

The results of the inhalation assessment indicated that there are no acute or chronic impacts to human health expected as a result of facility emissions to the ambient air of the surrounding community. In fact, most predicted concentrations ratios demonstrated that predicted ambient concentrations of the COCs were many orders of magnitude below the corresponding regulatory benchmarks.

### Chronic Multi-Pathway Results

The results of the chronic multimedia (i.e., inhalation, oral and dermal exposures) assessment indicated that there are no chronic impacts to human health expected as a result of deposition of facility emissions onto soils and home gardens of residences in the surrounding community. In fact, most predicted hazard quotients and incremental lifetime cancer risk levels demonstrated that predicted concentrations of each of the COCs in soil and home garden produce (where applicable) at the various sensitive receptor locations were many orders of magnitude below the corresponding regulatory benchmarks.

Furthermore, the milk and vegetable/fruit consumer scenario also indicated that there are no chronic impacts to human health expected as a result of these scenarios.

## Renewable Energy Management & Services Company (REMASCO)

### Environmental Screening Process Studies Presentation and Public Consultation

(ESP Public Meeting – August 22, 2011)

#### OVERVIEW

- REMASCO designed, constructed and has successfully operated its proprietary gasification technology over the past 3yrs. The REMASCO system incorporates state-of-the-art air pollution control.
- Throughout this time, REMASCO was permitted as a pilot facility to demonstrate that its technology is capable of reliable and economic operation while meeting all applicable environmental performance standards set by the MOE.

#### OVERVIEW

- In Jan 2011, REMASCO formally announced its intentions to seek full approval under the MOE's Environmental Screening Process (ESP) in accordance with Ontario's Environmental Assessment Act. This public meeting forms a part of REMASCO's public consultation process as mandated by the ESP approvals process.

#### OVERVIEW

- REMASCO designed its systems specifically to use an engineered fuel pellet (Enerpax) produced from residential waste. The pellets are produced at the Dongara Pelleting plant in Woodbridge, north of Toronto.



Each load of pellets received by REMASCO is accompanied by a Certificate of Analysis!

The CofA provides an analysis of contaminants, including metals and chlorine.



**REMASCO**  
Securing your future in energy

## OVERVIEW

The pelletizing of municipal waste is not new but has not traditionally been very successful.

So, What's Different Now?

- Source Separation (recycling) efforts have improved and expanded to include organics and kitchen waste, traditionally problematic streams due to high moisture and odour.
- The technology now exists to better identify, classify and sort each piece of waste material in real time. This not only includes ferrous and non-ferrous metals but also different types of plastics and materials of varying densities (batteries and electronic waste traditionally being particularly troublesome).

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Securing your future in energy

## OVERVIEW

Waste Derived Fuel Pellets (cont'd)

- Europe and recently the US have legislation to permit and promote the use of highly processed, homogeneous waste materials as renewable fuels. Such qualified, waste derived fuels are allowed to be used in appropriately designed boiler systems and/or used to co-fire with other fuels such as coal (ie: in cement kilns and coal fired utility boilers).
- Waste Management Inc. (WMI), the largest waste management company in the US and Canada is presently commissioning the first of up to 30 large waste pelletizing facilities it is proposing to construct over the next 5 years.

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Securing your future in energy

## OVERVIEW

- Unlike other greenhouse operations in Ontario, all of which are exempt from meeting any emission standards, use of the Enerpax fuel pellet requires that REMASCO seek and obtain a permit from the Ontario Ministry of Environment for each REMASCO installation. Even after approval, REMASCO will be required to undertake annual emissions testing and be subject to continuing oversight and reporting requirements from the MOE.

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Securing your future in energy

## OVERVIEW

### SCOPE OF ESP – Each Site/Expansion Requires Approval

**SSGH/MucciPac/Agriville**

**REMASCO AGRIVILLE EXPANSION**  
Four 500hp UNITS for 60 acres  
100 tonnes/day  
1700 GJ/day Thermal  
4000 tonnes on-site storage

**REMASCO SSGH/MucciPac EXPANSION**  
Seven 500hp UNITS for 110 acres  
145 tonnes/day  
2800 GJ/day Thermal  
40 m³/day Electrical  
4000 tonnes on-site storage


**Legend**  
Municipal Boundary  
Streets  
Water

**Scale** 1:25,000

**Map center:** 360354, 4656154


**Scale bar:** 0 400 800 m

**Map details:**  
Existing = 100 acres  
2011 Expansion = 30 acres  
2012 Expansion = 40 acres  
Total = 170 acres




## PUBLIC CONSULTATION

- This public meeting forms part of REMASCO's extensive public consultation process, an integral part of the MOE Environmental Screening Process (ESP).
- After having undertaken all of the appropriate environmental impact studies, including a comprehensive, peer reviewed Cumulative Effects & Process Upset Air Quality Report and Human Health Risk Assessment, REMASCO is seeking any additional input from you, public agencies and other stakeholders to confirm if any unanswered questions or unaddressed issues remain.
- Your input is important.




## PUBLIC CONSULTATION

- Since its inception 4yrs ago, REMASCO has been open and transparent while verifying and testing its technology. Throughout that period REMASCO has:
  - Provided regular updates to Kingsville and Leamington Councils. These updates included both, our successes and failures.
  - Hosted REMASCO plant tours for Kingsville Council and many other municipal and provincial representatives.
  - Established and maintained the REMASCO Public Liaison Committee (RPLC). Since 2007, the RPLC has met twice each year and is open to receiving additional members from the public.
  - Been featured in a several newspaper articles, trade magazines and local television news clips.



## PUBLIC CONSULTATION

- More specifically as part of the ESP process, REMASCO has undertaken the following public consultation efforts.
  - Sent Notices of Commencement, invitations to a March 30<sup>th</sup> Open House and this Public Meeting to approx. 300 parties, including residents within 500m radius of the existing/proposed sites, municipal council members, County and Provincial agencies, First Nations representatives and published the same in local newspapers.
  - Conducted plant tour for Kingsville Council on March 10<sup>th</sup>.
  - Conducted public Open House of REMASCO on March 30<sup>th</sup>.
  - Appeared on an ATV news segment May 5<sup>th</sup>.



## ESP STUDIES

- The REMASCO ESP studies/assessments/considerations undertaken as part of the ESP process will be discussed in more detail later, but the major studies included:
  - Air Emissions Modeling and Dispersion Study  
AJ Chandler & Associates Inc.
  - Human Health Risk Assessment  
Intrinsic Environmental Sciences Inc.
- In addition to commissioning these studies, REMASCO provided the financial support necessary to allow the Town of Kingsville to retain their own, independent consultant to review and comment on these studies. Stantec was the consultant chosen by the Town and presented a summary of their findings to Council on August 15<sup>th</sup>.

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## ESP STUDIES

- Tonight's presenters/attendees include:
  - John Chandler – AJ Chandler & Associates
  - Elliot Sigal / Erin McGregor – Intrinsic Environmental Sciences Inc.
  - Ruwan Jayasinghe – Stantec
  - Bert Mucci – Southshore Greenhouses

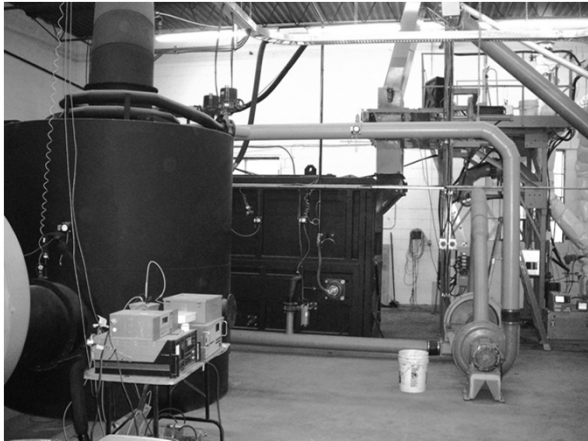
**REMASCO**  
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## TECHNOLOGY OVERVIEW

- REMASCO has designed, constructed and operated its own, proprietary gasification technology over the past 4yrs.
- Complying with Ontario's stringent emission standards is a significant accomplishment.
- Recognize that Ontario's emission standards are set more stringently than required to protect human and animal HEALTH. They are set to reflect state-of-the-art technology PERFORMANCE and are regularly reviewed and tightened to reflect improvements in technology.
- Recognize that despite Ontario's farms (including greenhouses) being EXEMPT from meeting any emission standards whatsoever, REMASCO systems have been and will continue to be subjected to regular testing and continual MOE oversight.

