Life Cycle Assessment as a Tool for Agriculture

Taking the First Steps

Biomass: Securing a Sustainable Supply
Kerrianne Koehler-Munro
March 5, 2012
Outline

• Setting the Context
• Why an LCA Approach
• Applications of LCA in Agriculture
• Environmental Footprinting in Alberta
Is it all about GREEN

- Population 9 billion by 2050 with higher incomes
- Meat- and dairy-based diets (70% more food by 2050)
- Global warming and extreme climate events
- Competition for grains and oilseeds (food versus fuel)
- Food wastage in developed countries
- Consumers, governments, NGO’s, food industry, our children concerned about food sustainability issues
And, globally, there’s **LESS**:
- Water (75% global water usage is in agriculture)
- Land available for agriculture (10% less by 2050)
- Fossil fuels (if not “peak” oil, higher cost oil)
- Public investment in agricultural R&D
- Old growth forests
- Food stocks
Who is Interested in a Sustainable Image?

- **Retailers**
  - **Walmart** – #1 in world
    - Locally sourced products
    - Support 3rd world farmers
    - Track pesticides, fertilizer and water use
  - **Carrefour** – France, #2 in world
    - Carbon legislation
    - Social welfare
  - **Tesco** – UK, #3 in world
    - Carbon labeled products
  - **Sobeys**
Woody Harrelson breaks from ‘Hunger Games’ to promote Canadian wheat-based paper

by Dirk Meissner, The Canadian Press on Thursday, October 25, 2012 9:48am -
Values: The Other Half of the Equation

Source: IGD 2012
The global sustainability megaforces result in both risks and opportunities. Businesses can design effective strategies to address the risk while simultaneously taking advantage of the opportunities.
Environmental Labels
Certified Labeling
Momentum is Growing

THE GLOBAL PACKAGING PROJECT
PART OF THE CONSUMER GOODS
FORUM SUSTAINABILITY PILLAR

Retailers
ASDA
Loblaw

Manufacturers
The Coca-Cola Company
Sara Lee

Associations
AIM
FCPC

Packaging manufacturers
P&G

Consultant support
Quantis
GreenBlue

**Sustainable Apparel Coalition**

- Adidas
- Arvind Mills
- C&A
- Duke University
- Environmental Defense Fund
- Esprit
- Esquel
- Gap Inc.
- H&M
- HanesBrands
- Instando
- JC Penney
- Kohl's Department Stores
- Lending
- Levi Strauss & Co.
- LF USA, a division of Li & Fung Limited
- Marks & Spencer
- Mountain Equipment Co-op
- New Balance
- Nike
- Nordstrom
- Otto Group
- Outdoor Industry Association
- Patagonia
- Pentland Brands
- REI
- TAL Apparel
- Target
- Timberland
- U.S. Environmental Protection Agency
- Verité
- VF Corp
- Walmart

Sustainability Consortium
Retail Sector Moving Quickly

Keeping Score with the Environmental Scorecard

Jessica Droste Yagon
Senior Manager, Sustainable Supply Chain

Objective: Work with our suppliers to help them become more aware of the resources they are using and drive continuous reduction of environmental impacts in the production process.

Solution: About five years ago, McDonald's began working with Conservation International and some
“An estimated 90 to 95 percent of the food industry’s environmental footprint occurs in commodity production.”

-2009 Corporate Social Responsibility Report
Market demand for food safety and environmental sustainability assurance programs has become a global reality.

The phenomenon will only increase as more companies implement their own social responsibility (SR) programs.
Many challenges and opportunities for farmers, society & the food sector
Life Cycle Assessment (LCA)

- A decision-making tool to identify environmental burdens and evaluate the environmental consequences of a product, process or service over its life-cycle from cradle to grave
- Standardized by ISO (14040)

Indicators for decisions with a science-based aggregation
Example: Snapshot of product system, biodiesel

Showing only 85 of about 2000 interconnected unit processes
Some Uses of LCA

- Compare alternatives
- Identify “hot spots”
- Invest resources intelligently
- Set goals & measure progress
- Benchmark performance
- Manage risk
- Communicate & substantiate
- And more...
Carbon Footprint Analysis for Wood & Agricultural Residue Sources of Pulp

- carbon footprint of wood and agricultural residue sources of pulp
- determine whether the use of crop residue had the potential to reduce the environmental “load” associated to pulp production
Value Added Opportunities for Straw in Alberta

- Opportunities for industrial use of straw exist in the Lamont, Minburn, Two Hills, Beaver and Camrose counties.
- There is some opportunity in the Clear Water, Mountain View, Rocky View and Foothills county and municipal districts as well.
- Straw supply is variable over time and space in Alberta.
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Margaret Atwood, Author

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MARGARET ATWOOD
Welcome to Canopy's list of the most environmentally friendly paper available in North America.

Criteria for inclusion are based on the Paper Steps, developed with and endorsed by the Environmental Paper Network.

This list includes Ancient Forest Friendly™ papers, and other eco papers that are category leaders. So, whether you're looking for paper with recycled, FSC or agricultural residue content, you can be sure that the printing and writing grades, copy paper, newsprint and packaging options below are the greenest Canopy has found on the market.

If you manufacture or sell eco paper you think should be added to this list, or have an update to include, please email neva@canopyplanet.org.

How to use the database:
Narrow your search by filtering the list. Fewer filters will result in a larger list.

Click on a paper's Brand Name to see more details.
Environmental Footprinting for Agriculture in Alberta Project

- Funded by the Federal Provincial Agricultural Flexibility Agreement
- March 2014
Environmental Footprinting Project

- Primary production level sustainability assessment and reporting using a life cycle approach for four agriculture commodities in Alberta
  - Canola
    - The functional unit for this study is the production of one (1) kg of Alberta-grown canola at the farm gate.
  - Potato
  - Chicken
Project Goals

- Build capacity to understand, develop and utilize environmental footprints
- Develop data inventories that are applicable to the prairie region
- Processes and methodologies that are recognized nationally and internationally
Canola Boundaries
Milk Production LCA Results Example

Total Emissions: 28 Million Metric Tons CO₂e
Equivalent to approximately 10 lbs CO₂e per gallon of milk
Footprinter Example: Milk

**Intended use:** help US milk farmers understand their environmental impacts and prioritize their efforts for reducing them

**Carbon footprint**
- Emissions for 1 kg of milk (FPCM)

**Your footprint**
- kg CO₂-eq
- % of total footprint

- **Feed print** (view breakdown)
  - 0.16
  - 31
- **Enteric print**
  - 0.17
  - 35
- **Manure print**
  - 0.13
  - 25
- **Fuel print** (view breakdown)
  - 0.05
  - 9

**TOTAL**
- 0.5
  - 100

*view the FAQ*
Times have changed

“It is not the strongest species that survive, nor the most intelligent, but the ones who are most responsive to change.”

- Charles Darwin
Thank you…

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Life Cycle Impact Assessment

- Raw Material Production
- Agriculture
- Crop Production

- Crude oil
- Iron ore
- Phosphates
- NOx
- And hundreds more

- Climate change
- Mineral extraction
- Non-renewable energy
- Human toxicity
- Respiratory effects
- Ionizing radiation
- Ozone layer depletion
- Photochemical oxidation

- Aquatic ecotoxicity
- Terrestrial ecotoxicity
- Acidification
- Eutrophication
- Terrestrial acidification
- Terrestrial nitrification
- Land occupation
- Water extraction
- Water stress

- Climate change
- Resource consumption
- Human health
- Ecosystem quality
- Water Withdrawal

Adapted from Impact 2002 +