

Mt Alexander Fruit Gardens 5 Year Sustainability Plan

Hugh & Katie Finlay

2009



In this plan we have described the lifestyle we enjoy and the type of business we want.

We have calculated our carbon footprint and committed to becoming carbon-neutral by capturing as much carbon from the air each year as we release into the atmosphere as carbon dioxide (CO₂).

We aim to run a self-sufficient business, with all inputs being produced on the farm, as far as is practical.

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1. BUSINESS & LIFESTYLE DESCRIPTION

1.1 WHAT IS OUR CORE BUSINESS?

Mt Alexander Fruit Gardens is a certified organic orchard, growing fruit according to biological farming principles.

Our fruit is sold directly from the farm through pick-your-own, at farmers' markets, by mail-order and at the wholesale organic market in Melbourne.

Our fundamental farming practice is to improve our soil by increasing beneficial microbiological activity and organic matter through the use of compost and compost tea. This should result in:

- Increased soil carbon levels;
- Increased water holding capacity of soil;
- Increased resilience to drought, frost and harsh conditions;
- Improved soil structure;
- Better (and free) nutrition for orchard trees and grasslands;
- Healthier plants;
- Increased resistance to pests and diseases.

1.2 WHAT IS MOST SUSTAINABLE ABOUT OUR BUSINESS?

Our sustainability plan is based on the *triple bottom line* model, where **personal sustainability** (what we need to feel happy and satisfied), **social sustainability** (how our business fits into the wider economy, what our customers want, how we interact with peers etc); and **ecological sustainability** (the environment, global issues etc) have all been considered. The discussions that took place while writing this plan highlighted the following points:

- We enjoy working at home and working together, while maintaining separate areas of interest within the business;
- We enjoy having the flexibility (through being self-employed) to spend time with our children, work at off-farm jobs and be involved in community projects;
- By growing certified organic produce and practicing biological farming, we support the expansion of the local organic industry, and reductions in the use of pesticides and fertilizers and the amount of oil used in food production;
- Through interaction with the public when selling our fruit (at home, at farmers markets and through our website), we inform people of the benefits of organic and biological farming techniques and connect consumers directly with food at the source. We enjoy selling fruit to people who live locally and are committed to continue doing so;
- When selling direct to the consumer some of our packaging is sustainable. Customers either provide their own bag or we provide 100% post consumer recycled paper bags (for free) or re-used boxes. We aim to completely phase out the use of plastic bags (see the packaging analysis at 3.2);
- At the moment 39% of our fruit is sold either at local markets (Wesley Hill and Castlemaine Farmers Market – 16%) or the Melbourne wholesale market (23%), both of which require minimal greenhouse gas production in transport (see the transport analysis at 3.1).

1.3 WHAT IS LEAST SUSTAINABLE ABOUT OUR BUSINESS AND LIFESTYLE?

- Household energy use is high as our house is not as energy and water efficient as we would like. Lack of insulation, absence of curtains and draughtiness leads to the use of heaters throughout winter in the office and bedrooms;
- Car transport is a major greenhouse gas (GHG) contributor;

- Transport to get fruit to markets is a big contributor to our (GHG) production. Other activities that use a lot of energy include fruit refrigeration;
- We work too many weekends, taking time away from family and kids;
- Packaging fruit for the wholesale market into new cardboard boxes (even though the boxes are made of recycled material) creates a lot of waste for the retailer;
- On a personal level we waste a lot of energy by double or triple handling fruit due to old or inadequate equipment and infrastructure, mostly because all fruit must be loaded by hand into the chiller. Selling our fruit at weekend markets sometimes provides little return for a lot of effort and takes away valuable leisure time;
- The future supply of irrigation water, on which we rely, is very insecure. This is the 6th year of restrictions and we have no guarantee of full supply being restored. We have improved our irrigation infrastructure and techniques to the point where in 2007/08 we grew our crop with only 35% of our water right and in 2008/09 with 30% (see the water analysis at 3.3). We will upgrade our system to become more efficient this year due to a \$20,000 Federal irrigator's grant for which we are very grateful. We are planning to plant more orchard, and the likelihood of ongoing irrigation restrictions remains one of the biggest barriers to security for our business;
- While the business is profitable, it returns a low wage to both of us for the amount of hours we work. Hugh does off-farm work (contract editing from home) to help support the family, and while he enjoys this work it adds further time pressure, and he often works at night in the office so he can be free to do farm work during the day.

1.4 IN WHAT DIRECTIONS DO WE WISH TO DEVELOP OUR BUSINESS AND PROPERTY? HOW WILL OUR BUSINESS AND LIVES LOOK WHEN IT IS MORE SUSTAINABLE?

We wish to buy the farm from Katie's dad, and have negotiated to do so by the end of 2009. We aim to increase our income to provide a prosperous standard of living including comfortably meeting mortgage payments despite an unstable global financial situation. We want maximum financial return for our labour without compromising our principles.

We aim to have at least a neutral effect on the carbon cycle – ie we want to sequester as much carbon through our farming activities (trees, crops, grasslands and soil improvement) as we generate through our business and lifestyle. We want to generate at least as much electricity (through wind & solar) as we use. In order to do this we will:

- reduce our energy consumption and make our house energy efficient;
- buy genuine 'green' power generated from renewable energy sources until such time as we generate our own power, and to meet any shortfall we can't provide ourselves;
- continue to increase and monitor carbon levels in our soils;
- include a calculation of sequestered soil carbon in our carbon footprint equation;
- develop non-orchard land use on the farm for maximum carbon sequestering, through revegetation or cropping;
- install the most cost-effective renewable energy infrastructure available to supply our electricity needs.