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Securing your future in energy

### REMASCO PROTOTYPE 2007-08

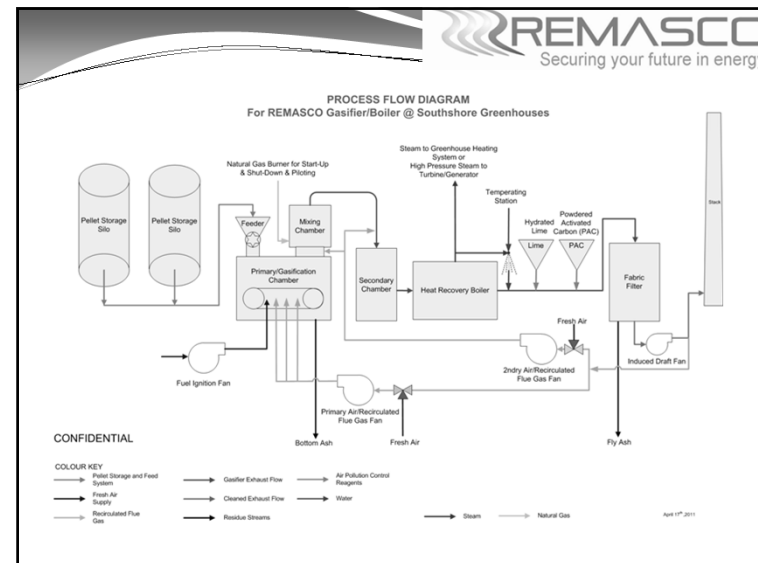
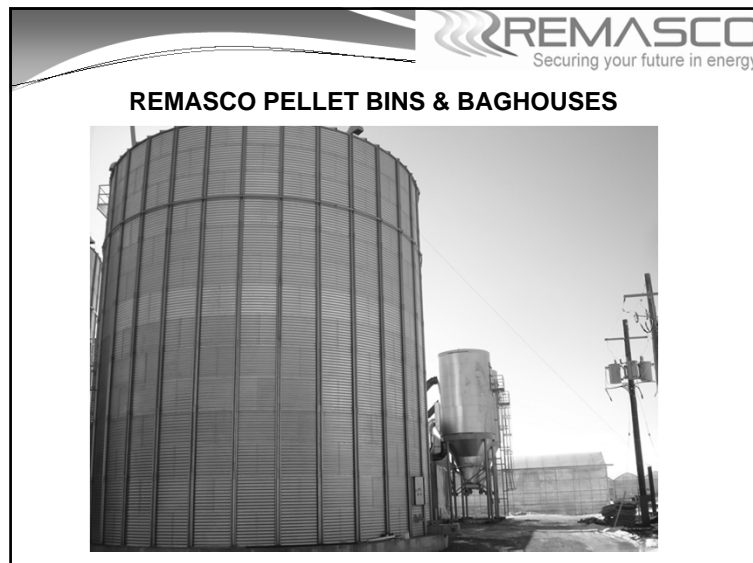


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### REMASCO PILOT PLANT 2009-Present



*Unit 2 Recirculated Flue Gas & Steam Injection*




## TECHNOLOGY OVERVIEW

- REMASCO gasifiers use a proprietary grate design that ensures excellent combustion air distribution while producing minimal wear and tear on the grate.
- REMASCO gasifiers employ three separate stages of gasification/combustion to ensure good mixing, complete combustion, low NO<sub>x</sub> emissions and higher thermal efficiencies.
- REMASCO gasification systems employ a proprietary, on-line boiler tube cleaning system that helps ensure the tubes remain clean at all times.
- REMASCO gasification systems employ a proprietary means of maintaining gas velocity through the boiler tubes throughout all operating ranges, from full load to part load operation. This plays an important role in the emissions abatement of the system.

## TECHNOLOGY OVERVIEW


- REMASCO gasification technology is unique in:
  - Its small size (less than ¼ the size of traditional, small industrial/utility units).
  - Its flexibility to viably process many different types of difficult-to-process fuels, including most energy crops and crop residues. It can be applied to a close-coupled boiler (as at Southshore) or the syn-gas can be captured, cleaned and used to fire a reciprocating engine or turbine (future).
  - The REMASCO gasification technology can vary the degree of gasification from very aggressive (high temperature in an oxygen rich atmosphere) to very gentle pyrolysis (low temperature in an inert environment) to produce char.



## OUTSTANDING TECHNICAL UNCERTAINTIES


### NONE

- Operationally, the REMASCO units have performed very well. They have reliably produced rated output for more than 10 continuous weeks without requiring a shutdown.
- Economically, the units have performed according to the REMASCO business model (although natural gas is presently slightly cheaper).
- Environmentally, the units and air pollution control systems have demonstrated their ability to meet all of the very stringent MOE compliance criteria.



## REMASCO ENVIRONMENTAL PERFORMANCE

- REMASCO has invested more than \$6.5M and 4yrs developing and proving its technology. More than \$400K has been spent on independent, environmental testing alone.
- All environmental testing has been conducted by an independent, third party.
- All environmental testing procedures and methodologies were approved by the Ministry of Environment and witnessed by MOE personnel.
- The modeling of the air emissions from REMASCO used actual test data collected and supplied by AMEC Earth and Environmental, the testing company, not REMASCO. This test data formed the basis for the Air Modeling Study and Human Health Risk Assessment.



## REMASCO TRANSPARENCY COMMITMENT

- Since 2007, REMASCO has maintained the RPLC and kept the Kingsville Council current on both REMASCO's progress AND difficulties.
- The owners & operators of REMASCO are local residents and business owners who need to uphold and protect their good and valuable reputations.
- Unlike any other greenhouse energy producers, the MOE permanently oversees all REMASCO facilities and requires regular emissions testing to ensure facilities & equipment are properly operated and maintained.

## Environmental screening Process

REMASCO Gasifier Project

## Approvals in Ontario

- Any construction in Ontario requires some types of government approval
  - Buildings are covered by codes and must get municipal approval
- Any source that emits to the atmosphere requires a Certificate of Approval (Air) from the MoE although there are exceptions:
  - Smaller buildings with limited heating installations;
  - Agricultural buildings.
- Roads, rail lines, power transmission lines, wind farms all require approval under Environmental Assessment Act

## REMASCO Project

- REMASCO propose to use ENERPAX pellets to generate energy
- ENERPAX pellets are made from residual waste
- The MoE has designated the pellets as a waste
- Any facility handling waste is classified as a waste management facility
- Ontario Regulation 101/07 provides the Environmental Assessment Requirements for Waste Management Facilities
- REMASCO is not a waste management facility, but the proposed fuel is a waste thus REMASCO must undertake an environmental assessment

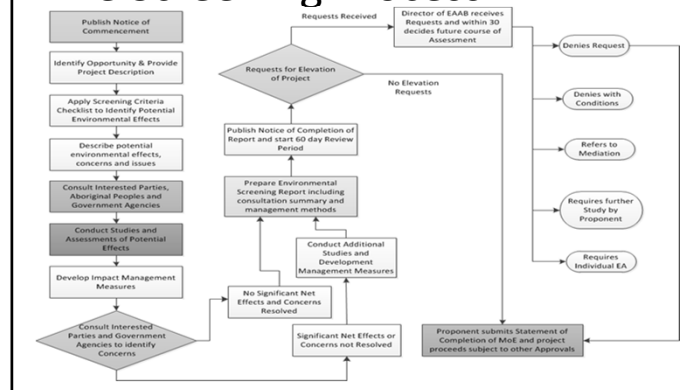
## Purpose of Process

- An Environmental Assessment seeks to examine the project and its interactions with the environment
- The Environmental Assessment Act defines environment into two broad categories:
  - the natural environment and in particular:
    - air quality;
    - water quality;
    - plants; and,
    - animals including humans; and,
  - the socio-economic environment
    - social, economic and cultural aspects such as those pertaining to industry, agriculture, tourism, First Nations Communities, and heritage resources.

