



TOGA is an alliance of Ontario's greenhouse vegetable and greenhouse floral grower organizations.

WHAT YOU NEED TO KNOW ABOUT CARBON FOOTPRINTS

Energy is one of the most significant cost factors in greenhouse production in Ontario

Energy from combustion produces emissions of carbon dioxide and other gases such as methane and nitrous oxide – collectively these gases are called “greenhouse gases” or GHGs for short¹

In order to address global climate change, different approaches to reducing potentially harmful gas emissions are being considered by governments and by large trading companies

The purpose of this bulletin is to connect these dots, updating you on how pending changes could impact the Ontario greenhouse sector and affect your future business decisions. **Public policy is moving in the direction of a low carbon economy.** There is another factor driving change: the role of the grocery retail trade. Large customers like WalMart and Loblaws are adopting sustainability policies in which they are increasingly scrutinizing the practices of their suppliers and requiring reporting from them. While the marketers and wholesalers will be in the front line of these requirements from the trade, they will flow through to their suppliers, individual grower operations. These twin factors – governments and customers – are driving change for which our sector needs to be positioned competitively and strategically.²

While future policies could impose additional costs and more reporting requirements on our sector as energy users, by taking measures to reduce GHG emissions, **greenhouse operators may also gain significant economic benefits.** That is undoubtedly one of the reasons why the trade is increasingly pushing this agenda – it's good for their bottom line – and it can be for yours too.

While there are different views of the validity of the scientific basis for global climate change, governments and large businesses are taking the issue seriously. Our sector, as a major user of energy, cannot afford to ignore it.

1. The greenhouse sector tries to discourage the use of the term “greenhouse gases” but it is widely used to convey that the atmosphere of the earth acts like a greenhouse for the entire planet providing higher surface temperatures than would otherwise be possible. Carbon dioxide is the most important of the “greenhouse gases” as it accounts for about 20% of the heat retention of the atmosphere. Measurements show that the level of carbon dioxide and other GHGs have been steadily increasing over the past one hundred years. Canada ranks seventh in the world in terms of our total GHG emissions.

2. Fresh and packaged food products in European and Japanese supermarkets are increasingly disclosing each product's carbon footprint prominently on the label. Among other considerations, should this kind of voluntary label disclosure take hold in North America, it will enable consumers to comparison shop and choose products with lowest carbon footprints.

What is a “carbon footprint?”

- “Carbon footprint” is the term used to refer to the quantity of GHG emissions directly or indirectly caused by a company’s operations.
- There are six primary gases that are internationally recognized for reporting purposes: carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbons, perfluorocarbons, and sulfur hexafluoride.
- Because each gas has a different atmospheric life, each one has its own “global warming potential” number to provide equivalence among the various gases using carbon dioxide as the reference point. For example, nitrous oxide has a global warming number of 310, meaning that the impact of 1 kg of nitrous oxide is equivalent to 310 kg of carbon dioxide.

Direct Impact Examples

- When a greenhouse burns fuel in its own boiler and releases carbon dioxide and other gases in the exhaust
- When a farm vehicle burns gasoline in its engine

Indirect Impact Example

Depending on how it was generated, the source of the electricity which a greenhouse buys from the grid can significantly affect the greenhouse’s own carbon footprint. Each purchased input like electricity is assigned a carbon co-efficient.

How are carbon footprints measured?

To provide a reasonable basis for objective comparisons, a number of international protocols are emerging as standards. Two of the more widely used are (1) ISO 14064 and (2) WRI/WBCSD (World Resources Institute/World Business Council on Sustainable Development). The latter was chosen for this project because it is the one most used in the North American

grocery and food industry. In the study done for TOGA, it was used to develop the carbon footprints for the seven sample greenhouses. Because it is not possible to directly measure the carbon footprint of purchased inputs and fuel, there are standardized GHG co-efficients for different materials as well as for the combustion impact of different types of fuel.