We are developing our farm according to the permaculture principles of providing for as many as possible of our needs from our own land, using the least land as possible to do so and getting multiple uses from all elements that make up the farm and business. We value diversity in income production and crops as insurance against disasters. We are committed to maintaining off-farm income, and will continue to diversify our commercial crops. We will continue to build other farm resources to provide multiple sources of energy, water, food and income.

Thus we aim to:

- produce as much of the food we consume from our own land as is practically possible;
- continue our native revegetation and weed control program on any land not needed to produce our food or income;
- produce our own farming inputs such as compost and any natural insecticides we use;
- deal with pest and disease problems (and not all pests and diseases constitute problems that require action) as naturally as possible, through the promotion of soil and plant health, animal predation, and natural home-grown (or wild harvested) and home-made insecticides;
- re-use or recycle most of our waste products (orchard, animal, human and domestic) in a productive way, particularly ensuring all nutrients are returned to the soil.

We live in a beautiful and healthy environment and are keen to share it with family, friends and others who appreciate and would like to learn about our environment and lifestyle. We will:

- minimize weekend work to enable us to spend time with our children, family and friends, socializing and relaxing;
- develop the business in such a way as to allow our children and their families to be involved in the business now and in the future if they should wish;
- develop (with our kids) a transparent and frequently revisited succession plan for the farm;
- welcome WWOOFers, agricultural trainees and other similar visitors to the farm to be involved with our farming life in a spirit of co-operation and exchange;
- develop a range of on-farm accommodation options so family and visiting workers can stay in comfort and beauty;
- have enough regular help on the farm that Hugh has flexibility to retain his off-farm job without having to work at night;
- willingly and openly share information about our farming practices.

We continue to expand and develop our farm business by planting more orchard and continuing to add new varieties. We plan to build a comfortable and efficient packing shed incorporating an energy-efficient coolstore. We plan to develop a small commercial kitchen for value-adding to our fruit, which will be energy efficient, comfortable to work in and beautiful to look at. We are committed to ongoing professional development in our individual interest areas, undertaking study and attending training courses, seminars, workshops and field days.

We are looking to the future when we will gradually retire from active farm work, and plan to extensively travel. While maintaining our carbon neutral lifestyle we will:

- continue to develop our skills and experience to the point where we can meaningfully and profitably share them with others;
- leave the farm for warmer climes each winter, possibly combining travel with off-farm work, leaving the farm in capable and experienced hands;
- have regular time away together;
- regularly travel overseas;
- work less in the farm businesses, leaving plenty of time for spending time with the family and community involvement;

In addition:

- Katie intends to train as a Permaculture practitioner, a Buteyko breathing teacher and get her pilot's license;
- Hugh and Katie both intend to get motorcycle licences;
- Hugh and Katie will devote regular time to their personal health, wellbeing and relationship to ensure they remain happy and healthy for the rest of their lives.

2. BENCHMARKING ENERGY USE

2.1 SUMMARY OF LEVELS OF EMISSIONS FOR 2007/08 FINANCIAL YEAR:

- Annual greenhouse gas emissions (CO₂): 43.0 tons

Sources of emissions	kg CO ₂	Black balloons ^a
Electricity – home	14,190	283,766
Electricity – farm	5,990	119,808
Gas – home	280	5,758
Diesel – us	1,276	25,520
Diesel – share of neighbour’s vehicle use	65	1,300
ULP	3,788	75,752
LPG	17,376	347,520
TOTALS	42,965	859,433

^a 1 black balloon = 50 gm carbon dioxide

- Sequestering of CO₂ by farming practices (trees, soil, annual crops): 20.2 tons

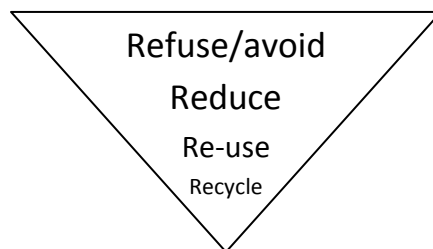
Sources of sequestering	kg CO ₂	Black balloons
Orchard trees	20,200	404,000
Soil	Not counted	-
Annual grasses	Not counted	-
Revegetation zone	Not counted	-
TOTALS	20,200	404,000

Net greenhouse gas emissions (CO₂): 22.8 tons
Black balloon equivalent: 455,433

2.2 WHAT HAS BEEN INCLUDED IN CALCULATION OF GHG EMISSIONS?

We have made our calculation based on our use of resources that give us operational energy. We have not included embodied energy in consumables used in our family life or business as the information is very difficult to obtain or calculate.

We have however made a commitment to use as little energy from non-renewable sources such as fossil fuels in our business as possible. We have adopted the philosophy of:



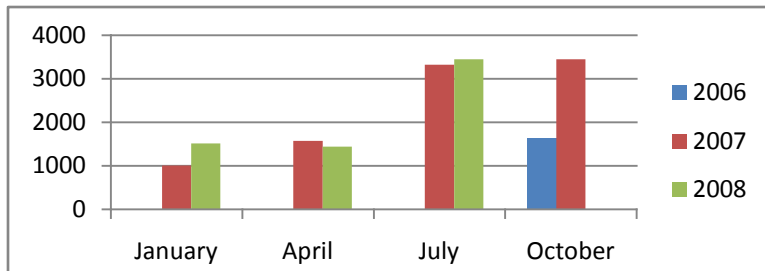
We will continue to adapt our business practices to reflect this philosophy wherever possible and practical. Specific measures are included in our 5-year sustainability plan.