## Requirements of Regulation

- The 101/07 Regulation defines different types of assessment procedures
- A full environmental assessment (Part II of the Regulation) for landfill site and large EFW facilities; or,
- A screening assessment for certain types of facilities including a thermal treatment site [REMASC0] if:
  - the site is located at a commercial, industrial or manufacturing facility;
  - the primary purpose of the facility is not waste management;
  - more than 100 tonnes of waste are received per day; and
  - the energy generated is recovered for use at the facility.

## The Screening Process



## Other Approvals

- Any facility handling materials characterised as waste requires a Waste Management Facility approval
- Typically with a release to the atmosphere would require a Certificate of Approval (Air) as well
  - Agricultural facilities are exempt but this facility will have the Air requirements as part of the Waste Approval
- Municipal approvals required for construction on the sites if new structures are needed

## Description of the Process

- The regulation requires that the proponent not divide a project up into little components
- REMASC0 envision that gasifiers will be installed at Southshore and Agriville to meet the heating needs of both the existing greenhouses on these sites, and proposed expansions of these facilities
- With the expansion at Southshore there is an opportunity to install a co-generation system to generate electricity and heat
- Project considered 3300 boiler HP at Southshore and 2000 boiler HP at Agriville as required by Regulation

## Study Area

- Early undertakings by REMASCO stated that an Air Quality and Human Health Risk Assessment would be completed
- That commitment assisted in defining the study area
  - South of a line from the intersection of County Road 3 and County Road 29 due east to the Kingsville Town Line
  - Approximately 13 square kilometres centered on a point half way between the Southshore and Agriville sites

## Study Area Description

- Stretches about 4.5 km north of lake
- Zoning within 2 km of lake largely residential with agricultural, commercial and institutional uses interspersed
- Agricultural includes:
  - About 120 ha of greenhouses at 23 separate complexes
  - Areas of orchards, vineyards and field crops

## Screening Process

- Designed to cover all environmental aspects
- Identify specific areas and ask whether the project might cause a change in that area
- 9 broad categories
  - Water quality; Land use; Air quality; Natural environment; Resource use; Community and Social structures; Heritage resources; Aboriginal land use; and Use of hazard land.
- 48 criteria in all

## Screening Criteria

CRITERION	YES	NO	CRITERION	YES	NO
1. Have negative effects on surface water quality, quantity or flow?	X		37. Have negative effects on generation of energy that cannot be captured and utilized?		X
2. Have negative effects on ground water quality, quantity or movement?	X	X	38. Have negative effects on generation of energy that cannot be captured and utilized?		X
3. Have significant sedimentation, soil erosion or disturbance to freshwater system on or off site?		X	39. Have negative effects on the use of Canada's Land Inventory Class 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000		



## Criteria Evaluation

- Each of the Criteria are addressed in the Environmental Screening Report
- This amounts to a number of pages in the report
- Time is important so:
  - Will list the 37 criteria that the project is unlikely to effect first with brief explanation
  - Discuss the 11 criteria where there might be effects
  - The Air Quality issues will be addressed in a separate presentation as will the Human Health Risk Assessment

## Water Quality – No Effects

- have negative effects on ground water quality, quantity or movement?
  - No water taken, nor discharged to ground
- cause potential negative effects on surface or ground water from accidental spills or releases (leachate) to the environment?
  - All equipment on concrete pads a barrier between the soil and any material spilled.
  - No liquids outside the buildings and solid spills can be cleaned before they might present a concern.

## Land Use – No Effects

- have negative effects on residential, commercial or institutional land or other sensitive land uses within 500 metres of the site boundary?
- be inconsistent with the Provincial Policy Statement, provincial land use or resource management plans?
- be inconsistent with municipal land use policies, plans and zoning by-laws (including municipal setbacks)?
- use hazard lands or unstable lands subject to erosion?
- have potential negative effects related to the remediation of contaminated land ?

## Land Use No Effects Rationale

- Generally equipment installed inside existing greenhouse buildings on site already approved
- The REMASCO process is an adjunct use on the greenhouse lands needed to heat the greenhouses
- All greenhouses have heating systems so no different than other sites
- Will be done within requirements of the municipality
- Conclusion no effect on those land use items listed on the previous slide

## Air Quality – No Effects

- cause light pollution from trucks or other operational activities on site?
  - Unlike a landfill where large volumes of trucks operating late can create this type of effect, limited trucks used to deliver pellets and remove residues from the site
- Not anticipated to be an effect

## Natural Environment – No Effects

- cause negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?
- cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?
- cause negative effects on wetlands?
- have negative effects on wildlife habitat, populations, corridors or movement?
- have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g., water temperature, turbidity, etc.)?
- increase bird hazards within the area that could impact surrounding land uses (eg airports)?
- have negative effects on locally important or valued ecosystems or vegetation?

## Natural Environment - No Effects Rationale

- the sites are on lands occupied by existing greenhouse operations in fields that have been cultivated in the past.
  - No additional displacement since cultivation has done that
  - Municipal drains could be influenced but discussed later
  - Pellets are stored in siloes, have little odour and will not attract birds so no impact
  - No ecosystems identified on lands

## Resources – No Effect

- result in inefficient (below 40%) use of a non-renewable resource?
- result in generation of energy that cannot be captured and utilized?
- result in practices inconsistent with waste studies and/or waste diversion targets (eg result in final disposal of materials subject to diversion programs)?
- have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?
- have negative effects on existing agricultural production?
- have negative effects on the availability of mineral, aggregate or petroleum resources?
- be located a distance from required infrastructure (such as availability to customers, markets) and other factors?
- have negative effects on the availability of forest resources?
- have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?

## Natural Resources - Rationale

- No forestry, aggregate, petroleum, fishery or game resources on site so no possible influence
- Enhances the use of agricultural land and ensures good production because supplies heat so a positive effect
- Recovers over 70% of the energy from the pellets
- Energy is used on site so no limitations on use
- Uses a product (ENERPAX pellets) from materials that would otherwise have been landfilled so a positive benefit

## Socio-Economic – No Effect

- have negative effects on neighbourhood or community character?
- result in aesthetics impacts (eg visual and litter impacts)?
- have negative effects on local businesses, institutions or public facilities?
- have negative effects on recreation, cottaging or tourism?
- have negative effects related to increases in the demands on community services and infrastructure?
- have negative effects on the economic base of a municipality or community?
- have negative effects on local employment and labour supply?
- be located within 8 km of an aerodrome/airport reference point?
- interfere with flight paths due to the construction of facilities with height (ie stacks)?

## Socio-Economic - Rationale

- Little opportunity for the REMASCO facilities to create negative impacts on the neighbourhood or the community.
  - Pellets arrive in a closed truck, stored in a closed silo, and fed to the gasifiers through an enclosed fuel transfer system.
  - Pellets will not create a litter or visual impact, nor to cause any negative impacts on local businesses, institutions, or public facilities, nor to conflict with recreation or tourism in the area.
  - Pellets will not attract vectors or birds and no increase in bird populations in the area to affect aviation activities.
  - The operators can expand operations with assured energy costs creating more product and more economic spin offs to community.