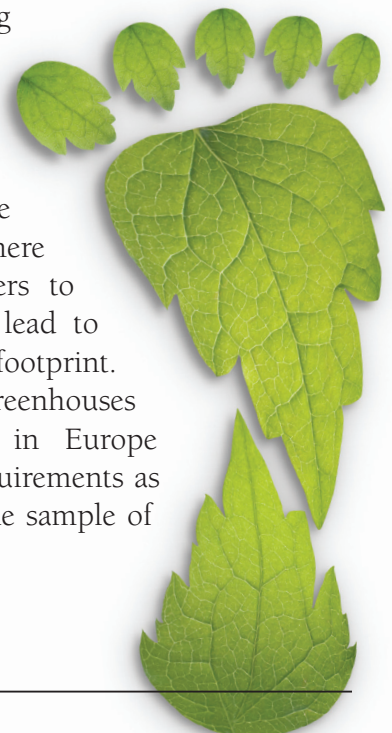
What did the Ontario greenhouse sample results show?

The sample of seven greenhouses³ covered in the project showed that there is considerable variation in carbon footprints. Carbon footprints are expressed as the kilos of carbon dioxide produced per square meter of greenhouse. As noted earlier, gas emissions such as nitrous oxide and methane are expressed in kilos of carbon dioxide equivalent based on the global warming number of each gas. There are three primary sources for the carbon footprint of Ontario greenhouses:

1. **Energy** (ranging from 53% to 85% of the total carbon footprint)
2. **Growing media** (ranging from 2% to 22% of the total carbon footprint)
3. **Waste** (ranging from 1% to 15% of the total carbon footprint)

Fertilizer, packaging and transport

are other areas offering opportunities to lower the carbon footprint of individual greenhouse operations. The variability among greenhouse operators shows that there is room for many growers to adopt practices that will lead to an overall lower carbon footprint. The carbon footprint for greenhouses at comparable latitudes in Europe with the same heating requirements as Ontario’s is in line with the sample of greenhouses in Ontario.



3. Because of the small sample size, grower data cannot be reported, in order to assure confidentiality

Why is there variability among greenhouse operations?

- the carbon footprint depends on the type of production system, the crops grown, and the scope of operations: for example, some operators pack and ship whereas others simply harvest and move the product to another location for packing
- the indirect inputs can have a major impact – if electricity from the local utility is generated by a coal-fired plant, it will lead to a higher carbon footprint overall than if it comes from a hydro generating station
- those greenhouse operators who are able to recapture carbon dioxide from waste gases on combustion and feed it to their plants will have a lower carbon footprint than those who release all the CO₂ as an emission without recovering any of it
- those greenhouse operators that use renewable fuels – forms of biomass – rather than fossil fuels will have a lower net carbon footprint

What can individual greenhouse operators do?

Energy is the largest source of the carbon footprint in Ontario's greenhouses. Measures that could be taken by operators which have not yet been widely adopted include: combined heat and power applications including situating new greenhouses in proximity to industrial facilities generating waste heat, using natural gas in place of bunker oil, expanded use of solar panels, higher efficiency boilers and lighting systems, using biomass as a fuel in place of fossil fuels, and expanded

use of reflective films to reduce heat loss. Developing a “carbon conscious” approach to business in which operators look to reduce the carbon footprint will be increasingly important as a business strategy. That approach will require examining ways of reducing waste, increasing the use of recycled materials in packaging, and using growing media that represent less of an indirect impact.