2.3 SOURCES OF EMISSIONS: ELECTRICITY USE

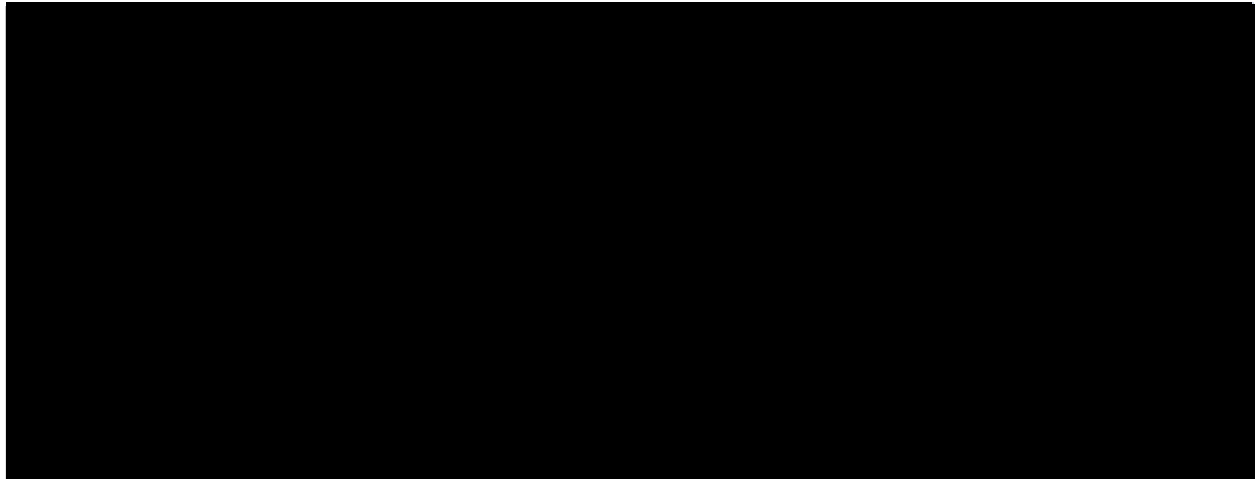
2.3.1 Domestic - last two years



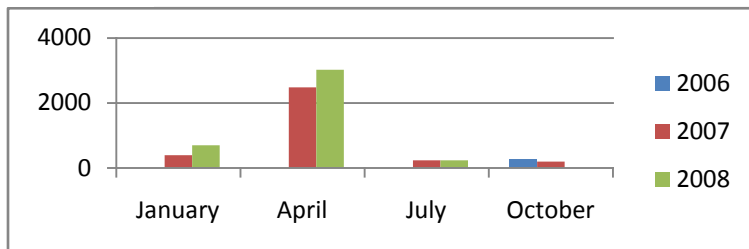
kWh/day



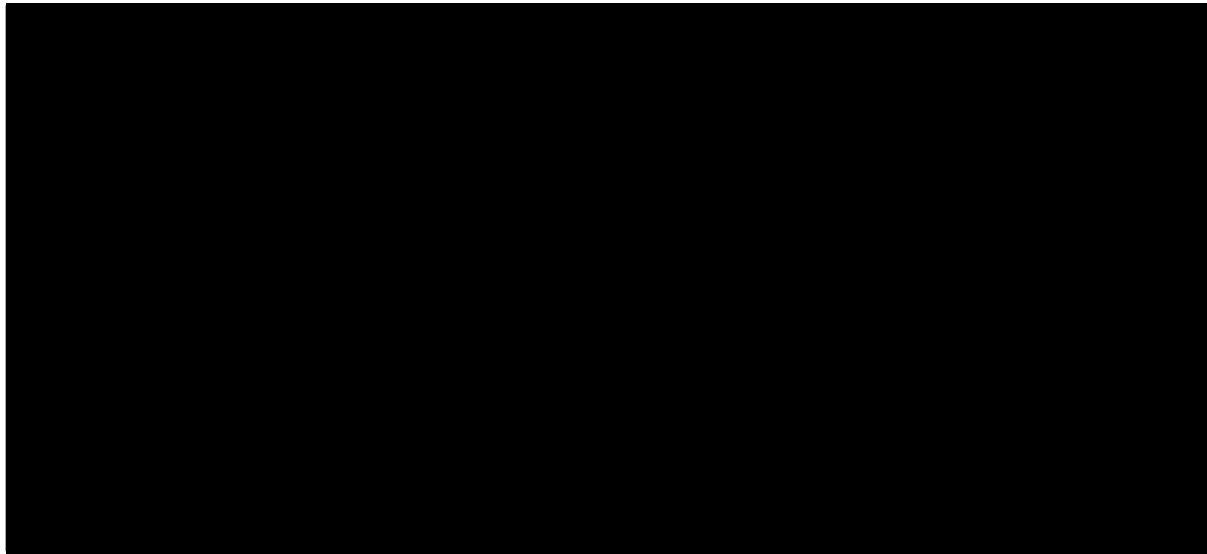
2.3.2 Farm – last two years



kWh/day



2.4 SOURCES OF EMISSIONS: BOTTLED GAS



Household gas is used only for cooking. Use has remained low and stable since 2006, though the price both of the gas and bottle rental is increasing dramatically.

2.5 SOURCES OF EMISSIONS: FUEL

2.5.1 Diesel: red tractor

440 litres/year x 2.9 kg CO₂/litre = 1276 kg (1.3T) = 25520 black balloons

2.5.2 Diesel: transport of our fruit to market on neighbour's truck

In 2007/08 we sent fruit 12 times to the Melbourne Markets with a neighbour, a return trip of 260 km. Their truck uses 2.1 litres fuel/km, or 124 litres each trip. The conversion factor for diesel into CO₂ is 2.9, so 359 kg CO₂ are produced each trip, or 4,308 kg CO₂ for the 12 trips. The truck holds 66 pallets, and we sent one pallet each time, so our share of the CO₂ produced was 65kg, or 1,300 black balloons for the 12 trips (in fact our share would be even smaller than this as our pallets weighed less than a full pallet of apples).

