

**Vegetable Industry Carbon Footprint Workshop
Stamford Hotel, Sydney Airport
Wednesday 15 October 2008**

Notes - Alison Turnbull

Attendees - DPI staff, peak industry body representatives and vegetable industry members, consultants, Vegetable Environment Committee members, Horticulture Australia Limited

Purpose - to bring together industry and researchers to gain agreement on the best approach and industry requirements for the development of a carbon footprinting tool for the Australian vegetable industry.

Government and community perceptions regarding industry emissions are moving fast, need to understand what consumers are focusing on in this area and how to respond.

Carbon Pollution Reduction Scheme will be introduced within 15 months - important to be proactive in responding to this.

Summary of Common Themes

- **Big picture issues:**
 - High profile topic with a lot of activity, especially Governments
 - Reality that industry needs to understand the triple bottom line impact of the production / business. Even though horticulture (and therefore vegetable industry) is only a small proportion of the national emissions there is still a need to understand our contribution when talking to Government
 - Rules of engagement of an Emissions Trading Scheme may change by 2015 so if industry is not aware and confident in their contribution then they will be worse off
 - Cost efficiency and trade off of addressing business emissions needs to be determined to give growers a decision on how to implement any actions to reduce emissions.
 - Profitability of growers is a major concern, so any recommended practice changes need to be cost effective
 - Potential for efficiencies to bring benefits to growers?
 - Eco-efficiency (broader approach to sustainability) is important

- **A footprinting tool for industry:**
 - Agreement that a tool would be nice to have, but not a requirement
 - Any tool needs to be simple and flexible and useful for measuring direct emissions from on-farm
 - Needs to be free and easily accessible
 - Many tools are already available, but need to be adapted for industry. Need a simple interface, good emission factors validated by science and protocol that sits behind it
 - Needs to integrate with existing systems and reporting
 - Focus on on-farm footprint, not greenhouse gas accounting (this is too specific, will be costly, and the industry is a minimum contributor to national emissions so there is no benefit in going to this accounting level)
 - Need to consider the extension of the tool as well

- **Need for benchmarking:**

- Benchmarking of the industry through footprinting will be important - allow for future industry planning, allow for comparison with other industries and potentially internationally
- **Public perception:**
 - Consumers will not pay for this, but will require it (premium versus expectation)
 - Confirm industry 'right to farm' - can a footprint defend this?
 - Increase community trust in sustainability of industry and its practices
 - Education of consumers is important
- **Urgency for proactive response:**
 - Carbon footprinting has similarities with the Quality Assurance Scheme - there is a need to ensure that industry is well placed to proactively respond to this issue
- **Research needs:**
 - Need to refine and improve emissions factors, e.g. field study of N₂O emissions for various vegetable crops
 - Fill in gaps in data - Fuel use for machinery operations, irrigation requirement for various vegetable crops, electricity use for post-harvest storage, and fertiliser use
 - Development of recognised protocol as well as footprinting interface
 - Interpretation document and potential for extension of the tool needs to be scoped when developing the tool
 - Education and awareness campaign for consumers interpretation of footprinting results
 - Cost-benefit analysis of reduction options
 - Benchmarking of current industry practice, in relation to practices that influence GHG emissions
 - Investigation of soil carbon sequestration opportunities for industry

Discussion Paper presentations:

What is a carbon footprint? (Andrew East, Growcom)

- This presentation provided an overview of the background to this term, some key definitions and methodologies of a carbon footprint and provided a definition for industry
- Definition for industry - *"A direct measure of greenhouse gas emissions (GGEs) caused by a defined activity. At a minimum this measurement includes emissions resulting from activities within the control or ownership of the emitter and indirect emissions resulting from the use of purchased electricity."*
- Originated in the concept of ecological footprint, which is easier to define and more recognised footprint. This was a measure of bio-capacity of the land - measured in land area not tonnes, i.e. a footprint
- There are a range of definitions of a carbon footprint. Some measure bio-capacity, land area, CO₂ equivalence, etc. Carbon Trust definition has been established and recognised in literature
- There is little grounding of this term in scientific literature and it is often criticised
- Common use terms are carbon footprint, carbon calculator, greenhouse gas accounting (from popular culture to scientific)
- Purpose is largely defined by the user, i.e. to improve efficiency of farming practice (grower), to detailed labelling to inform consumer (retailer)
- There are international standards for carbon footprinting, i.e. PAS 2050, World Resources Institute, ISO 14064, Life Cycle Assessment Society of Japan
- There is a categorisation of emission sources by ownership or control of those emissions - scope 1, 2 and 3. See paper for more info on this...
- All six gases are included in Kyoto Protocol and footprints, i.e. not just CO₂
- Scope 1 and 2 emissions are generally measured in a footprint, but scope 3 is harder and