## Heritage Resources – No Effect

- have negative effects on heritage buildings, structures or sites, archaeological sites or areas of archaeological importance, or cultural heritage landscapes?
  - installed on agricultural land that has been disturbed and unlikely to find any undisturbed archaeological sites
- have negative effects on scenic or aesthetically pleasing landscapes or views?
  - Land around the two sites is relatively flat
  - Site lines are unlikely to be disrupted as far removed from the road and shielded by existing greenhouses

## Aboriginal Community – No Effects

- cause negative effects on land, resources, traditional activities or other interests of Aboriginal communities?
  - Being cultivated land it can be assumed that there is little Aboriginal activity on the properties or surrounding lands
  - No comments have been received from local Aboriginal leaders

## Other Effects

- cause any other negative environmental effects not covered by the criteria outlined above?
  - No other effects were identified by the study team or mentioned by those contacted about the project or those attending public meetings

## Potential Effects

- There are 11 criteria that required further investigation as initial review suggested that there were possibilities that the project could cause some negative effects
- These were
  - Water related impacts (2)
  - Air related impacts (4) and the associated potential for concern about air pollution in the community (1)
  - Traffic concerns (1)
  - Land use not designated as industrial or waste management (1)
  - Waste generation on site (2)

## Land Use – Possible Effects

- use lands not zoned as industrial, heavy industry, or waste disposal?
  - The installations have been deemed adjunct to the operation of the greenhouses, an approved agricultural use for the land – they supply heat and electrical energy
- This designation makes the installations an approved use on the subject sites

## Air Quality Effects

- have negative effects on air quality due to emissions of nitrogen dioxide, sulphur dioxide, opacity, hydrogen chloride, suspended particulates, or other pollutants?
- cause negative effects from the emission of greenhouse gases (CO<sub>2</sub>, CO, methane)?
- cause negative effects from the emission of dust or odour?
- cause negative effects from the emission of noise?
  - Defer this to the detailed air quality study discussion

## Water Related Effects

- have negative effects on surface water quality, quantities or flow?
  - Having more land covered with buildings can increase runoff from the site
  - Increased runoff has the potential for soil erosion
  - Erosion can increase silt discharge
  - Concerns about process water discharges to local drainage ditches/municipal drains
- Storm water control plans are required for sites
- Water from facilities will be collected in holding tanks and used for ash quenching in facility, or hauled off-site to the water treatment facility – no discharges to municipal drains

## Water Related Effects (2)

- cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off site?
  - Possible for construction activities to increase run off in short term
  - Construction contracts will require appropriate measures to limit run-off to municipal drains
- By controlling storm water flow from site and not releasing process water to municipal drains there will be no long term impacts

## Traffic Impacts

- have negative effects related to traffic?
  - Worst case operating situation - 10 trucks could enter and leave the Southshore site each day
    - Deliver pellets
    - Remove residues
  - Traffic data from the County notes that 10,000 vehicles a day pass the site on Seacliff east of Union.
- With limited number of trucks entering the site, it is unlikely that there will be any impact on local traffic.

## Residue Effects (1)

- result in the creation of non-hazardous waste materials requiring disposal?
  - Gasifier ash defined as non-hazardous under O.Reg.347
  - No restrictions on the disposal of this material
  - Arrangements made with EWSWA to dispose in landfill
  - Will be tested periodically
- Managed in this manner no negative impacts from gasifier ash

## Residue Effects (2)

- result in the creation of hazardous waste materials requiring disposal?
  - Boiler ash and residue from the Air Pollution Control system is classified as a hazardous waste
  - Containers of these residues are tarped and hauled by a company licensed by the MoE to a disposal site capable of safely handling this material.
- With the due diligence exercised in the handling and disposal of these materials they pose no threat to the environment or human health.

## Community Concerns

- The community has expressed concerns mainly about air emissions
  - Recognizing this the Air Quality Study and Human Health Risk Assessment were undertaken
- These are presented in the next sections of this evening's presentations

## Air Quality Study

REMASCO Proposal Kingsville

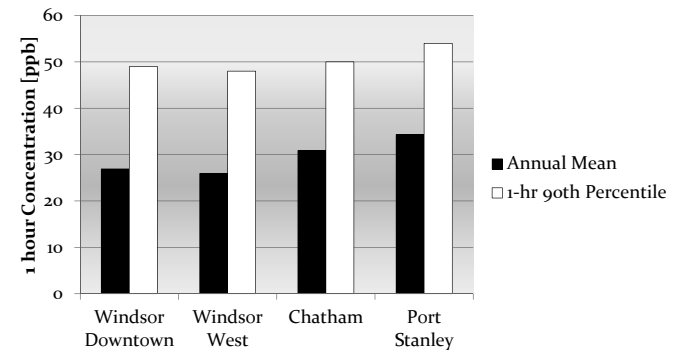
## Introduction

- Considered:
  - Existing Conditions
    - Ambient air quality data
    - Local sources
  - Emission Test Data from REMASCO
- Modelled Existing and REMASCO sources to:
  - Determine Cumulative Effects of Project
  - Point of Impingement Results for REMASCO
    - Compared POI values to Standards
    - Transferred results to Human Health Risk Assessment

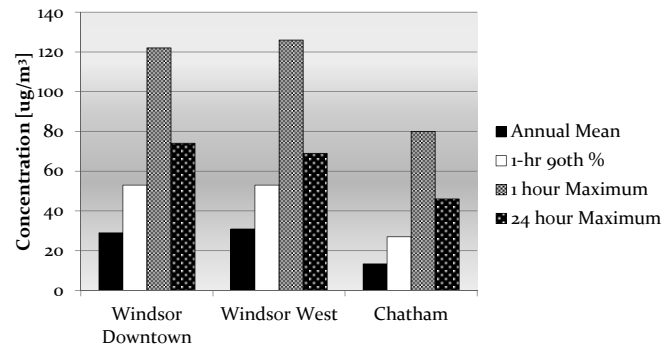
## Existing Air Quality

- Southwestern Ontario under influence of trans-boundary flow of contaminants results in elevated levels of ozone [ $O_3$ ], fine particulate [ $PM_{2.5}$ ], oxides of nitrogen [ $NO_x$ ]
- Local sources: building heating; power generation; vehicles; and, industrial processes also contribute to Air Quality conditions
- Ministry of Environment [MoE] monitors
  - $O_3$ ,  $PM_{2.5}$ ,  $NO_x$  in Windsor and Chatham
  - $O_3$  and  $PM_{2.5}$  in Port Stanley

