



WineSkills Sustainability Workbook

November 2011

This workbook has been designed to help UK wine producers assess their wine production activity against the WineSkills sustainability guidelines. Resources that support the guidelines and their implementation are available at: www.wineskills.co.uk.

wineskills.co.uk
delivering training to the wine industry

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How to use this workbook

This workbook has been designed to help producers assess their wine production activity against the WineSkills sustainability guidelines. Producers can answer YES or NO to indicate whether they follow a guideline.

The completed document can then be submitted to WineSkills by post or email and producers will subsequently be provided with a report comparing their performance with that of the average of those submitted.

WineSkills are working on an on-line self-assessment tool for the website that will enable producers to monitor their performance in relation to the guidelines. WineSkills plan to launch the on-line self-assessment tool in spring 2012.

All information provided to WineSkills will be dealt with in confidence.

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Please enter producer details below so that we can respond to you.

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The WineSkills sustainability initiative

The WineSkills sustainability initiative aims to support UK wine producers who wish to produce wine more sustainably, in particular, those who wish to:

- Create and maintain a wine production industry that is economically viable over time
- Maintain the highest level of grape and wine quality
- Implement cultural practices and solve wine production problems in a way that minimises the use of off-farm inputs, such as agricultural chemicals and fertilisers, with the aim of protecting workers, the environment, and society at large
- Promote and maintain biological diversity in the vineyard
- Promote and maintain soil health, fertility, and stability
- Reduce greenhouse gas emissions
- Manage water and energy use more efficiently, and reduce and recycle waste
- Engage in aspects of social responsibility
- Have a safe and healthy working environment

The guidelines within this initiative have been established to help producers meet these goals. They will be reviewed and revised annually and should be seen as part of a process of development towards sustainable wine production.

The guidelines are purely voluntary. They form a good practice tool, but are in no way prescriptive or mandatory. However, putting them into practice will benefit the producer as they will have:

- A business with a competitive edge as a sustainable producer selling wine produced in a more environmentally sensitive manner
- A business with improved public relations; engaged with its workforce, the public, consumers, and the community in which it operates
- Access to business support and training through WineSkills and the sustainability initiative
- Participation in and interaction with a group of like-minded wine producers who wish to develop a more sustainable industry in the UK for future generations of vine growers and wine makers

Participation in the sustainability initiative should also allow producers to:

- Have a reduced impact on the increasingly scarce world resources and be a better custodian of the environment, both within the vineyard and beyond

It is important to note that the WineSkills sustainability initiative is not intended to be a comprehensive guide to wine production. An understanding of the fundamentals of business, viticulture and/or oenology is necessary before adopting the guidelines. Also, the initiative assumes that all regulatory requirements are already being met by the producer. The guidelines aim to take producers beyond what is required by law.

The WineSkills sustainability initiative recognises that vineyards and wineries are unique and what works at one location may not work somewhere else. It tries to provide information about different practices that could be considered sustainable based on their application.

About the guidelines

The guidelines were initially established through sustainability forums, run by WineSkills, and advertised on the WineSkills website. These events reviewed the guidelines from 14 different sustainable wine production schemes and other sustainability initiatives from throughout the world. Delegates, experts and technical committee members then selected those that they considered useful and amended and tailored them for application in the UK. New guidelines were also developed. The forums were open to all UK wine producers and involved subject experts and members of the technical committees.

The guidelines will be reviewed and revised in future WineSkills workshops and through requests to the technical committees. Requests by producers for alterations or additions to the guidelines should be emailed to: alister.nesbitt@plumpton.ac.uk. The technical committees will meet in spring 2012 and then annually to consider these.

Help in implementing the guidelines can be requested by producers in the form of training courses or through the WineSkills mentoring scheme. Requests can be made by following the link on any of the WineSkills website guideline pages.

Resources that support the guidelines and their implementation will be added to the WineSkills website on an on-going basis.

Using the guidelines

There are three categories of guidelines:

- **Best practice** (from a sustainable perspective), which should be encouraged for those who wish to produce wine in a more sustainable way.
- **Minimum standards**, which must be applied for those who wish to produce wine in a more sustainable way.
- Practices which, although legal, contravene the aims of a sustainable wine production system, and so should be **proscribed** for those who wish to produce wine in a sustainable way.

Those using the guidelines should comply with the minimum standards and where possible aim for or achieve the best practice standards.

Participating in the sustainability initiative

The initiative entails guidelines, supporting material and training courses, designed for those wanting to produce wine in a more sustainable manner. Using the guidelines is voluntary; there is no accreditation scheme as yet. Please feel free to use the guidelines if you wish to. If you do, we would very much value your feedback, either by contacting us through the WineSkills website, or by joining a technical committee and helping to review and agree the guidelines.

The Technical Committees

There are 3 technical committees; The Vineyard Technical Committee; The Winemaking Technical Committee; and The Business Technical Committee. They are made up of experienced professionals working in the UK wine industry.

New technical committee members who wish to play an active role in developing best-practice guidelines are actively sought. Producers from outside the South East of England are particularly encouraged to become members so that regional committees can be established.

Membership of these technical committees is open to anyone who can demonstrate a minimum of:

- 3 years of professional wine production experience and a relevant higher education (BSc, Foundation Degree, or equivalent) qualification; or,
- 5 years of professional wine production experience

To find out more about the committees or apply to join contact: alistair.nesbitt@plumpton.ac.uk.

Vinegrowing guidelines

1. Crop management

Crop management techniques are implemented to reduce the risk of disease, optimise leaf and fruit-zone light exposure, improve air circulation and optimising grape quality and yield. Techniques include: winter pruning, shoot thinning, shoot positioning, leaf thinning, cluster thinning, green harvesting and hedging. These techniques also help control vine vigour and improve the efficacy of crop protection.