therefore less accounted for

- Issue: hard to avoid undercounting and double accounting of emissions and use of emission factors

Questions and comments:

- The two different measurements of a footprint - land area (intensity) of production and tonnes emitted are two separate methods and should not be compared. Industry can use both approaches, but it depends on what use.
- What about eco-efficiency? WRI is focused on this - focused on sustainability and profitability as well as environment

How will carbon footprinting address the issues of mitigation, emissions trading, and/or marketing? (Markus Deurer, HortResearch)

- This paper and presentation aims to describe some of the potential uses of a carbon footprint for industry, specifically related to reduction / mitigation of emissions, marketing and/or involvement in ETS
- Carbon footprint is already being used and wanted by consumers
- Tesco survey - a survey of consumer groups demonstrated that the number one requirement from consumers is that they want the company to have 'concern for the environment'. Tesco have since carbon footprinted some products and are using a footprint logo on product in store (branding)
- Wal-Mart - they have instigated a Greenhouse Gas Scorecard for products that is completed prior to getting on shelves and therefore no labelling /branding is required - all products are measured before put on shelves cause they believe consumers do not read the labels (shelf access)
- Consumer behaviour might change if they are given a choice of products (competitive advantage)
- There is potential for a competitive advantage for undertaking a footprint, but there is still the big picture of needing to continue to reduce emissions - supermarket chains might require that a product reduce their emissions by a certain percentage per year
- Most protocols use the life cycle analysis approach - i.e. used to identify 'hot spots' along the life cycle of the product. This allows efficiency opportunities to be identified
- Some examples of opportunities for reduction of GGEs:
 - On-farm - mixture of diesel/biofuels
 - Storage - reduce leakage from refrigeration
 - Packaging - Tetra packs used instead of glass bottles for wine
 - Distribution - more efficient shipping
 - Consumption - education of consumers about the benefits of microwaving a product instead of boiling
- Mitigation (off-setting of emissions, i.e. not changing practices, but rather offsetting current level of emissions - this is different to reduction, which indicates a change in practice) can be attempted, better once reduction approaches have been researched - some options:
 - Purchase of carbon credits (within a recognised trading scheme)
 - Recycling of organic wastes, e.g. biochar
 - Mitigation with the objective to be carbon neutral e.g. Grove Mill winery in NZ - now has access to shelf space in Tescos and Walmart since becoming carbon neutral (race to the top)
- Australian Carbon Pollution Reduction Scheme (emissions trading scheme):
 - Agriculture might be included 2015 (to be decided 2013)
 - Horticulture contributes about 1% of agriculture's national emissions, which account for 16% of the nation's emissions
 - Point of obligation is a problem - simple and accurate tools need to be developed to size emissions from agriculture

- A carbon footprinting tool could be used for multiple purposes - marketing, reduction and mitigation and emissions trading
- Industry needs to understand its footprint for opportunities such as:
 - Shelf access
 - Branding opportunity
 - Legislative requirements

Questions:

- Retailers are pushing for less and less labelling of fresh produce (i.e. black crates) - how can industry capitalise on branding opportunities of footprinting if retailers do not allow for this? This is an issue for QA schemes already...