2.5.3 Petrol: panel van, grey ferguson tractors, brush cutter, cherry picker, cherry pump, Lizzie's car going to farmer's markets

ULP Fuel bill for year	Av \$/litre of ULP 07/08	No. litres	GHG (kg CO ₂) (x2.7kg CO ₂ /litre)	Black balloons
\$1,992	1.42	1,403	3,788 (3.8 tons)	75,752

2.5.4 LPG: cars (Hugh and Katie)

LPG Fuel bill for year	Av \$/litre of LPG 07/08	No. litres	GHG (kg CO ₂) (x1.86 kg CO ₂ /litre)	Black balloons
\$5,605	0.60	9,342	17,376 (17.4 tons)	347,520

We do not currently keep log books and cannot therefore calculate what percentage of car use is for business purposes and how much is domestic.

2.6 CARBON SEQUESTRATION THROUGH OUR FARMING ACTIVITIES

Growing orchard trees, re-foresting areas of our farm, cropping the non-orchard areas and particularly increasing the microbiological activity and organic matter in our soil are all likely to

be sequestering carbon. Accounting for this carbon in a verifiable fashion is difficult. The Australian Government’s Greenhouse Office provides a free National Carbon Accounting Toolbox which can calculate greenhouse gas emissions and carbon stock changes for various types of land use, however it is very complex to use and beyond the scope of this sustainability plan. We have included a calculation for the carbon sequestered into the biomass of our orchard over the lifetime of our trees (see 2.6.1.) but until we can easily calculate the carbon sequestered by our soil, revegetation areas and cropping areas, or decide to pay someone to make the calculation for us, we have chosen not to include that carbon in our carbon equation.

2.6.1 Orchard trees

According to a New Zealand review of published literature for measurements or reliable estimates of the standing biomass of orchard crops,¹ apples and pears sequester 66 tonnes of CO₂ per hectare, peaches and nectarines 73 tonnes/ha and plums 114 tonnes/ha. No figures were available for cherries or apricots, so we have used the lowest figure of 66 tonnes/ha for our calculation of the amount of CO₂ sequestered by the orchard trees at Mt Alexander Fruit Gardens (Australian conditions are similar to New Zealand conditions).

Variety	No.hectares at MAFG	Tonnes CO ₂ /ha	Tonnes CO ₂ sequestered over the lifetime of the tree
Apples & pears	0.7	66	46.2
Peaches & nectarines	0.7	73	54.7
Plums	0.8	114	95.8
Cherries	1.4	66	92.4
Apricots	0.4	66	26.4
TOTAL	4.0		315.5

- The average lifespan of a commercial orchard is 15 years, so we can assume that **21.0 tons of CO₂** are sequestered by our orchard trees every year;
- Some of the CO₂ is released back into the atmosphere each year. Our current practice is to burn the larger prunings (smaller prunings are left on the orchard floor to rot and return the C to the soil). We estimate that the equivalent of 150 trees (3.75% of the orchard) is burnt each year, so 3.75% of the 21.0 tonnes of CO₂ sequestered by the trees = **0.8 tons of CO₂** is released back to the atmosphere;
- Taking the above factors into consideration we can assume that the orchards at Mt Alexander Fruit Gardens sequester a net amount of **20.2 tons CO₂** from the atmosphere each year.

2.6.2 Soil carbon

According to Dr Christine Jones, principal of ‘Amazing Carbon’² whose work is referenced in the Garnaut Report³, the world's soils hold three times as much carbon as the atmosphere and over four times as much carbon as the vegetation. Soil therefore represents the largest carbon sink over which we have control.

Dr Jones has proposed the Australian Soil Carbon Accreditation Scheme (ASCAS) that would pay farmers for the carbon stored in their soil, plus the increase in the amount of carbon in the soil

¹ Kerckhoffs L.H.J and J.B. Reid, *Carbon sequestration in the standing biomass of orchard crops in New Zealand*. Report prepared for Horticulture New Zealand Ltd by New Zealand Institute for Crop & Food Research Ltd, RD2, Hastings, New Zealand 26 March 2007

² www.amazingcarbon.com

³ Garnaut, Ross, *The Garnaut Climate Change Review: Final Report*, Cambridge University Press, 2008, Ch 22: Transforming Rural Land Use, 22.3.2. Soil Management

each year, as explained at the 'Managing the Carbon Cycle' Katanning Workshop in 2007.⁴ Dr Jones outlines a methodology for calculating soil carbon stocks, which we have used in the following calculation.

Calculating our total soil carbon stocks in tonnes per hectare (tC/ha)

Soil bulk density (BD) (g/cm^3) is the dry weight (g) of 1 cubic centimetre (cm^3) of soil. It is generally in the range 1.0–1.8 g/cm^3 . Bulk density varies for different soils and different soil depths. Generally, soils of low bulk density are well structured and have 'more space than stuff'. The lower the bulk density the more room for air and water and the better the conditions for soil life and nutrient cycling. BD generally increases with soil depth. The higher the BD the more compact the soil.

Tonnes of carbon dioxide equivalent sequestered per hectare are calculated by multiplying the carbon stock by 3.67.