Good management in this area supports economic sustainability through optimised grape quality and quantity.

Crop management guidelines

1.1 Treating pruning wounds

Treating pruning wounds to help prevent the ingress / spread of disease is a method of supporting the economic sustainability of any given vine or vineyard.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Where evidence or risk of disease being transmitted through pruning wounds is present, pruning wounds are covered by a wound sealer immediately after pruning.	

1.2 Canopy management

Canopy management is the organisation of the shoots, leaves and fruit of the grapevine to maximise the quality of microclimate surrounding them, thus helping improve quality and yield. Assessing a canopy will provide site specific information and inform canopy management decisions.

Features of an ideal cool climate canopy:

- Maximum exposed leaf area
- Homogeneous canopy density at 15 shoots/metre
- Homogeneous canopy thickness of no more than 2 leaves
- 60% or more fruit exposed
- 10 – 20 node shoot length
- Renewal & fruiting zones well aerated and exposed to the sun
- Shoots droop after veraison

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Canopy is assessed throughout the growing season using point	

	quadrat method and/or visual assessments (e.g. shading indices, sunfleck analysis). A light bar/ceptometer could also be used.	
Best practice	B. Achieve 50+ points on the Vineyard Scorecard (In: Smart, R. and Robinson, M. (1991) <i>Sunlight Into Wine: A handbook for winegrape canopy management</i> . Adelaide: Winetitles Pty. Ltd. Chapter 2).	

1.3 Yield management

Monitoring fruit quality and quantity helps with evaluation of vineyard management practices and with fruit yield prediction. Managing yield through pruning is key to achieving a desired quality and quantity outcome, supporting the economic viability of a vineyard.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Keep annual records of yields and average bunch size (in parcels) to help with future crop estimation.	
Best practice	B. Target yields are established to inform crop management decisions.	
Minimum standard	C. Undertake crop management at pruning through allocation of the correct number of buds for the particular cultivar according to vigour and target yield.	

1.4 Frost protection

Once vines are fully dormant they can tolerate quite severe frost, but temperatures below 0°C will cause damage once buds have burst. Frost protection through appropriate site selection and use of passive techniques (e.g. cold air drainage, pruning height, delayed pruning, and soil condition) are less damaging to the environment and less costly to implement than the use of heaters, fans/windmills, polymer coatings or water sprinkling.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Use passive protection techniques.	
Minimum standard	B. Remove barriers to cold air drainage in frost prone sites.	

2. Soil management

Good soil management is fundamental to vine health and grape quality. The ability of soil to function properly and support plant growth is determined by its physical, biological and chemical status. Conservation of the soil and soil organic matter helps ensure soil stability, reduces erosion, maintains good soil structure, promotes drainage and aeration, and supports microbial and macrobial life. Healthy soil will support microbes vital to the:

- Breakdown of organic matter and release of nutrients into plant available forms

- Suppression of soil-borne diseases
- Maintenance and improvement of soil structure
- Degradation of chemical compounds

The physical structure, pH and chemistry of soil will also affect root system development and the supply of water and minerals to the vine. Properly managed soil will reduce reliance on agrochemicals and allow the long-term maintenance of fertile soil.

Soil management guidelines

2.1 Soil management planning and policy

A good understanding of soil condition is the first step in developing a plan to maintain or improve it. Soil analysis can be used to better understand soil type and condition, and also to diagnose soil and nutrient problems. A documented soil management plan will help identify the processes for protection and improvement of soil and vine health. A plan will also provide a structural and considered approach to optimising crop production and economic productivity.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	<p>A. Have a soil management plan that identifies site suitable practices and includes a commitment to soil protection. The plan should include:</p> <ul style="list-style-type: none"> • Site & soil description (including soil texture and structure evaluation, organic matter and nutrient status). • A record of cultural interventions carried out in the vineyard. • Timeframes for undertaking soil nutrient, soil compaction, vine, petiole and sap analysis. • Evaluation of current practices used to: <ul style="list-style-type: none"> ○ Manage the vineyard floor ○ Minimise soil erosion by water and/or air ○ Maintain or improve soil organic matter ○ Maintain or improve soil structure ○ Maintain fertility, fauna, micro-flora and natural vegetative status ○ Minimise soil compaction ○ Cultivate the soil ○ Maintain good water penetration 	

2.2 Soil cultivation techniques

Excessive soil cultivation causes the break-down of soil structure and increases the respiration of soil organic matter which adversely affects soil aggregation. Tilling can also break down mycorrhiza fungi and contribute to soil compaction. It should therefore be undertaken sparingly and never in wet conditions. Cultivating when vine roots are active (6 leaves apparent) enables them to take-up

released nitrates. Poor soil aggregation and compaction can affect the economic productivity of a vineyard.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Cultivate the vineyard soil no more than 3 times a year and use biological amendments for nutrient management so as to replace lost organic matter.	
Proscribed	B. Till the vineyard more than 6 times a year.	

2.3 Recycling organic matter

Recycling organic matter benefits soil through:

- Maintenance of soil structure
- Retention of available nutrients
- Increasing water-holding capacity
- Reducing plasticity and cohesion
- Gradual release of available nutrients
- Darkening of colour

Recycling organic matter reduces reliance on 'off-farm' inputs, can reduce costs and benefits soil health and crop production.

Losses of organic matter will be increased by any activity that increases microbial activity, such as cultivations and nitrogen fertiliser applications.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Organic waste is recycled in the vineyard.	
Best practice	B. Don't remove pruning's from the vineyard except where wood disease requires removal.	
Minimum standard	C. Organic waste from the vineyard is recycled.	