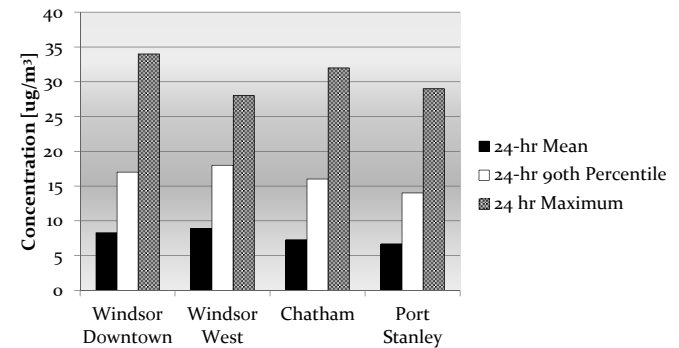
## Ozone Data for 2008



## Oxides of Nitrogen as NO<sub>2</sub>



## Fine Particulate [ $\text{PM}_{2.5}$ ]



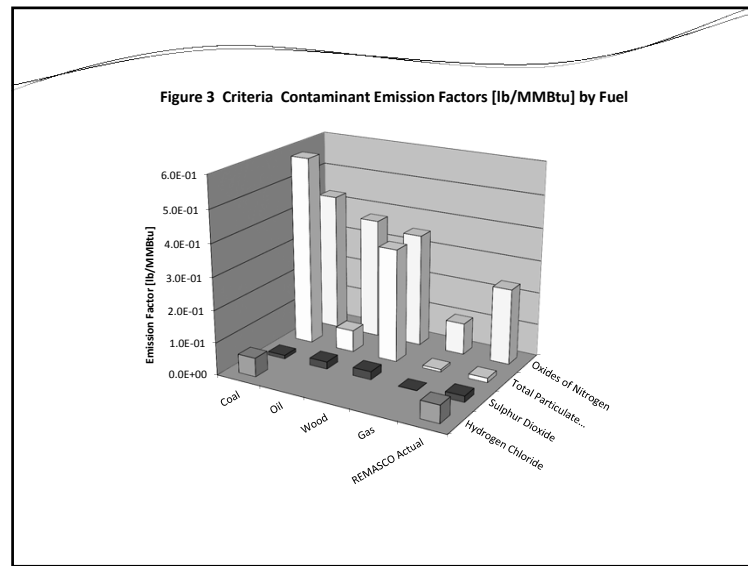
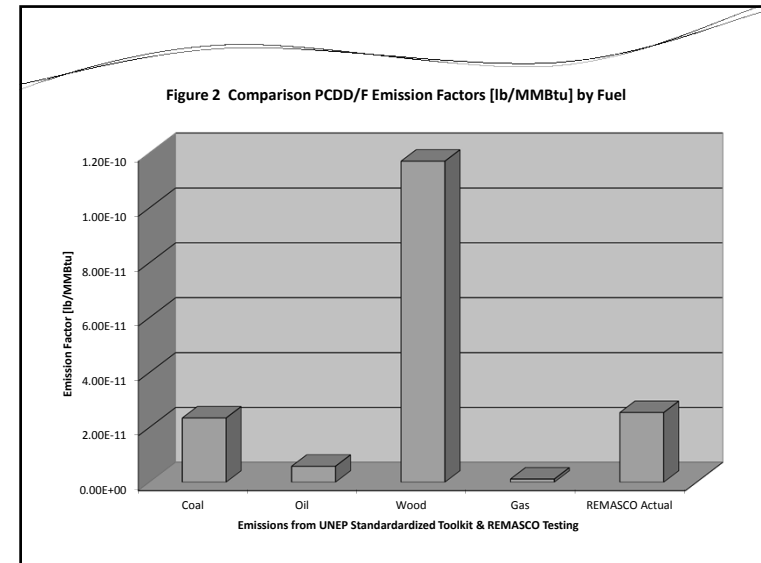
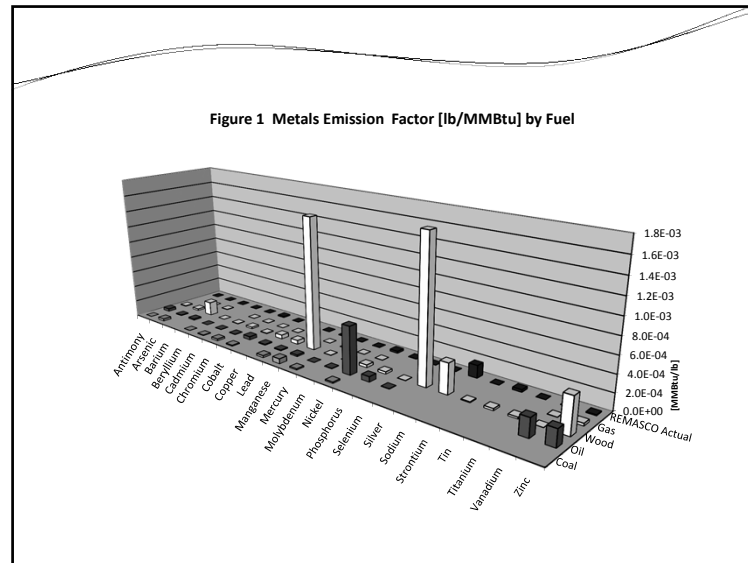
## Emissions Data

- REMASCO has been tested since operations started
  - April 2008; May 2009; April, July & Dec 2010
- Testing parameters set by MoE Guideline A-7 and listed in the Certificate of Approval issued to REMASCO by MoE.
- Testing completed by Independent Testing Firm
- Testing Firm obtains approval for testing from MoE
- Testing is witnessed by MoE who also review the final report
- Data for REMASCO emissions for this study from 2010 Report

## Emissions for Existing Sources

- Cumulative Assessment considered other greenhouse heating systems:
  - Various fuels used in these facilities (wood, oil, coal, natural gas)
  - No controls required on these facilities
  - No testing done on these facilities
- Used literature data to estimate emissions
- Emissions from existing facilities compared to REMASCO on the basis of energy generated [mass/MMBtu input]





## Proposed Installed Capacity

- Greenhouse heating systems sized for 30 Boiler HP per acre with storage systems
- Electrical needs 10 kWe per acre
- Gasifiers currently sized for 500 Boiler HP each but can be enlarged to 600 Boiler HP each
- Plan for ultimate systems will be 3300 boiler HP at Southshore and 2000 boiler HP at Agriville
- Will NOT operate at maximum output continuously

## Operating Scenarios

- Greenhouse heating requirements vary by season
  - January and February 100%
  - March 82%
  - April and December 60 – 70%
  - May, October and November 40 – 50%
  - June – September 27 – 35%
- Co-generation system >90% except July & August 72%
- Emissions related to input levels
  - adjusted emissions to reflect operating situation for both REMASCO and existing greenhouse systems

## Modelling Procedures

Computerized model uses wind speed, wind direction, temperature, and solar insolation values to predict TURBULENCE in the atmosphere

Introduce sources into the wind field and the model simulated the EMISSIONS as they are transported downwind

As the emissions are moved downwind the wind STRETCHES the plume in the downwind direction

Atmospheric turbulence SPREADS the plume in the vertical and cross wind directions

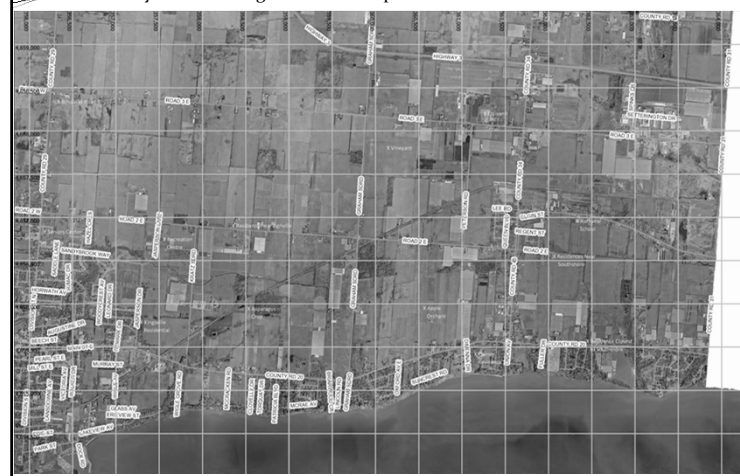
These effects REDUCE the CONCENTRATIONS as the plume moves downwind



## Modelling Receptors

- Model predicts concentrations at locations
  - Overall 100 m x 100 m spacing over 10 square kilometres centered on a point between Agriville and Southshore
  - Additional receptors around sources with tighter spacing brought total to 11,300 receptors

Study Area showing Sensitive Receptors



## Meteorological Data

- Model uses hourly data for 5 years
  - Wind Speed
  - Wind Direction
  - Temperature
  - Solar Insolation
- 365 days per year x 24 hours per day x 5 years = 43,800 hours
- Combined with receptors means nearly 495 million values calculated

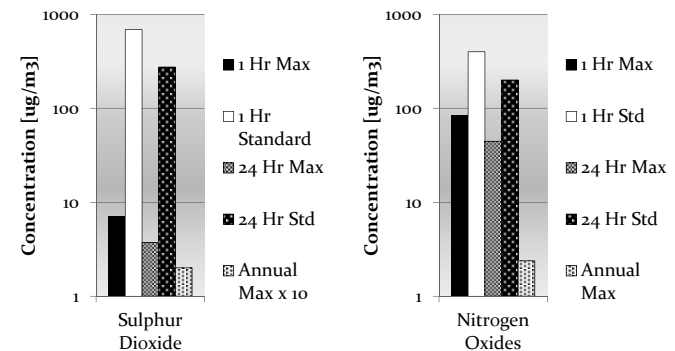
## Sources

- REMASCO sources
  - 3 stacks at Southshore
  - 2 stacks at Agriville
- Existing Greenhouse Sources
  - 25 greenhouse complexes included
  - Size of boiler input based upon area of greenhouse
  - Assumed large diameter low velocity exhaust point
- Sources modelled at different rates for all each month

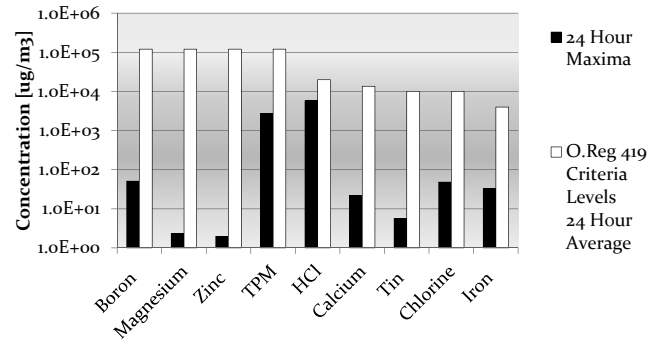
## Results

- Generates a value at each receptor for each hour
- Data is used to define:
  - The maximum hourly value at each receptor
  - The maximum 8 hour, 24 hour averages at each receptor
- Model allows comparison of effects of different groups of sources – REMASCO and the existing greenhouses
- Given the amount of data generated typically reduce to maximum values at each receptor and plot results as lines of equal concentration [isopleths]
- Values transferred to Intrinsik for HHRA