What carbon footprinting tools are currently available? (Shaun Lisson, CSIRO)

- This paper and presentation describes a number of existing footprinting tools and their potential use for industry.
- Needed to understand the key selection criteria for a carbon tool - including scale, boundaries, process scope, management functionality, scientific understanding, suitability for Australian conditions and others.
- Four models/tools focused on:
 - Grains GGE calculator
 - Spreadsheet based
 - Individual to mixed farm, but on-farm emissions only
 - Simulates NxO emissions from soil disturbance and fertilisers
 - Simple interface, low input requirements
 - Carbon Zero
 - Certification program for minimising CC impacts
 - Crop specific to whole farm, on-farm + upstream and downstream emissions
 - Limited agriculture application to date, but is increasing
 - Offers a full service for measurement, manage, mitigate and certification and marketing (independently audited)
 - FullCAM
 - Process-based, farming system model
 - Part of carbon accounting toolkit
 - Crop specific to whole farm (mixed enterprise), on-farm
 - Limited vegetable crop functionality to date
 - Complex for inputs and interpretation
 - APSIM
 - Process-based, farming system model
 - Crop specific to whole farm (mixed enterprise), on-farm
 - Limited vegetable crop functionality to date
 - Most on-farm management practices simulated
- The above four are individually unsuitable, but collectively models capture key attributes and functionality for vegetable calculator
- Apparent trade off between operability and accounting accuracy
- Different tools for different end users/applications

Questions:

- Do all tools account for plant growth (photosynthesis) - some crops consume CO₂ and how is that covered? These are assumed within the models.
- In a closed-loop, hydroponic system how easy is it to measure emissions?
- Disconnect carbon footprinting and carbon accounting - precision and accuracy is different to what the tool is being used for.

What is the GG contribution of horticulture/vegetables compared to other agriculture

industries (Abdur Rab, VIC DPI)

- This paper and presentation aimed to estimate, using existing data, the GG contribution of industry
- There was limitations on data availability for specific crops and activities and emissions factors for veg industry
- GG Emission = activity x energy required x emissions factor
- Total horticulture emissions are estimated at 1,047,008 t CO₂-e year⁻¹ (25% ON FARM, 15% POSTHARVEST, 60% PREHARVEST):
 - On-farm: Electricity 66%, soil 19%, fertiliser 8%, fuel 7% and agrichemical 1%
 - Off-farm: postharvest 22%, irrigation 78%
- Research needs:
 - Need to refine and improve emissions factors, e.g. field study of N₂O emissions for various vegetable crops
 - Fill gaps on data

Questions:

- Should we be confident about the accuracy of the estimated industry emissions? Tightening up the accuracy for particular industries will be important for the end user, but this estimate is within factor 10 of Peter Deuter's back of the envelop estimate, so is an appropriate estimate.
- What is the comparison between diesel and electricity in relation to irrigation on farm? I.e. what profitable practice changes can be undertaken to reduce the emissions by changing fuel type? Cost is very important, not so much related to environmental benefit of reducing emissions
- **Action:** circulate the AFI Mike Keogh latest report

What are some of the practices for mitigating GHG emissions? (Nick O'Halloran, VIC DPI)

- This paper and presentation aimed to identify some key practices to recommend to industry that reduce emissions
- N.B. Mitigation and reduction are both used for the same purpose in this talk
- Mitigation/reduction practices are divided into three categories - pre farm, on farm and post farm
- Mitigation can include implementing a practice that has less emissions or reducing the intensity of an activity
- Pre farm:
 - Low embodied energy and emissions important,
 - Need to consider transport of the product to the user
- On farm:
 - Improving efficiency of input use on farm include electricity (irrigation and refrigeration), fuel (machinery use), fertiliser, agrochemical
 - These require knowledge of crop requirements for water, chemicals and fertilisers
 - Reducing GHG from soil via improved management of fertiliser, irrigation, organic matter and reduced tillage
 - Capital buildings and machinery - consider size and scale and/or options for multipurpose buildings and equipment
- Post farm:
 - Transport and refrigeration
- Issues to consider regarding the above proposed practice changes:
 - Cost of these options
 - Downstream impacts
 - Impact on product quality and waste production
- Research needs:
 - Benchmark of industry practices and their associated emissions

- Measurement of GHG emissions under current or improved practices
- Information packages for growers, including BMPs
- Cost-benefit analysis of GHG reduction and mitigation options

Case Study presentations

Case Study 1: Houston's Farm Carbon Footprinting update (Allison Clark, Houston's Farm)

- This presentation was an overview of the Houston's Farm/HAL footprinting project that commenced in 2008 - giving an overview of why this vegetable producer decided to develop a footprinting tool and the steps to date. Key lessons learnt, drivers for, and next steps were discussed.