2.4 Under-vine weed control

Weeds are plants that are unwanted and have a detrimental effect on production. The main methods of weed control in vineyards are cultivation, ground cover, herbicides and mulching. Effective weed control will support the economic productivity of a vineyard.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Control under vine weeds with cultural or mechanical methods	

	rather than herbicides.	
Proscribed	B. Use of herbicides in both under-vine and in inter-row alleys.	

2.5 Water penetration

Water penetration is important to minimise run-off, which can cause erosion, and to optimise the amount of water available to vine root systems. Processes to improve poor penetration and allow sufficient drainage can improve a vineyard's performance and reduce risks of environmental damage.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. If soil penetration is poor, improve it by using at least one of the following: adding gypsum, compost, manure, a cover crop, soil ripping between vine rows.	

3. Vine nutrition

The objectives of nutrient monitoring and management are to supply vines with nutrients at the appropriate time and rate, supporting crop quality and yield. Appropriate application methods should ensure a targeted supply and minimise the risk of pollution by loss of nutrients via runoff, leaching, and emissions to the air. Nutrient management planning is an on-going activity that needs to be responsive to the vineyard environment and crop requirements.

Vine nutrition guidelines

3.1 Nutrient management planning

Vineyard nutrition is not an exact science as:

- Soil fertility is a complex concept
- Vines are a low nutrient crop, as:
 - Little is exported from the field
 - Perennial plants explore a large area of soil
- Rootstocks can influence nutrient take-up
- Problem of quality vs. quantity

Grapevines are able to grow and crop satisfactorily in a wide range of soils but, vine nutrition should not be ignored. To help plan nutrient management the following questions need answering:

1. What are the essential elements for the growth and performance of vines?
2. How can the need for these be measured?
3. What fertilisers can be used to fulfil this need?
4. How much and when should these be applied?

Proper planning, as an on-going process, will facilitate nutrient management to ensure that vines can access required quantities of key nutrients so as to be healthy and productive. Good planning should also minimise the risk of excess application of nutrients that can contaminate ground and surface waters and lead to financial waste.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	<p>B. A comprehensive nutrition management plan is developed which contains the following elements:</p> <ul style="list-style-type: none"> • Field parameters • Regular soil analysis • Water analysis • Petiole or other tissue analysis • Vineyard yield history • Sources and forms of nutrients • Sensitive areas • Recommended rates and timing • Methods of application • A review and updated schedule <p>The plan should include a process to record inputs and outputs (the nutrient budget/balance) to inform nutrient management decisions and help in achieving a neutral nutrient balance.</p>	

3.2 Nutrient management

Monitoring and analysis are key components of nutrient management and allow for targeted, specific amendments to improve or correct deficiencies or imbalances. Analysis and recording of soil and vine condition provides justification for the use of amendments with demonstrable outcomes. Doing so reduces waste and the risk of nutrient loss or run-off. Key to successful management is awareness of nutrient deficiencies.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Undertake soil and vine analysis at least every 2 years, to inform nutrient and soil management decisions.	
Best practice	B. Use soil applied nutrients and amendments to correct underlying major deficiencies or imbalances rather than foliar feeds.	
Minimum standard	C. Undertake soil and/or vine analysis at least every 5 years to inform nutrient and soil management decisions.	
Minimum standard	<p>D. Be able to recognise symptoms of deficiencies in:</p> <ul style="list-style-type: none"> • Potassium • Magnesium • Nitrogen 	

	<ul style="list-style-type: none"> • Boron • Manganese • Iron [Chlorosis] 	
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3.3 Fertilisation

Fertilisation (organic or inorganic) should only be undertaken where and when required in order to reduce potential for water pollution (nitrogen and phosphorus leaching), air pollution and unnecessary energy costs.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. If fertilisers are required, organic options are used preferentially (e.g. cover crops, nitrogen-fixing and deep rooting plants, compost, manure, green manure, mulch).	
Minimum standard	B. Nutrients are only applied if petiole and soil analysis, vine vigour, and visual observations of nutrient deficiencies indicate they are needed.	
Minimum standard	C. Follow the IOBC guidelines in regard to Nitrogen application.	
Proscribed	D. Use of fertilisers or manure contaminated with toxic or environmentally-hazardous substances such as heavy metals or pathogenic micro-organisms.	

3.4 Cover cropping

Ground cover can be:

- Temporary: Planted in the autumn and destroyed in the summer
- Permanent: Planting permanent cover crop or allowing natural vegetation to grow

Plant cover can improve: water infiltration, nutrient supply for soil organisms, soil structure, soil fertility and organic matter, water-holding capacity, biodiversity, biological pest-control, and increase humus content. Plant cover can consist of grasses or legumes and is regarded as a long-term cost-effective way to increase the amount and persistence of soil organic matter.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Ground cover is present in 50% of the vineyard throughout the year.	
Minimum standard	B. Ground cover is present in vineyard inter-row alleys in the winter.	

4. Integrated pest management

Integrated Pest Management (IPM) is a pragmatic ecosystem based management practice that integrates biological, cultural, physical and chemical tools to manage pests and diseases in

agriculture. It does not aim to eradicate pests but to reduce their numbers so that the cost of the damage that they cause is less than that required for further intervention. One of the main aims of an IPM program is to reduce the use of chemical controls, and to use control strategies that are least damaging to the crop, non-target organisms, humans, and the environment.

The application of IPM to manage pests and diseases helps protect ecological and environmental infrastructures in vineyards, whilst also protecting their economic viability and minimising health risks.