Steps That Individual Greenhouse Operators Can Take Now

- 1. Map Out Your Carbon Footprint** – assess the usage of carbon and carbon derivatives in your operation and throughout the supply chain for areas of high usage. This mapping may require making changes to your enterprise accounting system so that it more effectively tracks units of materials used so that data can be quickly and reliably generated.
- 2. Identify Good Substitutes and Begin Using Them** – look at alternatives to high carbon materials and determine how to effectively use them
- 3. Engage With the Supply Chain** – engage suppliers to see what they are doing to lower the carbon footprint of the materials which they supply and determine what joint steps can be taken for more progress
- 4. Think Systematically** – chart the flow of materials and think about how they are sourced, used and disposed of, looking for barriers and potential solutions
- 5. Use Your Sustainability Score To Advantage** – Once you have taken steps to lower your carbon footprint, consider how you can highlight your sustainability credentials and use them as a marketing tool

It's Not a Question of *If* but *When* and *How* Government Will Act

Most of the action on using various policy levers to drive towards lower overall carbon emissions is expected to occur in Canada at the provincial level. At the federal level, the Canadian government has been following US policy which is **uncertain** at this time. Broadly speaking, governments have two policy options: (1) putting a tax on carbon or (2) implementing a form of “cap and trade.” One Canadian province that forged ahead with its own carbon policy was British Columbia, which implemented a carbon tax.

The Carbon Tax In British Columbia (BC)

In 2008, BC was the first province in Canada to introduce a carbon tax levied on fuels for combustion such as natural gas, diesel, gasoline, bunker C, peat, tires and coal. The tax is levied based on the estimated carbon dioxide emission equivalent for different types of fuel. Most forms of biomass were exempted from the tax. So far, the rest of Canada has not followed suit. But the issue of putting a value on carbon emissions is not going away as policy-makers grapple with global climate change.

Cap and Trade System

Although BC chose to put a tax on carbon based on the quantity of the fuel input, the other possible scheme is to let the market put a value on carbon by introducing a ‘cap and trade’ regime. The way that ‘cap and trade’ works is that large emitters, that use fuel above a certain cap or ceiling, are required to buy permits for their excess emissions (that is, those above the ‘cap’). The market-place sets a value on this right to exceed the target threshold, imposing an additional cost on large emitters, and thereby providing an economic incentive to reduce their emissions. The cost to the

emitter is revenue to the seller, firms with carbon offset credits from permanent, verifiable reductions. There is an essential role for government in the cap and trade system as it sets the caps, creates the permits, and determines the allocation of the permits by sector. There is also a role for brokers to aggregate individual carbon offset credits into large blocks for trading on a globally fungible basis. The cap and trade system is potentially very complex, carries significant uncertainty, and is open to abuse from speculation.

The policy debate over which option to choose in Ontario – a carbon tax or a cap and trade system or a combination – is continuing. With a provincial election in the fall of 2011, it is unlikely that Ontario will enact any significant change during the term of this government. Under the Western Climate Initiative, to which it is a signatory, Ontario is committed to implementing a form of cap and trade by January, 2012 for certain large industrial users including electrical power utilities and by 2015 for the economy more broadly.

Next Steps

Staff at TOGA, OGVG and FCO will continue to closely monitor developments in this changing regulatory landscape so that our boards can make decisions on policy direction for the benefit of the greenhouse growers we represent. Having greenhouses exempted from the first proposed round of cap and trade in 2012 is an important policy goal. More information will be provided to growers as their needs to support steps to prepare for the future are better defined and as policies unfold.

Support for This Initiative

The Ontario Greenhouse Alliance (TOGA), representing the combined interests of both greenhouse vegetable and floral growers in Ontario, and in collaboration with AgEnergy Cooperative, applied for and received a grant from the Agricultural Adaptation Council's CanAdvance program to undertake an independent analysis of the Ontario greenhouse sector's carbon footprint. TOGA and AgEnergy together matched this amount. The purpose of this work was to be proactive in seeking to gain an understanding of the impact of changes on our sector in which the utilization of carbon

will increasingly be measured and have a cost attributed to it. Through a competitive tendering process, the study was awarded to a consulting firm with technical and business expertise in carbon-related matters, PPD Inc. With cooperation from both vegetable and floral growers, the lead consultant, Kaji Kado, completed their report. This document summarizes key learning from their work. **TOGA appreciates the support** for this project provided in part by Agriculture and Agri-Food Canada through the Agricultural Adaptation Council and from AgEnergy Cooperative.

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