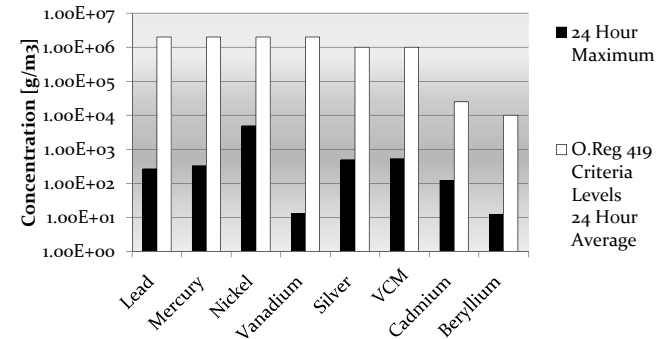
## Results Compared to Standards



## Results 24 Hour Maxima



## Results 24 Hour Maxima



## REMASCO Results Summary

- Maxima predicted for all contaminants were below the applicable guideline value for both 1 hour and 24 hour averages:
  - NO<sub>x</sub> values closest to standard at 21 – 22% both 1 hour and 24 hour averages
  - Sulphur Dioxide and Particulate matter 1 – 2% of standard
  - HCl at the emission limit of A-7 produces 24 hour average that is 29% of the standard
- Maxima occur on Site at Southshore – values at sensitive receptors are lower

## Sensitive Receptors

- At the sensitive receptors specific values were determined for the maximum value over the period
- Since the absolute maxima for all receptors is on the Southshore site
  - Not surprising maxima at the sensitive receptors are all lower than those shown previously
  - The further the sensitive receptor is from the REMASCO sites the lower the maximum concentration
- Can conclude levels at sensitive receptors low compared to standards

## Upset Conditions

- Sometimes people suggest that stacks are sampled under ideal conditions
- This implies that worse emission levels could be missed by testing – typically these would be UPSETS
- This effect was evaluated at the Sensitive Receptors for all contaminants using US EPA approaches:
  - Increase in hourly emission rate 10 times except NO<sub>x</sub> at 2.15 times and SO<sub>2</sub> at 7 times
  - Daily and Annual values 2.8 times the hourly emission rate

## Results Upset Conditions

- All results at the sensitive receptors under upset conditions were less than the MoE guideline values:
  - NO<sub>x</sub> hourly maxima was 33% of standard
  - HCl hourly maxima was 41% of the standard
  - NO<sub>x</sub> daily maxima was 7% of the standard
- Can conclude that even under Upset conditions the concentrations are below the MoE guideline values

## Guideline Values

- Based upon extensive scientific study of effects of contaminants
- Take into consideration typical background levels of contaminants in atmosphere in the province
- Regardless there are questions about the potential effects of adding a new source to emissions in the community
- This is typically called the Cumulative Effect

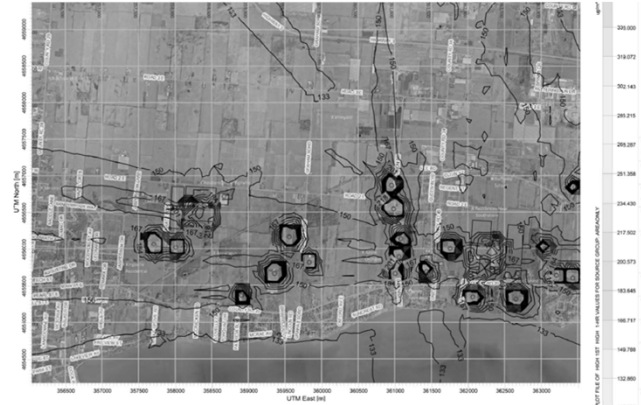
## Cumulative Effects Assessment

- Combines:
  - The existing air quality in the community
    - If there is monitoring data in the community this can define the existing air quality
    - If no monitoring use data from other communities and combine with the effects of existing sources in the community
  - 90<sup>th</sup> percentile accepted as a conservative representation of background concentrations
    - Used Chatham and Windsor data
- Need to look at existing major sources - greenhouses

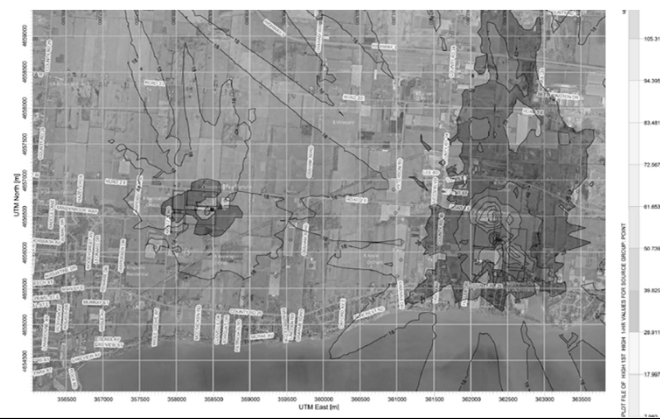
## Cumulative Assessment (2)

- Used same computer model
- Modelled NO<sub>x</sub> and particulate matter emissions for:
  - Existing situation for 25 greenhouse complexes in the study area including existing Southshore and Agriville
  - Future situation replacing Southshore and Agriville existing emissions with REMASCO emissions
- Reviewed output
  - Graphical comparison of levels
  - Numeric comparison at critical receptors for HHRA study

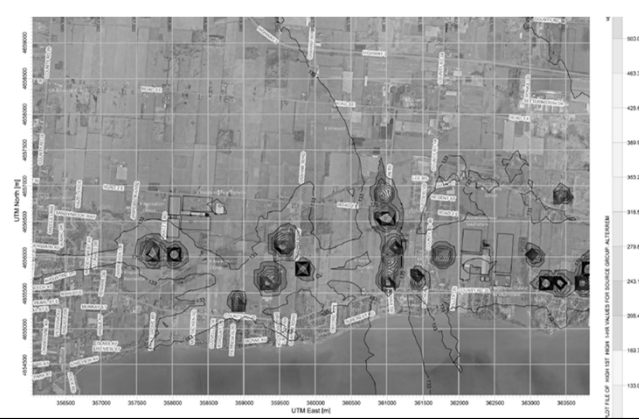
## Existing Maximum 1 Hr NO<sub>x</sub>



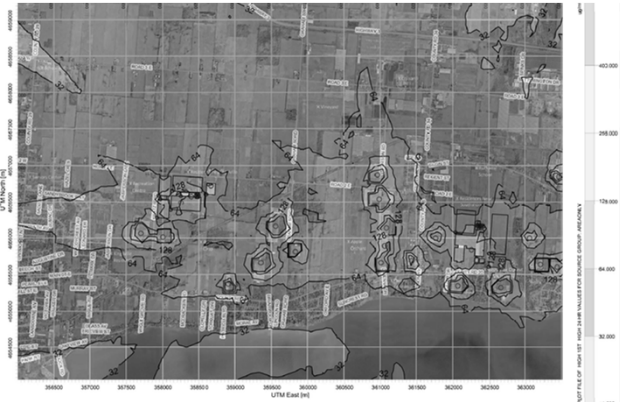
## REMASCO Maximum 1 Hour NO<sub>x</sub>