Integrated pest management guidelines

4.1 Pest and disease monitoring

A pest is any organism that reduces the availability, quality or value of a human resource. Most organisms in vineyards are non-pests, some can be occasional (or potential) pests, but the main problems are key pests, which cause significant damage every season unless some management action is taken. Many key pests are parasites where the host/parasite relationship has become unbalanced. Using appropriate methods for monitoring pest and disease levels in vineyards provides the basis for managing them. Managing them in a considered manner, through the establishment of action thresholds and subsequent control strategies, will reduce waste and reliance on agro-chemicals, improve crop productivity, and support the economic viability of the vineyard.

Pest management programmes should include:

- A means of monitoring pests and factors that influence their development
- An assessment of the level of damage at which intervention is required
- The assessment of risks to the operator and environment of available control methods
- The implementation of all available methods of control in an effective and coordinated fashion
- The monitoring of effectiveness of control methods used

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Use weather based forecasting models for disease prediction.	
Best practice	B. Monitor the vineyard floor for insect, mite and disease pests twice a week during the growing season and keep a written record as part of a pest management programme.	
Best practice	C. Establish action thresholds that consider the potential damage to the crop, cost of control methods and value of production.	
Minimum standard	D. Weekly monitoring of pests and diseases is undertaken to assess the risk of damage in relation to the development stage of crop and local weather conditions.	

4.2 Identifying beneficial organisms

In order to effectively monitor pests and diseases it is essential that a producer can recognise symptoms and / or identify the problem. Identifying and understanding the role of beneficial organisms will help in making pest and disease management decisions and support the economic and environmental sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Beneficial organism populations are monitored and recorded throughout the year.	

4.3 Integrated pest control measures

The goal of integrated pest management is not to eradicate pests but to control them using a range of management tools. The first line of defence is prevention, which involves managing the vineyard in a way that discourages pest proliferation and maintains optimal crop production. Preventative measures are often cost-effective and pose little environmental risk. Once preventative measures are no longer effective or efficient, then alternative treatment for pests and diseases should be selected, only if the cost of the action does not exceed the damage the pest/disease will cause if no action is taken. Using biological (e.g. predator enhancement strategies), cultural, mechanical and physical control methods (e.g. pest-resistant crop varieties and canopy management), and reducing reliance on agrochemicals minimises the impact on the receiving environment and can reduce costs.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. The effectiveness of pest management decisions is evaluated after every growing season.	
Best practice	B. When an insect or mite spray is necessary, treat only that portion of the vineyard where a problem exists, such as edges or 'hot spots', not the whole vineyard.	
Minimum standard	C. Use biological, cultural, mechanical and physical control methods if practical and economical, in conjunction with other techniques, such as selective chemicals.	
Minimum standard	D. Preventative measures for pests, diseases and weeds are prioritised over intervention with direct plant protection measures.	
Minimum standard	E. Practice resistance management by rotating pesticides and not using chemicals with the same mode of action consecutively.	
Proscribed	F. Pests are only controlled with chemical applications.	

4.4 Spraying and spray equipment

Maintaining spray equipment, monitoring the amount of spray applied to ensure desired levels are maintained, minimising waste through calibration, and use of spray equipment in suitable conditions has clear cost benefits and minimises any environmental impact.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Atomisers should be equipped with a stop drop system on nozzles.	
Minimum standard	B. Spray equipment service records are kept.	
Minimum standard	C. Have a sprayer maintenance plan containing the following components: cleaning, filters, pump, control unit, pressure gauge, nozzles, the boom, the PTO, the boom tube and hoses, and rust prevention.	
Minimum standard	D. Records are kept of every spray application and include site, date, target pest, pesticide and quantity, crop stage, harvest date, application method, spray volume, weather observations, and precautions followed.	

5. Conservation, biodiversity & ecosystem management

Recognising the vineyard as part of an ecologically interconnected system and adopting practices that reduce environmental impacts, avoid damaging habitats, and contribute to biodiversity, allows for a stable and biologically diverse ecosystem. Identifying and monitoring ecological and environmental habitats plays an important role in conservation and environmental sustainability.

The effective functioning of an ecosystem has value as an ecosystem service. For example; invertebrates provide an ecosystem service through:

- Pollination
- Biological control
- Nutrient cycling

These services can reduce the need for off-farm inputs and increase the productive capacity of the vineyard. Conservation is an important tool in protecting and enhancing biodiversity and ecosystem services in vineyards.

Conservation, biodiversity & ecosystem management guidelines

5.1 Conservation plan

Mapping the vineyard and production site, and planning measures to enhance conservation, biodiversity and ecosystem features, is the first step to promoting the sites ecological infrastructure in a planned and considered way. It will help minimise adverse environmental impacts on existing habitat and encourage better integration of the vineyard into the surrounding ecosystem.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. Have a long-term plan for both cultivated and non-cultivated land which protects and enhances conservation features.	
Minimum standard	B. Map wildlife, wildlife habitat, environmental, landscape, archaeological and historical features in the vineyard and in the winery area (if applicable) and identify reasons for their importance.	

5.2 Promoting ecological infrastructure

By conserving habitats and supporting biodiversity, nature's services (for example: biological pest control and pollination) can improve soil quality and reduce reliance on agrochemicals. The process supports environmental sustainability, but also presents an opportunity for engagement with interest groups.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Nesting boxes, nesting habitats and perches for animals that prey on vineyard pests are established around the vineyard property.	
Best practice	B. Maintain hedgerows of native plants and maintain native grasses and shrubs where possible.	
Minimum standard	D. At least 5% of the estate (excluding forests) should be identified and managed as ecological infrastructure (ecological compensation area) with no input of pesticides and fertilisers in order to enhance botanical and faunistic biodiversity.	
Minimum standard	E. Allow vegetation, other than noxious weeds, to grow on headlands.	