- To measure our soil carbon content (in the absence of a BD measurement) we have assumed our soil is in the middle of the BD range ie 1.4 g/cm^3 ;
- Soil tests undertaken at Mt Alexander Fruit Gardens in 2006 showed a figure for organic C of 2% (averaged across all our orchards). Organic C is about 50% of total C, so we can assume a total C figure of 4%;
- Dr Jones recommends calculating soil carbon to a depth of 110 cm in her proposal for a soil carbon accreditation scheme, which equals 1,100 m^3 of soil/ha. Using the BD measure of 1.4 g/cm^3 , this translates to 1,540 tons soil/ha. When last measured total C made up 4% of our soil, so we currently have a soil carbon stock of 61.6 tons C/ha;
- Our property is 24.5 ha, therefore our total soil carbon stock is 1,509 tons;
- Using the multiplier of 3.67, this is the equivalent of 5,539 tons of CO_2 , or 226 tonnes/ha that was sequestered in our soil in 2006.

Since converting to organic production our main orchard management technique has been to improve our soils through the addition of compost and promotion of biological activity, both of which add C to the soil. We would expect to have increased our soil carbon levels since 2006, but have not taken another soil test since. We will again test soil carbon in 2009.

According to Dr Jones, well managed perennial grass is the quickest and most effective way to sequester carbon from the atmosphere. Ground cover can include plants and plant litter – in our case the grass on the orchard floor, small prunings, grasses and shrubs in the reveg zone and pasture grasses. Dr Jones maintains that soils under healthy perennial pasture may contain up to 350 tonnes of carbon per hectare and sustain high levels of microbial activity.

Without sufficient expertise to be sure we are calculating our soil carbon levels correctly, and until we undertake further testing of soil carbon to ascertain whether we are increasing soil carbon levels we have decided not to include soil carbon in our figures for carbon sequestration through farming activities.

3. BUSINESS ANALYSIS

3.1 TRANSPORT & MARKETING ANALYSIS:

In the 2007/08 fruit season we sold 23.5 tons of fruit at a range of markets. The markets are grouped into 5 categories: (1) Local (2) Regional farmers market (3) Wholesale market (4) Melbourne farmers markets and (5) Pick your own. We rated each category of market for:

- sales and income

⁴ 'Managing the Carbon Cycle' Katanning Workshop 21-22 March 2007

- the amount of CO₂ generated per kg of fruit sold
- how well it fits our needs as outlined in 1.2 and 1.4.

It should be noted that for the purposes of business planning we had to determine the point at which our responsibility for CO₂ generation ends, and this is when the fruit is sold to the next person in the supply chain (customer or wholesaler). While we understand that this does not give the whole picture of 'food miles', we can't affect what happens after the fruit leaves us.

In 2007/08 fruit season we started offering a mail-order service, sending 5kg boxes of fruit via courier or Australia Post. There was not enough data to include them in the above table, however selling fruit this way has minimal greenhouse gas implication for us.

Taking all factors into consideration our marketing plan for the 2008/09 season is to sell fruit at:

- local markets (Wesley Hill and Castlemaine Farmers Market);
- farm sales only during the cherry season;
- wholesale market;
- mail-order ;
- focus on those farmers markets that offer the best balance between the above principles (ie those with the lowest score).

3.2 PACKAGING ANALYSIS AND PLAN:

Guiding us in our decisions about the packaging we use are the following principles:

- Packaging should be minimized and not provided wherever possible;
- Packaging should serve more than one purpose if possible – e.g., paper bags should also act as our 'brochure';
- Any printing will be with non-harmful vegetable dyes to allow composting after use;
- We will recommend ways to re-use our packaging;
- When we provide packaging it will be as environmentally sustainable as possible, eg any new products (boxes, paper bags) will be recycled materials (made from post-consumer waste where possible) or made from sustainable and renewable resources (eg cornstarch bags);
- We will continue to seek low carbon alternatives to any plastic packaging we use, eg liners for cherry cases, pallet wrap, plastic inserts for peach trays.

Pick-your-own:

- We provide a plastic bucket (which is re-used) lined by a plastic bag for pick-your-own. Plastic bags will be phased out and customers encouraged to bring their own bag to line the bucket;
- Alternatively people can pick into an unlined bucket and then transfer the fruit into a bag or box they have supplied or a re-used box supplied by us. We will collect clean, used fruit and veg boxes from Wesley Hill and other markets we attend and bring them to the farm as a back-load, ie the return journey of a trip we were already making;
- We will supply MAFG branded cloth bags (made from re-used material) for sale;
- We will supply cornstarch bags to line buckets if required (which we will sell at cost).

Farmers Markets

- We will ask every customer if they have their own bag (customers often find they can put fruit in a bag or basket they are already carrying when prompted);
- We will supply paper bags (that double as our brochure) if necessary, for free;
- We will supply cornstarch bags if necessary, at cost;
- We will supply MAFG branded cloth bags (made from re-used material) for sale.

Mail-order boxes

- We will re-use clean fruit and veg boxes collected from markets (as above) if they are available, otherwise 100% recycled (post-consumer) boxes;
- Re-used boxes will be labeled to explain why we are using a re-used box;
- Boxes will be lined with clean, shredded office waste (documents printed on recycled paper generated as part of Hugh’s off-farm job)

Wholesale market

- Boxes will be 100% recycled (post consumer if possible);
- Boxes will be labelled to reflect carbon status;
- We will investigate the possibility of supplying fruit to the wholesale market in re-used boxes, or developing a system of returnable, re-usable fruit and veg boxes.

3.3 WATER ANALYSIS

We own a water right from Coliban Water of 32.4mL, and historically have always used the full allocation to grow our crop.