HOUSTON'S FARM OVERVIEW

- Houston's Farm - baby leaf fresh cut salad producer nationally, with 5 farms (2 owned, 3 leased) based in Tasmania. Environmentally conscious for a long time - family owned and driven
- Aware of food miles concept from overseas since 2004 and have monitored developments. This has been overtaken in last 18 months by footprinting of impacts of activities
- Harvesting - Hand cut the lettuce crops and use harvesting machinery for the other crops. Summer 70t per week, winter 40-50t per week
- The culture of the business is early adopters of technologies. So the drivers for this project are market access, reduction, potential for mitigation (but not focused on carbon neutral), and efficiency improvements.

THE HOUSTON'S FOOTPRINT PROJECT

- Partnership with HAL to begin development of footprinting tool for their business. Phase 1 has been commenced, but funding for future phases to be confirmed
- This project is not just about impact of carbon, but also practices and whole farm impacts
 - Three areas - agricultural practices, processing practices and supply chain (review from seed to supermarket)
 - Three phases - tool and protocol document, industry tool, road show
- Early project challenges:
 - Appropriate project partners
 - Understand boundaries for the assessment
 - Assessing models available
 - Cost effectiveness of approach
 - Understand what it meant to be carbon neutral
- Main driver to participate with rest of vegetable industry and develop some common language around this issue, within industry and with consumers
- Consultants - ARM (link to DCC and CSIRO), TOA (extension) and Pitt & Sherry (model creation)
- Information sources - manufacturers, journals, central databases (greenhouse accounts - DCC, AGO), SimaPro (LSA software), first principle calculations
- Audit to ISO14044 undertaken
- Reference Group developed - DPI QLD, NZ Landcare Research, MLA, AFI, UK Carbon Trust
- Next phase of development
 - Simple interface for input by businesses
 - Interpretive document referencing where to go for further information
 - Tool capable receiving new research parameters as they are released
- Marketing for Houstons is about access, not a branding opportunity

Case Study 2: Wine Industry perspective (Amy Russell, Winemakers Federation Australia)

- This presentation provided an overview of the wine industry activity in developing a carbon calculator and footprinting protocol. The wine industry is well advanced in this area, due to international activity in this area (wine industry is export focused, therefore vulnerable to international pressure in this area)
- Began with food miles - wine industry was hit by this issue as they are a major exporter and use heavy glass bottles for transport
- Challenged the UK about food miles as not all-inclusive of impacts and about the fact that wine is air-freighted, as only less than 1% is flown in (most by ship)
- Support PAS 2050 to be the protocol used for international standards for products. To be launched on 29th October in London
- Food Climate Research Network - contacted WFA about wine figures for carbon footprinting. Comparisons between Californian production and Australian production - use of different emissions factors and methods. Comparisons therefore were not correct
- Excel based wine calculator developed with international linkages
- There are retailers that are either seeking carbon footprinting now or within 2 years - with the need for producers supplying them to meet this within that timeframe as well
- Development of international wine carbon protocol. Challenged Kyoto standards re fermentation of wine versus sequestration on-farm
- Including stationary, tillage, vine photosynthesis, sequestration into fruit and other structures, winery processing emissions, fugitive emissions from fridges, methane from combustion structures, packaging waste, purchased electricity, electricity and transmission losses
- Majority of emissions are scope 3
- Market signals focus on life cycle analysis rather than scope measurement. But this might change as a result of the Carbon Pollution Reduction Scheme
- The protocol is the most important document - other countries already looking at developing different calculators but that takes into account the protocol and therefore allows for equivalence
- Glass manufacturing and transport are the highest emissions from wine production and delivery. But emissions from on-site breakdown of pruning on-farm and nitrous oxide emissions from soils are high proportions as well for some producers
- Starting to review outcomes from calculators in field - research needs to improve data inputs into calculators