5.3 Controlling invasive species

Invasive species are generally detrimental to the conservation of biodiversity. Controlling invasive species helps conserve the vineyard environment, prevents ingress of undesirable or competitive plants and supports the environmental and economic sustainability of the site.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. Only fully composted material and clean soil amendments and mulches are used, to prevent introduction of invasive species.	

5.4 Working with environmental organisations

Working with experts to appropriately manage the vineyard environment, and species within it, will help improve management decisions and foster engagement with interest groups / communities. In doing so, producers are supporting both the environmental and social sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Relevant conservation organisations are consulted to find out about species at risk and other plants and wildlife, their habitat, and management practices to support them.	

Winemaking Guidelines

6. Energy management

The combustion of fossil fuels increases the amount of carbon dioxide in the atmosphere, accentuating the greenhouse gas effect. This is recognised by many of the world’s climate scientists as a major contributor to global warming.

Using energy supplied from renewable sources contributes to environmental protection by reducing reliance on non-renewable fossil fuels and reducing greenhouse gas emissions. Monitoring and optimising the use of energy, whilst maintaining the same quality and quantity of production, helps to achieve efficiency, with potential financial benefits.

Energy management guidelines

6.1 Energy efficiency plan

Having a documented plan to monitor energy and reduce its use will help achieve energy efficiency in a structured and informed manner. A plan should document how, where and when energy use will be monitored and how the results will be used to improve energy efficiency over time. Reducing energy use for the same quality and quantity of production has clear economic and environmental advantages.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. Producers have a written plan that identifies targets and methods for energy use reduction within their production operation. This should encompass a monitoring programme and energy use reduction strategies including engineering solutions and training to improve energy efficiency. The aim of the plan should be to reduce the amount of energy used for the same quality and quantity of production.	

6.2 Energy monitoring

The process of monitoring energy should be undertaken in a systematic way, to ensure data collected can be analysed consistently. Real-time data will help identify peak flow rates and times, and help identify specific high-energy usage processes that could be targets for reduction. Only through monitoring energy consumption can reduction progress be measured.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Real-time energy use records are collated in the form of metrics data to enable a detailed analysis of winery energy use.	
	B. Monthly or quarterly energy use records exist. As a minimum	

Minimum standard	<p>these should be in the form of bills or financial statements. To measure continual improvement of energy use, the following records are regarded as the most important:</p> <ul style="list-style-type: none"> • Electricity usage (kWh) • Diesel usage (Litres) • Petrol usage (Litres) • Liquid Petroleum Gas (LPG) usage (kg) • Any other fuels (e.g. coal, furnace oil, etc.) (kg or Litres) 	
Proscribed	C. No monitoring of energy consumption.	

6.3 Equipment servicing and optimisation

Optimising and servicing equipment will reduce energy consumption and therefore save costs. It will also assist in the efficiency of the production process.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Energy efficiency is a key decision factor in the purchasing of new equipment.	
Minimum standard	B. Machinery and equipment is serviced regularly, repaired or replaced to ensure optimum energy consumption. Servicing and repair records are kept.	

6.4 Building energy efficiency

There are a range of measures that can be incorporated into new and existing building design to improve energy efficiency and reduce environmental footprints. Many of these facilitate 'good housekeeping' practices; reduce waste, save energy and lower operational costs. Energy efficiency and environmental planning should be a critical component of new winery premises. These will bring medium-long term financial benefits to the producer and improve the business's environmental sustainability.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Consideration of a building site's micro-climatic advantages (water, topography etc), location, orientation and site integration (caves, berming, green roofing, landscaping) is evidenced in site selection and building design.	
Best practice	<p>B. New buildings incorporate at least 10 of the following energy efficiency measures:</p> <ul style="list-style-type: none"> • Appropriate building shape and form for intended use • High-performance building envelope • Better than Building Regulation standard U values • Minimised uncontrolled air infiltration • Zoning, fenestration and orientation • Passive design, heating, cooling and ventilation 	

	<ul style="list-style-type: none"> • Solar gain • Stack effect/wind effect • Night-time purging • Good use and control of day-lighting • Shading • Building finish e.g. reflective material • Thermal response 	
Minimum standard	<p>C. Buildings incorporate:</p> <ul style="list-style-type: none"> • At least Building Regulation standard U values • Good use and control of natural light 	
Proscribed	<p>E. No attempt to improve the energy efficiency of wine production premises.</p>	

6.5 Building services systems and equipment

Planning, incorporating new technology, and optimising existing building equipment and services will reduce medium-long term costs and improve the environmental sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Incorporate Combined Heat and Power (CHP) or Tri-generation systems.	
Best practice	<p>B. As well as incorporating the energy-efficient systems identified in minimum standards, also include the following where possible:</p> <ul style="list-style-type: none"> • Heating, ventilation and air conditioning (HVAC) systems <ul style="list-style-type: none"> ○ Mixed mode operation ○ Recirculation and stratification of air distribution ○ Heat recovery ○ CO₂ extraction • Refrigeration plant <ul style="list-style-type: none"> ○ Modular operation and controls • Boiler Plant <ul style="list-style-type: none"> ○ Modular operation and controls • Compressed Air <ul style="list-style-type: none"> ○ Heat recovery • Lighting <ul style="list-style-type: none"> ○ Adopt lighting control systems • Electricity <ul style="list-style-type: none"> ○ Consider VSDs for roto-dynamic equipment ○ Review power factor and consider PF correction equipment • Energy Building Management System (EBMS) 	
Minimum standard	<p>C. For new build or existing buildings design/select systems and equipment considering energy load, patterns and duration and utilise the most energy-efficient systems.</p>	
	<p>D. Utilise energy-efficient systems and plants including:</p> <ul style="list-style-type: none"> • HVAC systems 	