We have had severe and increasing water restrictions over the last 6 years (see row 2), and despite practicing greater water efficiency have struggled to maintain the volume of fruit we grow per ML (see row 3). This is largely due to the fact that harvest volume (see row 1) is affected by many factors other than the amount of water used to grow the crop, including frost, hail, bird damage, reduced vigour of trees due to ongoing drought conditions and reduced productivity due to reduction in use of artificial fertilizers. We have also pulled out a substantial percentage of our orchard as a strategy to cope with decreased water allocation.

		03/04	04/05	05/06	06/07	07/08	08/09
1	Volume of fruit picked (kg)	32,656	40,761	47,671	18,537	23,468	15,881
2	Water used (ML) 100%=32.4	21.06mL (65%)	16.2mL (50%)	16.2mL (50%)	9.72mL (30%)	11.34mL (35%)	9.72mL (30%)
3	Kg/ML	1,550.6	2,516.1	2,942.7	1,907.1	2,069.5	1,633.8

We will probably be facing similar water restrictions for the 09/10 season, or possibly worse. Hugh is one of the grower members of Coliban Water’s Harcourt Water Services Committee, which has a brief to oversee the reconfiguration of the Harcourt Main Channel. Our irrigation water supply is currently via a leaky and inefficient concrete channel system supplemented by a temporary pipe, and Coliban Water has committed to replacing it with a permanent low pressure piped system, which should be in place for the 2010/11 irrigation season.

The new system will improve the efficiency of water delivery to Harcourt irrigators, which may offer us more water security than we currently enjoy, though irrigation water security will still depend on the amount of inflows to the Coliban system and the potential to connect to another system that can provide us with water.

Average rainfall has decreased by 15% in the last 10 years⁵, and this pattern looks set to continue. Our on-farm water storage is between 6 and 8 ML, which is less than we use each year. As things stand our commercial viability is dependent on irrigation water being delivered each year. The possibility of not getting as much water as we need is our biggest commercial risk. It is imperative that we continue to increase our water use efficiency:

⁵ *Climate change in the North Central region*, Victorian Government Department of Sustainability and Environment, June 2008.

- The \$20,000 grant received this year from the Federal government is being used to connect our on-farm irrigation system to the reconfigured pipe system, replace our pump with a more powerful and efficient model (thereby reducing our GHG production) and buying more compost to continue our soil improvement program;
- We are being considered as a site for a trial to demonstrate whether compost and compost tea can actually make a difference to soil moisture retention capacity;
- On the advice of the Department of Primary Industries we will commence watering much earlier in the growing season to maximize fruit set and fruit size, thereby maximizing potential harvest size for the amount of irrigation water used.

4. BALANCING THE CARBON EQUATION

HOW WILL WE BECOME CARBON NEUTRAL?

By implementing the initiatives in this plan we aim to sequester more carbon into our trees and soil than the amount of CO₂ we produce, by 2013 or before. However rather than wait until we have achieved that goal to become carbon neutral, we will balance our net emissions each year, by buying carbon offsets.

In choosing our carbon offset provider we considered many factors. In some ways we would have preferred to invest in overseas projects where our investment could possibly be of greater significance. However we decided it was more important to know that our carbon offsets were provided by additional, permanent and verifiable greenhouse gas emissions reductions or sequestration. For this reason we chose a provider that has been approved by the Australian Government Department of Climate Change 'Greenhouse Friendly' accreditation scheme. We aim to reduce our CO₂ production and increase our carbon sequestration to become carbon self-sufficient (so we're not buying carbon credits from an outside source) within 5 years.

5. BACKGROUND TO THE PLAN: WHAT HAS INFORMED US?

5.1 WHAT IS INCLUDED IN THE PLAN?

As already noted, in calculating our carbon footprint we have included the resources we use to provide us with operational energy (fuel, power etc). However we are aware that many of the choices we make in our lifestyle and business have fossil fuel and greenhouse gas implications. We are committed to reducing our energy and resource use wherever possible even if it does not directly reduce our carbon footprint. We have therefore included in this plan all the ways in which we are reducing our non-renewable energy consumption.

5.2 EDUCATION, TRAINING AND PROFESSIONAL DEVELOPMENT:

Hugh has completed two units (*Monitor and manage soils*, and *Pest, disease and weed management*) of the Diploma of Agriculture in Organic Farming delivered by the Organic Agriculture Association in conjunction with the Northern Melbourne Institute of TAFE. He attended Dr Arden Anderson's *Sustainable and Biological Farming Workshop* in 2006. In 2008 he completed Elaine Ingham's *True Fertility Compost Tea Workshop*, and the Soil Food Web's *Microscope Course* to learn how to assay compost tea for microbiological viability.

Katie gained a BSc at Monash University in 1989. In 2003 she completed the *Food Safety Practices* training, and the Melbourne Markets *Registered Food Safety Program*. In 2007 she and Hugh attended a one day *Soil and Agronomy* seminar by Dr Arden Anderson. This year she completed the *Footprints to Sustainability* course taught by Jane Knight, attended a *Biodynamic Field Day* and is undertaking an informal course in *Prosperity* with some friends. She started a Permaculture Design Course in early 2009.

In 2003 we participated in a Farm\$mart workshop: *Laying Foundations for our Future*, which was a joint initiative of DNRE and VFF. In 2008 we attended a series of workshops on *Environmental Best Management Practice on Farms*, delivered by the Department of Primary Industries. We have also attended training sessions on pruning, irrigation management, cherry and rubus crop management, apple maturity management and fertilizer management. We regularly attend field days, workshops, and information sessions, participate in online forums and read industry magazines to stay abreast of new information as it emerges.