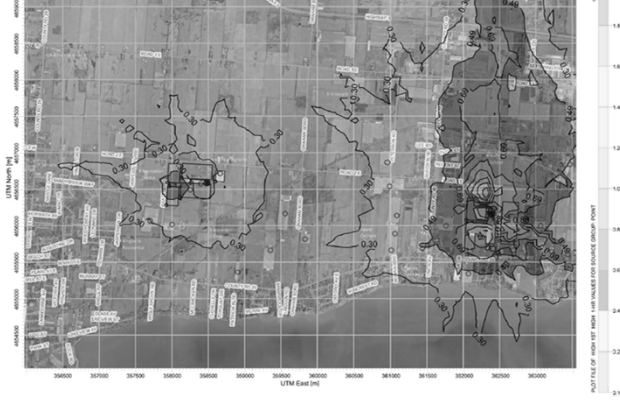
## Combined Maximum 1 Hr NO<sub>x</sub>



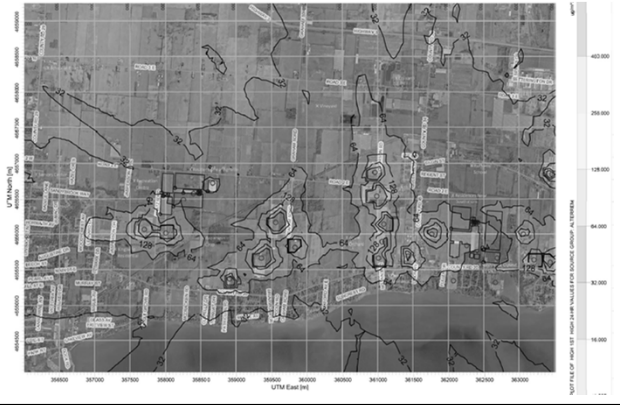
## Existing PM<sub>2.5</sub> Maximum 24 Hr



## REMASCO PM<sub>2.5</sub> Maximum 24 Hr



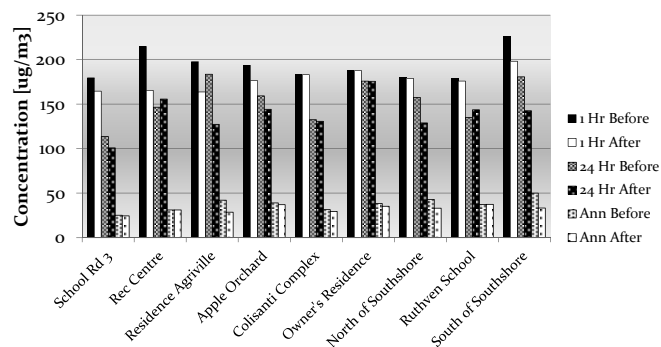
## Combined PM<sub>2.5</sub> Maximum 24 Hr



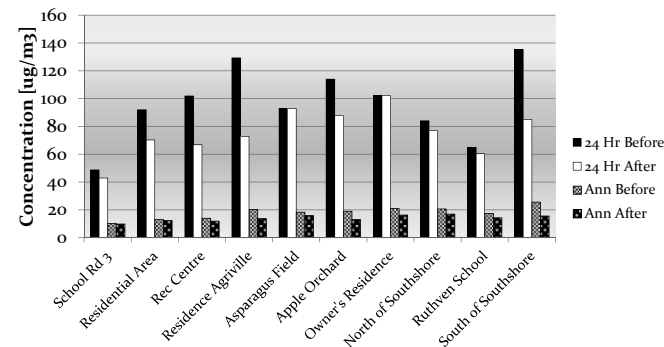
## Accounting for Existing Air Quality

- Using the 90<sup>th</sup> percentile for NO<sub>x</sub> and PM<sub>2.5</sub>
  - NO<sub>x</sub> – hourly 40 ug/m<sup>3</sup>; daily 58 ug/m<sup>3</sup>; annual 22 ug/m<sup>3</sup>
  - PM<sub>2.5</sub> – daily 17 ug/m<sup>3</sup>; annual 8.2 ug/m<sup>3</sup>daily
- Add to predicted concentrations
- Consider values at critical receptors

## NO<sub>2</sub> Cumulative Results



## PM<sub>2.5</sub> Cumulative Results



## Cumulative Conclusions

- NO<sub>x</sub> levels are consistently below the criteria levels
  - Replacing units at Southshore and Agriville will lower the burden in the community
- PM<sub>2.5</sub> predictions for existing suggest higher than standards
  - Suggest that emission factors could be refined and revising the source configuration could lower values
  - REMASCO will add negligible quantities to atmosphere since controlled
  - Installing REMASCO units will lower burden





## Human Health Risk Assessment REMASCO Gasifier Installations Kingsville ON

Elliot Sigal and Erin McGregor

*REMASCO Open House - Monday August 22, 2011*

## Human Health Risk Assessment (HHRA)

- Human health risk assessment is a scientific process that is used to estimate the likelihood that a population may experience adverse health effects as a result of exposure to particular chemicals in the environment.



- It considers the following factors:
- How dangerous a chemical is known to be;
- How sensitive people are to the chemical;
- How a person might come into contact with the chemical such as swallowing, breathing, or skin contact as well how often and how long they are exposed; and,
- How much of the chemical a person is exposed to.



## HHRA Study Objectives

**Objective :** The primary goals of the current assessment were to evaluate the potential incremental impacts of projected emissions (*i.e.*, from stack) from the gasification facilities proposed for the Kingsville area, and to determine the health implications to potentially sensitive individuals living, working, or playing in the surrounding communities, under “worst case” exposure conditions. While this assessment has focused primarily on inhalation risks related to ground-level air concentrations predicted throughout the area, it also evaluated the potential risks associated with deposition of particulates onto soils and home gardens in the surrounding area

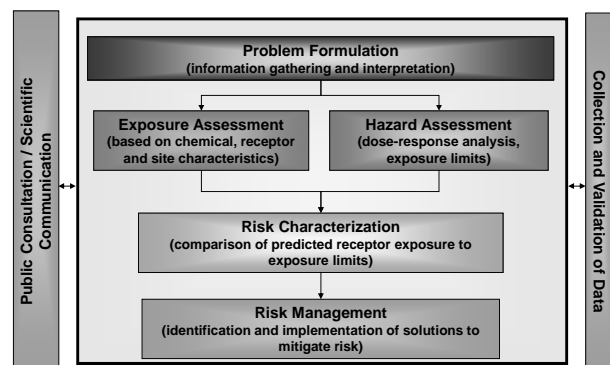


## HHRA Study Scope

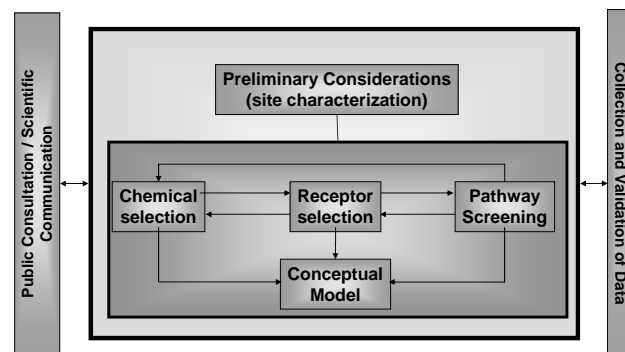
- Exposure to 14 chemicals of concern (criteria air contaminants, metals, dioxins, volatile organic compounds and PAHs);
- Three exposure routes (oral, dermal, inhalation);
- Several exposure scenarios including workers at the greenhouse facilities, residential (with vegetable gardens); milk consumers; greenhouse vegetable consumer
- Multiple sources of exposure (air, soil, diet);
- Both cancer and non-cancer health effects;
- Five life stages (infant, toddler, child, adolescent, adult) and lifetime;
- Thirteen (13) sensitive receptor locations (nearby residential, schools, farms).