Minimum standard	<ul style="list-style-type: none"> ○ Flow resistance, leakage and control ○ insulation improvements ● Refrigeration plant <ul style="list-style-type: none"> ○ Flow temperature, resistance and control ○ Thermal insulation improvements ● Boiler Plant <ul style="list-style-type: none"> ○ Flow temperature, resistance and control ○ Thermal insulation improvements ● Compressed Air <ul style="list-style-type: none"> ○ Flow resistance, leakage, temperature and control ● Lighting <ul style="list-style-type: none"> ○ Use the most appropriate lamps and luminaries 	
Proscribed	E. No attempt to improve the energy efficiency of the building services systems and equipment in the wine production premises.	

6.6 Energy sources

Using renewable energy sources to complement or replace non-renewable resources will reduce a business's carbon footprint.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. The use of non-renewable energy sources is kept to a minimum. The winery should obtain at least 5% of its energy use from renewable sources such as: <ul style="list-style-type: none"> ● Solar thermal and photovoltaics ● Ground source heat pump systems ● Bio-mass ● Anaerobic digestion of winery waster ● Other renewables 	
Best practice	B. Bio-fuel and electric powered vehicles are used where possible	

7. Greenhouse gas accounting

It is largely accepted amongst the scientific community that global warming is closely linked to the increase in atmospheric carbon dioxide (CO₂) concentrations. Greenhouse gas emissions linked directly and indirectly to uses of energy in wine production, CO₂ emissions from fermentation and CO₂ sparging contribute to global warming. It should be noted that CO₂ fixation within the vineyard system requires consideration in determining the overall carbon balance between the winery and vineyard. Notwithstanding the outcomes of such calculations, reducing CO₂ emissions through use of renewable energy sources and energy efficiency measures contributes to environmental sustainability. Monitoring CO₂ and other greenhouse gas emissions allows for better management and the implementation of reduction strategies.

Greenhouse gas accounting guidelines

7.1 Greenhouse gas accounting

To help businesses reduce carbon dioxide and other GHG outputs it is helpful to first measure them.

There are several GHG accounting tools available to wine producers. The International Wine Carbon Calculator (IWCC) was developed collaboratively with wine industry bodies and is compliant with current international standards and practices for GHG accounting. Using the calculator tool will provide general guidance on the significant emissions associated with wine production. The calculator breaks emissions into three levels:

- Scope 1 emissions are those over which a company has direct control via ownership of activities.
- Scope 2 is purchased electricity, heat or steam.
- Scope 3 is the emissions from all activities that are purchased from other companies.

This separation of Scopes is critical to manage reporting data.

The tool can be used by several types of wine production businesses including; grapegrowing only; winemaking only; bottling only; grapegrowing and winemaking; winemaking and bottling; and grapegrowing, winemaking and bottling. It can account for contract grown grape intake as well as estate grown, contract winemaking in addition to estate winemaking and a mix of estate and contract bottling.

The calculation methodology uses an activity based approach where activity like fuel use or glass purchased are accounted then input into the calculator. This has the benefit of reducing or eliminating the need to measure emissions directly and ensures that the wine industry works on a common accounting basis.

Footprinting and accounting GHG emissions and then adopting a process of reduction and continual performance improvement are considered best practice, will help reduce costs and contribute significantly to the environmental and social sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Producers calculate their GHG emissions by using the internationally accepted protocol and calculator: http://fivs.org/home.htm .	
Best practice	B. Producers also assess and determine indirect emissions related to inputs such as fertilisers, packaging and transportation to wineries	

7.2 Greenhouse gas emissions reduction

If producers choose not to calculate their GHG emissions they should, as a minimum, adopt practices to reduce GHG output.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. In conjunction with the energy efficiency strategy, producers identify, document and implement ways of reducing GHG emissions.	

8. Water use

Water is an essential component of wine production. It is a valuable and costly resource and its management with regards to sustainability can be separated into two aspects: 1) Water use reduction: in order to conserve water resources and reduce costs, 2) Wastewater reuse, treatment and recycling: to minimise waste, avoid pollution and reduce costs of water use and wastewater treatment. Good water management has environmental and economic benefits.

Water management starts with effective monitoring of the quantity used in order to set targets for reduction, followed by development and implementation of strategies and methods to reduce uptake and increase reuse and recycling.

Water use guidelines

8.1 Water monitoring

Monitoring water use is the first step towards reducing its use and minimising water waste. There are various methods that can be adopted to monitor water use, including monitoring water bills, installation and monitoring of water meters, or installation of water metrics devices to monitor real-time data of specific areas of use and flow rates. The more consistent and informative the data the greater the potential for identifying opportunities to reduce use. Monitoring and reducing water use is compatible with the principles of sustainable production, economically, environmentally and socially.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Taps, pipes and other water fixtures are routinely inspected for problems and repaired promptly.	
Minimum standard	B. There is an effective wastewater monitoring system in place. The monitoring process is supported by a plan to reduce water use in the winery.	

8.2 Disposal of rain / storm water and untested / untreated winery effluent

Having an onsite waste water management system will not apply to all production operations. Where such a system exists, opportunities for recycling and reuse of water and waste products increases.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Contaminated storm water, winery wastewater, wine and grape juice that may escape from drains, pipes, sumps, tanks, retention basins or other facilities drain into the wineries wastewater management system.	
Minimum standard	B. Dispose of trade effluent in accordance with the relevant water authority and statutory requirements.	