5.3 MEMBERSHIPS

- We are certified organic by NASAA,⁶
- Harcourt and District Fruit Growers Association
- Harcourt Valley Landcare Group
- Coliban Water's Harcourt Water Services Committee (Hugh)
- Harcourt Applefest Committee (Katie)
- Taste of Gold Association
- The farm is an accredited 'Land for Wildlife' property.

5.4 WHO ARE WE INSPIRED BY?

- Each other!
- The many people doing exciting and innovative work in the fields of biological farming, organics and soil carbon sequestration. Of particular interest to us are:
 - Dr Arden Andersen. *Science in Agriculture. Advanced Methods for Sustainable Farming*, Austin, Texas, 2000, Acres USA.⁷
 - Dr Elaine Ingham PhD (Agrisolutions. *Seminar notes: True Fertility Seminar – combining soil biology, chemistry and structure*, 2008)
 - Dr Christine Jones. Katanning Workshop. 21-22 March 2007. *Australian Soil Carbon Accreditation Scheme (ASCAS), Managing the Carbon Cycle*.
- Jane Knight for her teaching program 'Footprints to Sustainability', which provided the impetus and much of the information for this document and process.
- Beck Lowe for her inspirational and down to earth permaculture training.

5.5 PRACTICES AND CHANGES WE HAVE ALREADY IMPLEMENTED TO BECOME MORE SUSTAINABLE AND ENERGY EFFICIENT IN THE BUSINESS INCLUDE:

- Applied biological farming techniques, especially biologically active compost and compost tea to increase biological activity in soil;

⁶ The National Association of Sustainable Agriculture Australia. Available: www.nasaa.com.au

⁷ Available: <http://ardenandersen.blogspot.com/>

- Sourced external farm inputs from as close to home as possible, eg compost has been sourced from Camperdown and Lockwood, *Melia azederach* seeds (for aphid spray) are wild harvested from street trees in Castlemaine;
- We encourage customers to bring their own recycled bags to the farm for pick your own and at markets, and we provide:
 - paper bags made from 100% post-consumer recycled paper (free)
 - re-used fruit and vegetable boxes, which are sourced from Wesley Hill market, so brought to the farm as back-fill on a trip already being undertaken (free)
 - locally made cotton fruit bags (at cost);
- Applied for funding to conduct a trial comparing the efficacy of compost, compost tea and no treatment in promoting soil moisture-holding capacity;
- Started a worm farm which processes waste paper and some fruit, and produces high quality compost tea starter and vermicast for the vegetable garden;
- Completely stopped the use of artificial fertilizers (even organic ones);
- Implemented soil moisture monitoring and timers to minimize water use on crops;
- Use wooden and heavy duty re-usable plastic boxes for most fruit picking, storage and transport to farmers markets;
- Re-use cardboard boxes for fruit storage and packing, replacing liners as required to ensure fruit hygiene;
- Stopped all use of chemicals;
- Stopped all use of copper sprays as fungicide (though allowable under organic certification) as the copper builds up in the soil and acts as a soil fungicide, working against our biological farming practices.

5.6 PRACTICES AND CHANGES WE HAVE ALREADY IMPLEMENTED TO BECOME MORE SUSTAINABLE AND ENERGY EFFICIENT IN THE HOUSE INCLUDE:

- Put a 4 minute timer in the shower and encouraged the family to use it;
- Changed to energy efficient light bulbs in the house and shed;
- Checked that the hot water, fridge, freezers and heaters are working at optimal temperatures;
- Encouraged the males of the house to pee outside;
- Turn off lights and appliances when not in use;
- Made our own clothes washing liquid;
- Growing as much of our food as possible, and swapping fruit with neighbours food we cannot supply ourselves;
- Making ethical food buying choices (organic, free-range, sustainable).

5.7 HOW WILL WE EVALUATE OUR PROGRESS?

- We will perform a carbon audit each year to check our progress towards becoming carbon neutral;
- We will annually update and review our sustainability plan to ensure it records our progress and reflects changing personal and global circumstances. The plan needs to incorporate new ideas and new technology as they become available;
- We will monitor our water use, income and expenses each year.

6. 5 YEAR PLAN TO BECOME CARBON SELF-SUFFICIENT AND ENERGY EFFICIENT

6.1 YEAR 1: BY THE END OF 2009:

- Implement behavioural changes to reduce energy use in the house:
 - only freeze food that is likely to be eaten within 12 months (eg meat), consolidate freezer space and turn off any freezers not required
 - encourage the family to take 4 minute showers (buy a timer)
 - encourage the family to turn appliances (esp TV, DVD, radios etc in bedrooms, lights) off at the switch when not in use
 - install a smart-meter to help the family track their energy use
- Implement behavioural changes to reduce energy use in the business:
 - empty and turn off the chiller at the end of the fruit season, find alternative cooling sources for fruit (eg cellar)
- Make modifications to house infrastructure to save energy:
 - Insulate the house ceilings (42% of heat loss is through uninsulated ceilings)
 - Make good any places where a draught can get in (this is one of the most important energy savers in an old draughty house like ours as they can dramatically speed up the number of room changes of air/hour, increasing the need for heating – this can be responsible for up to 12% of heat loss)
 - Securely seal unused fireplaces to prevent heat escape
 - Put proper curtains and pelmets on all windows
 - Insulate windows with clear plastic film
 - Insulcoat the roof (this can reduce heat transfer into the building by up to 20°C)
- Make modifications to business infrastructure to save energy:
 - Erect sunshade over chiller to prevent direct sunshine hitting any of its external surfaces
 - Service chiller to ensure efficient running
 - Install energy efficient lightbulbs in barn
- Reduce transport costs:
 - increase the proportion of fruit we sell at the wholesale market
 - keep car log books for a period of time to analyse our car travel and look for potential savings
 - direct our attention to markets that offer the best balance between income produced/ distance travelled (see Transport Analysis)
 - further develop the mail-order fruit box scheme in the coming season. Depending on the destination boxes are either delivered by Australia Post or by courier. We have no way of measuring the GHG impact of either system but can assume that deliveries by Australia Post would produce minimal GHG because all trips are already happening, while trips by courier would have a somewhat higher impact.
- Make our irrigation system more efficient:
 - replace the petrol pump with a more powerful diesel pump at the holding dam, therefore:
 - we can water the whole orchard in one watering from the holding dam, saving an estimated 4-6 hrs of our time per week in the irrigation season
 - the pump needs to be run for shorter times, saving on fuel and GHG production
 - diesel is a more efficient fuel than petrol, which will reduce our GHG production
 - we can claim the diesel rebate for running the pump, reducing our costs
 - replace the existing 30mm pipe with a larger diameter pipe to reduce friction, improve efficiency and further reduce pumping times