## Human Health Risk Assessment



## Problem Formulation



## Sensitive Receptor Locations



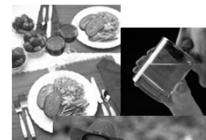
- Agriville Residential
- Southshore Residential S
- Kingsville Residential
- District School
- Ruthven School
- Southshore Residential N

- Recreation Complex
- Seniors Residence
- Colisanti Facility
- Asparagus Crop Land
- Apple Orchard
- Vineyards
- Residence S of Seacliff



## Exposure Pathways

The ways that people may be exposed to chemicals in the environment, and may include:



INGESTION



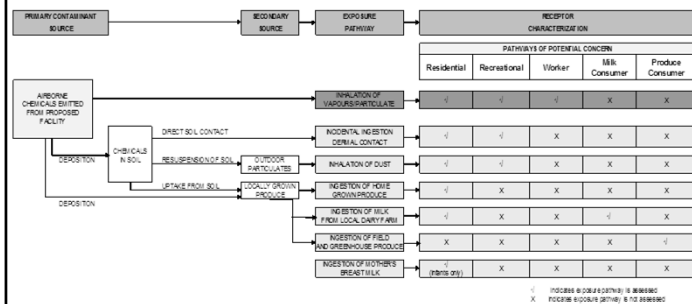
DERMAL CONTACT



INHALATION



## Exposure Pathways



## Chemicals of Concern

Criteria Air Contaminants	Inorganics	Volatile Organics	Carcinogenic PAHs
Sulphur Dioxide (SO <sub>2</sub> ) Nitrogen Oxides (NO <sub>x</sub> ) Hydrogen Chloride PM10 PM2.5	Arsenic Cadmium Chromium (III) Lead Mercury (Inorganic)	Vinyl Chloride Benzene	Dioxins & Furans



## Human Receptors

- Hypothetical individuals (people) that may be exposed to the chemicals of concern;
- Have access to potentially contaminated media;
- May be likely to experience higher rates of exposure than other receptors;
- May be especially susceptible to the toxicity of the chemicals of concern;
- Are the subject of concern of the general public



## Exposure Scenarios

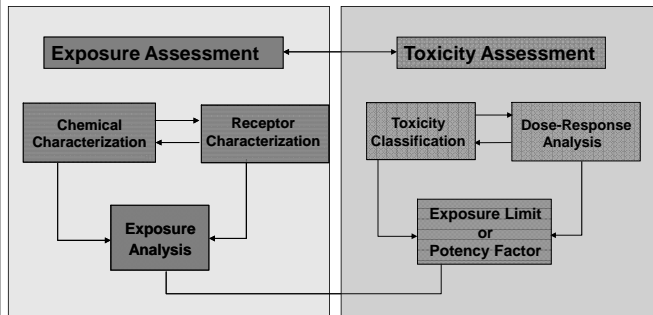
- Residential/Recreational
- Workers
- Milk/produce consumers
- Acute (short-term) and Chronic (long-term)



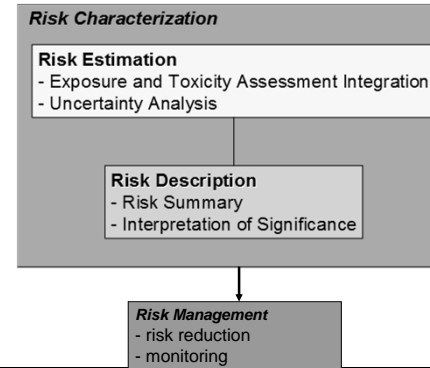
- Normal Operations and Upset Conditions
- Facility Impacts and Cumulative Impacts



## Exposure and Hazard Assessment



## Risk Characterization and Risk Management



## SUMMARY OF HHRA RESULTS

	Acute & Chronic Inhalation	Multimedia	Additional Scenarios	Upset Conditions	Cumulative Effects
Criteria Air Contaminant	○			○	●
Inorganics	○	○	○	○	
VOCs	○	○	○	○	
PAHs	○	○	○	○	
Dioxins & Furans	○	○	○	○	
Mixtures	○	○	○	○	●

○ Negligible risk – no further investigation required  
● Potential risk



## Results

### • Cumulative Assessment

- Evaluation of potential exposures under current and future cumulative conditions indicate marginal exceedances of the acute and chronic TRVs for NO<sub>x</sub> and PM<sub>2.5</sub> at several receptor locations.
- Mixture effects are also noted at several locations.
- In all cases, future cumulative risks with the proposed REMASCO facilities are equal to or lower than risks predicted under existing background conditions.
- There will be a net benefit to the installation and the operation of the REMASCO facilities.



## Overall Results

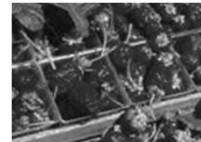
- The overall conclusion of the REMASCO HHRA is that the likelihood of health effects among Kingsville area residents from the operation of the REMASCO facilities is negligible

HIGH > 1 in 100 – described as frequent or significant
MODERATE 1 in 1,000 to 1 in 100
LOW 1 in 10,000 to 1 in 1,000 – described as tolerable or small
VERY LOW Between 1 in 100,000 and 1 in 10,000
MINIMAL 1 in 1,000,000 to 1 in 100,000
NEGLECTIBLE Less than 1 in 1,000,000 – considered remote or insignificant



## Screening Level ERA

- Based on the comparison of predicted surface soil concentrations to ecological component values, no unacceptable impacts to plants, soil invertebrates, birds or mammals from exposure to chemicals in soil are expected.
- Based on comparison of predicted maximum air concentrations emitted from the proposed facilities to air quality guidelines and preliminary plant-specific benchmarks, no unacceptable impacts to plants are expected.



- Marginal exceedances of preliminary plant-specific benchmarks for nitrogen oxides were predicted at future cumulative air concentrations, overall, anticipated risks to plants would decrease compared with existing conditions.



## Impact Management

Net Effects of the REMASCO Projects

## Impact Management

- Measures are incorporated into the design and operating plan of the facilities to greatly reduce the potential for negative impacts from the development and operation of the REMASCO facilities.
- For Water Related Issues
  - a stormwater management plan exists for the sites
  - construction contractor will control runoff quantities and prevent the transport of silt into the drainage areas
  - discharge from the operating process to a holding tank for reuse in the gasifier ash quench system, or for the flue gas cooling purposes

## Impact Management (2)

- For Water Related Issues
  - a stormwater management plan exists for the sites
  - construction contractor will control runoff quantities and prevent the transport of silt into the drainage areas
  - discharge from the operating process to a holding tank for reuse in the gasifier ash quench system, or for the flue gas cooling purposes

## Impact Management (3)

- For Land Use Related Issues
  - The operation is an adjunct use to the greenhouses.
  - These require heat, and the ENERPAX pellets are simply a unique source of energy for the heating system
  - The REMASCO projects are not incompatible with existing uses.
  - Only ENERPAX pellets will be received at site. These pellets are densified fuel that does not attract vectors, nor does it create odour issues.
- The municipality has confirmed the adjunct use to be within the zoning and development rules.

## Impact Management (4)

- Air Quality Issues
  - The company is committed to operating and maintaining the facility and equipment in a manner that ensures compliance with the Guideline A7 criteria.
  - This commitment includes maintaining the continuous emission monitoring systems and subjecting the units to annual testing in accordance with the requirements of its Certificate of Approval.
- Measures taken have been demonstrated to result in no exceedances of criteria

## Impact Management (5)

- Potential for Noise Impacts
  - Acoustic consultant has identified the existing REMASCO facility can create an unacceptable noise level under certain conditions.
  - The problem originates from the type of impellers in the large induced fans.
  - These impellers will be replaced with quieter ones and all future induced fans will incorporate only low noise impellers.

## Impact Management (6)

- Traffic
  - The Proponent will schedule shipments of pellets to arrive during the normal working hours thereby limiting the potential for unusual traffic conditions on the road surrounding the sites during low light hours when the presence of trucks could be more problematic.

## Impact Management (7)

- Public Anxiety
  - REMASCO will institute a formal Public Liaison Committee to act as an independent committee to overview the operation of the facilities and create a communications channel for the community
  - REMASCO will provide the necessary seed funding for this committee
  - The committee will operate at arm's length from REMASCO as a not for profit organization with its own rules of governance.
- Should relieve anxiety

## Net Effects of REMASCO

- The Environmental Screening Assessment suggests that the REMASCO projects will have some positive environmental effects:
  - Reducing air emissions from greenhouse heating boilers;
  - Reducing the use of fossil fuels at the project greenhouses; and,
  - Allowing local generation of electricity to reduce loads on the electrical distribution system;
  - Creating a PLC to work with the operators and ensure that local concerns are addressed;
- Any negative impacts, related to incremental increases in runoff from the sites, additional truck traffic to the sites, the generation of residue streams at the facility have been shown to be essentially insignificant.

## What is Next?

- Review any comments received tonight to determine if there are unanswered questions
- Complete the Environmental Screening Report as required by the Regulation
- Issue a Notice of Completion of the Screening Study
- A 60 day review period starts when the Notice is issued
  - Comments to the MoE Director and to REMASCO
- After 60 days the Director makes his decision
- If accepted, REMASCO will proceed with application for full CofA for the EXISTING installations at Southshore
- Subsequently REMASCO will need to apply for permission to install additional units until full capacity is reached