8.3 Wastewater treatment

The process of wastewater treatment, recycling and reuse can take several forms, but all will reduce freshwater use and associated costs.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. As a minimum solids, such as lees and filter residues, are separated.	
Best practice	B. On-site water treatment in the form of, for example: bio-systems or settling tanks are adopted.	

8.4 Alternative water sources

Harvesting rain-water, extracting ground-water and using recycled water reduces reliance on mains water supplies and is considered good environmental practice with potential long-term cost benefits.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Water recycling, rainwater harvesting and / or groundwater abstraction methods are implemented.	

9. Waste management

Waste management can be achieved through a process of planning, monitoring, reduction, reuse and recycling of waste. The consumption of natural resources at their present rate is unsustainable and the wine industry can minimise its contribution to industrial waste production by establishing strategies and methods to make waste management an integral part of the production process. Successful implementation will contribute to improved resource sustainability and offer cost savings.

Waste management guidelines

9.1 Waste management planning

Managing waste in a structured and considered manner, by identifying waste streams and opportunities for reduction, recycling and reuse, reduces a business's environmental footprint and saves costs.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. A waste management program is documented that identifies the waste types generated by production activity and the methods for reducing, reusing, recycling, storing and disposing of wastes.	

9.2 Solid waste disposal

Disposing of waste should be undertaken so as to comply with legal requirements. But, from an environmental perspective, where possible, waste should be recycled and reused on or off site.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. Non-organic matter (bentonite, spent filter material, sludge, etc) is recycled where possible or disposed of in accordance with local and national regulations.	
Minimum standard	B. Organic waste is recycled and / or reused where possible.	

9.3 Preferred purchasing

Using products and services that minimise waste and have minimal environmental impact supports the environmental sustainability of the business, often reduces costs and may bring PR /marketing opportunities.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Products and services that minimise waste and have minimal environmental impact are purchased and / or used by the business. For example: <ul style="list-style-type: none">• Light-weight bottles• Bottles produced from green glass• Bottles produced primarily from recycled glass• Re-used, recycled, biodegradable or compostable packaging• Barrels produced from sustainable sources	

10. Traceability & quality assurance

Traceability and quality assurance are essential components of the wine production process. Producing quality wine is a tenant of sustainable wine production. Quality control and due diligence throughout the production process helps mitigate hazards and risks and helps ensure the product is safe and of a desired quality standard. Adherence to a quality assurance scheme provides customer reassurance about the product's safety. Both control and assurance are important for consumer product confidence which in turn supports the economic sustainability of the business.

All products involved in the wine production process should be fully traceable so it is possible to establish their history, application or location, i.e. where they are from and where they went. Traceability provides product integrity, supports quality assurance, and supports practices required to comply with legal requirements about record keeping in the food supply chain. As with quality control, traceability supports a product standard (legal and producer driven) and provides consumer confidence, supporting the business's economic sustainability.

Traceability and quality control guidelines

10.1 Traceability

Keeping records of activities, inputs and outputs helps facilitate a process of monitoring and continual product and process improvement. Records will also provide a useful audit trail in the event of quality, health or safety issues arising. Traceability is a key aspect of quality control and assurance and will help provide product integrity. Doing so should support the economic sustainability of the production business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Accurate records of all wine production processes, activities, inputs and outputs are completed, maintained and kept for at least 5 years after the wine has been bottled, sold and dispatched.	
Minimum standard	B. Equipment maintenance records are completed and maintained.	
Minimum standard	C. The producer is able to give a full provenance description of the product.	

10.2 Quality assurance

Having documented procedures will add clarity to, and understanding of, production procedures regarding quality control, risk management, employee responsibilities, and processes for managing health and safety breaches. Being able to provide a consumer with a quality assured product has distinct economic and marketing advantages but also provides the producer with a process of analysing the production model and identifying improvement opportunities and potential costs savings.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Adhere to external quality assurance and management standards such as ISO 9001.	
Best practice	B. Have an external quality assurance auditor undertake a company audit.	
Best practice	C. Adopt a quality assurance approach to winemaking where each step of the wine production process is analysed, and hazard and control points are established.	
Minimum standard	D. Have a product safety plan that identifies due diligence required during stages of production.	
Minimum standard	E. A documented action plan must be in place to deal with the event of a product safety risk.	

Business guidelines

11. People management

Employing staff or having a voluntary workforce brings with it additional requirements for a productive, healthy and safe working environment. As well as complying with employment legislation there are additional areas of good practice that can be adopted to support the social and economic sustainability of the business.

Staff are a valuable asset to any wine production business and their involvement is important in maintaining business efficiency. Training, improving skills and performance management are important aspects of people management that help ensure staff are retained and motivated. Further, properly trained and competent staff are essential in achieving good standards of production, supporting innovation, increasing competitiveness and business profitability.

