

CHANGING LIVES IMPROVING LIFE

### Energy Crop Potential under Alternative Scenarios

#### **Alfons Weersink**

Dept of Food, Agricultural & Resource Economics (FARE)

Sustainable Energy in the Agri-Food System: Challenges, Opportunities and Success Factors **Climate Resilient Food Systems** 

May 6, 2016



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### Background

- Ontario's Green Energy Act- 2009
  - Feed-in-tariffs (FIT) for green energy
  - Phase out of coal-based power
    - 2 million tDM required

- Other uses of biomass
  - Local heat source (i.e. greenhouses)
  - European demand for biomass pellets
  - Second generation ethanol plants



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# Can Enough be Grown?- Yes

#### Estimated Amount of Swithgrass by Area Grown (tDM)

Land	Land Planted to Switchgrass		
Class	5%	10%	25%
1	485,293	970,587	2,634,926
2	792,951	1,585,902	4,088,250
3	474,109	948,218	2,510,375
4	241,602	483,204	1,325,597
5	113,505	227,011	647,614
ALL	2,107,461	4,214,922	11,206,762

Kludze, Deen, Weersink, DeLaporte 2014



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## Will it Be Grown?

#### De Laporte PhD Dissertation

- 30m x 30m (9ha) scale GIS model of province
- Yield estimated for each cell based on spatial temperature and solar radiation
- Net returns determined for several crops included biomass crops



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### Miscanthus has higher yields than Switchgrass



Mean  $Y_{SW} = 10.8 \text{ tDM/ha}$ 

Mean Y<sub>M</sub>= 18.3 tDM/ha



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# Switchgrass has higher break-even prices than Miscanthus



>70

Ontario Boundaries Miscanthus BEP Normals (\$/tDM/y) <60 60-65 65-70

>70

400 Kilom



Mean  $BE_{SW} =$ 73 tDM/ha

100 200

Mean BE<sub>M</sub>= \$58 tDM/ha



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### **Supply Curve for Miscanthus**





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# Area Planted to Miscanthus under \$80 and \$100 Biomass Prices





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# But ....Currently

- Nanticoke did not switch from coal to biomass
  - Price of natural gas
  - Technical burning issues
  - Demand for power fell

- Current biomass market is small
  - 35 members in coop
  - Local, niche markets
  - Lacking supply chain to meet European market



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Classifieds

**Opinion & Blogs** 

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Video

Home / Crops / News / Ontario biomass producers in expansion mode

### Ontario biomass producers in expansion mode

Posted Mar. 10th, 2016 by Jeffrey Carter

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Don Knott is currently Ontario's largest biomass producer with large fields of switchgrass near Clinton in Huron County. I Jeffrey Carter photo

CAMPELLVILLE, Ont. — There's been much talk about dedicated biomass in Ontario over the past couple decades. Now the industry may finally be ready to grow.

"We expect a major surge in acres this year," Urs Eggiman told a Ontario Biomass Producers Co-operative meeting Feb. 25.



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### Role of Prices and Biofuel Policy Impacts

Food Policy 37 (2012) 439-451



#### Biofuels and the poor: Global impact pathways of biofuels on agricultural markets

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The New Hork Times

#### UPDATED MAY 3, 2016 9:13 AM What's Holding Back Renewable Energy?





Wind turbines in western New Mexico. PNM, via Associated Press

#### Oxford researchers recently predicted

precipitous growth in green energy over the next 10 to 15 years, decreasing global need for fossil fuels. Yet, the largest renewable energy company in the world, SunEdison, just filed for bankruptcy on the heels of the fall of another clean energy giant, Abengoa.

Is the renewable energy sector in trouble? What is holding back more immediate success in the industry?

**READ THE DISCUSSION »** 

#### DEBATERS



Solar Energy Will Thrive DAVID SANDALOW, CENTER ON GLOBAL ENERGY POLICY

Solar module costs have plummeted. Integrating it into the grid is easier. And governments recognize its social benefits.



Subsidies in the Wrong Places Skew Solar's Power IOSEPH ALDY, PROFESSOR OF PUBLIC POLICY

The value of renewable power is often lower because investments do not always target he highest-quality resource: Solar goes where the subsidies are, not where the sun shines.



#### Utilities Must Stop **Blocking Solar** Growth

KATIE OTTENWELLER, SOUTHERN ENVIRONMENTAL LAW CENTER

Some utilities take advantage of outdated laws to prevent solar companies from offering customers options to lower or eliminate upfront costs of installing solar panels.



**Owners** Need to Understand Energy Use in Their **Buildings** 

ANDREW CHEN, WEGOWISE

Most don't know how much energy is being used and why and so they fail to make energy choices that would be useful to them.





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### But ....for the Future

 Historical evolution from hunter-gatherer to farming society continues

- Bioeconomy aids in the transition
- Movement influenced by
  - Search costs for non-renewables
    - Demand/supply conditions for oil
  - Conversion costs of renewables
    - Technological innovations



### **Thoughts from ISBBB**

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#### (International Symposium on Bioplastics, Biocomposites, & Biorefining)

- Growth in symposium
  - Significant resources into renewables

- Examples
  - 1. IPCG
    - Profitable "biorefinery"
  - 2. Nature Works- Ingeo
    - 10 years ago: Bioplastics = biodegradable
    - Currently: Bioplastics = plastics



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## Constraints facing Land-Intensive RE

- High land prices in Ontario
  - Significant conversion would put further pressure on land prices
  - Food vs Fuel debate re-ignited?

- Opportunity costs to
  - Iandowners growing the feedstock
  - energy producers/consumers



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### Constraints facing Land-Intensive RE

- Technological investment will lower conversion costs
  - Innovation breeds innovation

- Creation of a market is next hurdle
  FIT program for biothermal heat?
- New technology may leapfrog biomass