- begin monitoring and watering fruit trees much earlier in the season (from July) to ensure maximum fruit set and fruit size, and therefore maximum harvest volume
- Convert the cherry picker to run on electric batteries rather than petrol (this will be quieter and more pleasant to work with, remove the smell and produce less GHG)
- Completely phase out the use of plastic bags to sell our fruit
- Get the soil carbon tested again so we can monitor soil carbon levels to see whether our biological farming techniques are working
- Include any increases of soil carbon detected via soil testing in our carbon footprint equation
- Figure out how to calculate carbon sequestration levels in pasture areas, orchard floors and revegetation areas of farm and include them in carbon footprint equation
- Balance our carbon equation by buying carbon credits to offset our carbon production

6.2 YEAR 2: BY THE END OF 2010:

- Buy a chipper so as to stop burning large prunings and recycle all wood produced by the trees, thereby keeping the carbon on the property and returning it to the soil;
- Continue to make the house more energy efficient by installing windows that open in kitchen to allow cross draft and other efficiencies
- Have switched to buying 100% green power (sourced from audited renewable energy sources) for all our power needs. The cost of this will be offset by the savings we have made in domestic and business power usage through the strategies implemented in the first year;
- Plant more orchard, adding to the C-sequestration potential of the farm;
- Continue to improve soil through the use of compost and compost tea
- Have made our first batch of compost
- Develop a permaculture plan for the farm
- Start succession planning (assuming purchase has happened)

6.3 YEAR 3: BY THE END OF 2011:

- Investigate domestic renewable energy production eg solar panels and solar hot water
- Plant more orchard, adding to the C-sequestration potential of the farm;
- Investigate becoming accredited 'Greenhouse Friendly' with the Australian Government's Department of Climate Change⁸
- Implement the permaculture plan for the property, including:
 - Remove trees that shade the northern aspect of the house to let in the winter sun and make the most of the northern aspect, and frost protection to grow food plants that would otherwise not survive
 - Put up a pergola outside the kitchen window and plant deciduous creeper to maximize shade from summer sun and allow winter sunshine in
 - Plant and landscape around the house to divert wind away from the house, to help maintain steady temperatures in all seasons

6.4 YEAR 4: BY THE END OF 2012:

- Investigate domestic wind and/or solar energy production
- Continue soil improvement
- Continue implementation of permaculture plan
- Investigate new technology to make house and business more carbon and energy efficient

6.5 YEAR 5: BY THE END OF 2013:

⁸ www.climatechange.gov.au/greenhousefriendly

- Replace one of our vehicles with a hybrid/electric vehicle
- Continue soil improvement
- Continue implementation of permaculture plan
- Be sustainably carbon neutral!

7. USEFUL LINKS AND RESOURCES

Thanks to Jane Knight, Jayson Burhop at MASG and Beck Lowe and the permaculture class for many of these links. Others we found ourselves.

www.carbonoffsetguide.com.au/providers - a handy website put together by the EPA and RMIT that lists carbon offset providers

www.climatechange.gov.au/greenhousefriendly/index.html - lists some carbon offset providers and explains accreditation process for the Australian Government's Department of Climate Change 'Greenhouse Friendly' program.

<http://www.vecci.org.au/professional+services/grow+me+the+money/index1.asp> - Sustainable business assessment and accreditation process

<http://www.whitedogcafeoundation.com/about.html> inspiration plus on where a successful, sustainable business can take you

<http://www.abc.net.au/science/slab/natcap/default.htm> - examples of world leading business

<http://www.rmi.org/> - a think tank with amazing ideas

<http://www.treehugger.com/> - a mine of green info

<http://www.green.tv/> - great tv clips

http://www.youtube.com/watch?v=o_MDRI-Q76o - Fritjof Capra talking

<http://www.epa.vic.gov.au/GreenhouseCalculator/calculator/default.asp> - Greenhouse calculator

<http://www.sunlizard.com.au> - cool sustainable temperature modification for your home

<http://www.comfortheat.com.au/heatmat.htm>

<http://www.ata.org.au>

<http://www.yourhome.gov.au>

http://solarshop.com.au/main/category8_1.htm - solar pumps - you'd need to know the consumption of your current model

<http://www.greenhousebalanced.com/who-we-are> - Paul Dettmann who does appropriate planting for offsets (though not accredited)

<http://www.ncoc.us>

<http://www.casmgs.colostate.edu/default.asp>

<http://www.carboncoalition.com.au>