People management guidelines

11.1 Human resource plan

A human resource (HR) plan will provide a framework for HR management and help ensure that consistent processes and procedures are followed in support of staff welfare and operational delivery.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	<p><i>A. N.B. For businesses with >5 staff</i></p> <p>Have a written process for each of the following minimum standard areas:</p> <ul style="list-style-type: none"> • Staff recruitment • Retention • Training & development • Performance management • Employee relations • Record keeping <p>Each process should encompass meeting statutory obligations.</p>	
Minimum standard	<p><i>B. N.B. For businesses with <5 staff and/or unpaid volunteers</i></p> <p>Have a written process for :</p> <ul style="list-style-type: none"> • Staff recruitment • Record keeping 	

11.2 Employment documentation

Having up-to-date employee documentation will help both employee and organisation understand their role and conditions of employment, and are important in maintaining positive employee relations.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Have standard templates for key employment-related documents.	
Minimum standard	B. <i>N.B. For businesses with >5 staff</i> Maintain up-to-date versions of: <ul style="list-style-type: none"> • Job descriptions for all roles (to include job title & skills) • Employment contracts (hires/variations/terminations) 	
Minimum standard	C. <i>N.B. For businesses with <5 staff and/or unpaid volunteers</i> Maintain up to date versions of: <ul style="list-style-type: none"> • Job descriptions for all roles (to include job title & skills) • Employment contracts (hires) 	

11.3 Recruitment process

Recruiting the correct number of employees with the appropriate skills to work in the production process is crucial to the economic sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Implement a candidate selection process with screening methods suitable for use with different employment models.	
Minimum standard	B. <i>N.B. For businesses with >5 staff</i> Agreed screening processes by employment type to include practical skill tests & interviews which are conducted using specific questions designed for each position.	
Minimum standard	C. <i>N.B. For businesses with <5 staff and/or unpaid volunteers</i> Agreed interview process by employment type, using specific questions designed for each position OR use a simple skills checklist for volunteers.	

11.4 Employee orientation

Employee orientation will assist in helping employees understand the nature and role of the company they are working for, and maintain communication channels within the business. Doing so

should help them achieve their aims better. Employee orientation is also an essential part of due diligence on behalf of the employer.

Guideline categorisation	Guideline	Achieved? YES/NO
Minimum standard	A. Design and use a programme for employee induction , covering roles, responsibilities and health & safety during their first day/week/month.	
Minimum standard	B. A health and safety briefing to staff or volunteers before they start work.	

11.5 Workforce engagement

Clear, continuous lines of communication and an engaged and motivated workforce will support a well-functioning wine production process and enhance job performance. This should help ensure a productive workforce, who in turn contribute to the economic sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Operate a regular communication and employee engagement programme (For example: staff /team meetings, newsletters or staff events).	
Best practice	B. Conduct an annual employee satisfaction survey to assess progress.	
Minimum standard	C. Have a regular system for communicating with staff and ensuring their engagement.	

11.6 Education and training

Motivating and maintaining staff through staff development activities such as training will help ensure a productive workforce. It will also provide them with the skills required to achieve the job to a required standard, reduce risks and support the economic sustainability of the business.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. <i>N.B. For businesses with >5 staff</i> Draw up a personal development plan for training & assessment of each employee.	
Best practice	B. Adopt a policy for encouraging employee training that is job specific.	
Best practice	C. Annually assess the need for training, including legal requirements.	
Minimum standard	D. Defined company support system in terms of financial support and/or time off for: <ul style="list-style-type: none"> Attendance at seminars & educational programmes 	

11.7 Health & safety

Health and safety standards are legal requirements but good practice in this area is also essential for successful production.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Have a health and safety policy that is appropriate for the size and type of operation. It must include processes and procedures specific to the organisation and comply with all regulatory and legal requirements.	
Minimum standard	B. Appoint a member of staff to be responsible for worker safety, health and welfare issues.	
Minimum standard	C. Conduct a formal review of the employers 'duty of care' and produce written risk assessments for each activity identified. Review annually & ensure that statutory training is in place for all employees handling agrochemicals etcetera, including sub-contracted staff.	
Minimum standard	D. Have a workable system that allows all employees to raise & document H&S issues.	

12. Social responsibility and engagement

Social responsibility is an important pillar of sustainable wine production. Built around the concept that a business does not operate in isolation, but is a corporate citizen of the local, national or international community in which it operates, social responsibility and engagement are recognised as good business practice with PR and marketing benefits. Having good stakeholder relationships, including with staff, customers and suppliers, and being a good corporate citizen supports the position of the business within a community and contributes to its economic and social sustainability.

Social responsibility and engagement guidelines

12.1 Corporate social responsibility

Adopting a stance as a 'responsible' producer and working to benefit communities in which the business operates will help build good business and community relationships. Social responsibility is a key component of sustainability.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Engage with and support community based-projects.	
Best practice	B. Support the local economy through local employment where possible.	

12.2 Outreach and communication

Effective outreach and communication will help identify and address concerns and develop positive relationships with neighbours and communities in which the business operates. Doing so will aid social sustainability and support public relations exercises.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Where possible, events are hosted at the vineyard or winery to engage with the local community, showcase operations and build good relationships.	
Minimum standard	B. Channels of communication with communities, neighbours and stakeholders are in place.	
Proscribed	C. No attempt to engage with local communities.	

12.3 Complaints handling

Having a system in place for dealing with complaints is good practice and will help manage complaints in an efficient manner, saving time and speeding up a resolution.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. A grievance and complaints handling procedure is in place for staff and external stakeholders.	
Minimum standard	B. All complaints and their outcomes (i.e. follow-up, solutions) are documented.	

12.4 Alcohol awareness

The alcoholic beverage industry often faces competing views about the 'proper' place of their products in society. While scientific evidence pointing to the health benefits of moderate consumption continues to mount it is also recognised that excessive consumption can be harmful. As a result, and to help tackle the myriad of societal issues that arise out of excessive alcohol consumption, promoting sensible alcohol consumption is considered an important aspect of social sustainability.

Guideline categorisation	Guideline	Achieved? YES/NO
Best practice	A. Sales staff undertake the Personal Licence Holders qualification.	
Minimum standard	B. Signposting to 'Wine in Moderation' and/or 'Drinkaware' is present in producer's publicity / PR material.	