



**SUSTAINABLE  
WINEGROWING**  
BRITISH COLUMBIA  
Inspired people growing outstanding wine

## Sustainable Practices for BC Wineries

Condensed Guidebook

February 2016

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# ACKNOWLEDGEMENTS

## Research, Writing and Editing

Kellie Garcia, Insight Environmental Consulting Ltd.

José Garcia, Insight Environmental Consulting Ltd.

## Contributors and Reviewers

CHAIR: Gary Strachan, Strachan Consulting  
Brooke Blair, Vincor Canada  
Hans Buchler, Chair, BCWGC  
Karen Gillis, Red Rooster Winery  
Kathy Malone, Hillside Estate Winery

### *Pilot Project Participants:*

Trevor Butler, Archineers  
Aura Rose, House of Rose Winery  
Darryl Brooker, Cedar Creek Estate Winery  
David Ledderhof, Quails' Gate Winery  
David Paterson, Tantalus Vineyards

## *Members of the BCWGC Sustainable Practices Committee:*

Sandra Oldfield, Tinhorn Creek Vineyards  
Grant Stanley, Quails' Gate Winery  
Chris Wyse, Burrowing Owl Estate Winery  
Senka Tennant, Terra Vista Winery

Felix Boulais, Clos Du Soleil Winery  
George Phinitois, Desert Hills Winery  
Murray Synryk, Poplar Grove Winery  
Randy Picton, Nk'Mip Cellars  
Severine Pinte-Kosaka, Le Vieux Pin Winery

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# CHAPTER 1

## SETTING YOUR SUSTAINABILITY FOUNDATION

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# 1.0 SETTING YOUR SUSTAINABILITY FOUNDATION

## INTRODUCTION

Before starting this program you must first understand what sustainability means and how it relates to wine production. You also need to collect together information about your operation that will provide the foundation for creating a sustainability mission statement and completing the other chapters of this program.

Sustainability is a broad topic that means different things to different people. A common definition of sustainability is “meeting the needs of the present generation without compromising the ability of future generations to meet their needs” (The Brundtland Commission, 1987). Sustainability is more than just environmentally-friendly; it integrates protection of the environment, profitability, and social values. **Sustainable winegrowing reaches from soil to shelf.**

Implementing sustainable winemaking practices and measuring results is an ongoing process that does not happen overnight. **Sustainability is a journey of continual improvement rather than an end point.** The Sustainable Practices for BC Wineries self-assessment and guidebook will help you to choose practices to implement over time and teach you how to monitor and measure the results of these practices.

## CREATING A SUSTAINABILITY MISSION STATEMENT

A sustainability mission statement considers the fundamental ideas of how you wish to achieve sustainability of your winery. The mission statement will provide the framework for your winery management decisions.

### 1.1. Mission Statement

**A mission statement is a formal, short, written statement of the purpose of a company or organization.** You may already have a mission statement for your winery. If so, you do not need to write a new one, just incorporate sustainability into your existing mission statement.

A mission statement typically contains:

1. the purpose of the business or organization (e.g. to produce and sell high quality wines),
2. how this purpose is being filled (e.g. using sustainable techniques that protect the environment and provide social benefits), and
3. the principles and ideals that guide your work.

## DEFINING YOUR RESOURCE BASE

*You cannot manage what you don't measure.* Defining your resource base will provide you with a measurement of where you are now so you can judge whether you are making

progress as you work towards becoming more sustainable. The resource base of your winery is all of the resources you have available to you to operate and manage your property and business. It consists of the land and buildings, the people, and the operational resources.

**The intention is to put on paper what you already know about your winery to give you perspective on what you are managing and help you think of new ideas on how to manage it.** A clear understanding of your resource base will also help you to effectively communicate with others involved in your operations (e.g. auditors, consultants, contractors, employees, emergency first responders).

## 1.2. Land Base – Mapping and Description

A site plan of your winery and the surrounding land is a necessary and invaluable component of sustainable wine production. You can use your as-built drawings, a topographical or GIS (Geographical Information Systems) map, survey, or hand drawn map, or a combination of these. Air photos or orthophotos are also handy to have.

If you have existing maps you should try to extract the most pertinent information to compile on one map that will allow you to see how things interrelate and thus provide for better management opportunities. Your mapping information will need to be reviewed regularly to ensure that the information is current.

Your site plan should be accompanied by a written description. Be as detailed as possible and include the following components:

- Property boundaries
- Total hectares of your property
- Total hectares of vineyards
- Physical features: roadways, driveways, buildings, equipment storage areas, fences
- Other crops, including fruit trees and vegetable gardens
- Landscaping (e.g. flower gardens, lawns)
- Contours
- Seasonal and permanent water features on site or nearby: streams, drainages, pools
- Drains and wastewater treatment facilities
- Water source (well, surface water, municipal)
- Fuel tanks
- Hazardous materials storage areas
- Areas of erosion or sedimentation issues
- Waste bins/recycling bins
- Location of nearest neighbours

The site plan will be useful when completing sections of the subsequent chapters in this guidebook. For example, your site plan will be helpful when making decisions regarding landscaping plant choices, chemical use, and irrigation practices; management of hazardous materials; potential neighbour concerns; and wastewater management practices.

# SITE PLAN EXAMPLE

## Base Map / Site Plan

The diagram shows a rectangular property boundary. On the left is 'Fictional Road' and on the bottom is 'Westward Road'. Inside the property, there is a 'Tasting Room' and a 'Restaurant' on the left. In the center is a large rectangular area labeled 'Block 1 - Merlot 3 Hectares' with several horizontal lines representing vineyard rows. To the right of this area is an oval labeled 'Compost pile'. Further right is a 'Winery' and a 'Crush pad'. At the bottom right are 'disposal bins' and 'Trees' (represented by circles). A wavy line on the right side of the property indicates a 'Wetland' area. A north arrow is located in the top left corner of the diagram area.

**Components to include:**

Your site plan should be accompanied by a written description. Be as detailed as possible and include the following components:

- Property boundaries
- Total hectares of your property
- Total hectares of vineyards
- Physical features: roadways, driveways, buildings, equipment storage areas, fences, etc.
- Other crops, including fruit trees and vegetable gardens
- Landscaping (e.g., flower gardens, lawns)
- Contours
- Seasonal and permanent water features on site or near streams, drainages, pools, etc.
- Drains and wastewater treatment facilities
- Water source (well, surface water, municipal)
- Fuel tanks
- Hazardous materials storage areas
- Areas of erosion or sedimentation issues
- Waste bins/recycling bins
- Location of nearest neighbours

Site:

Location:

Completed by:

Date:

### 1.3. Human and Operational Resources

List all people who have anything to do with the management or operations of your winery. **You can list the types of activities these people do rather than listing their names (e.g. fencing contractor, seasonal worker).**

This list will help you communicate your sustainable practices to those that will be implementing the practices or whose activities could affect the sustainable operation of your winery. For example, say you made a significant effort to restore native vegetation along a property boundary only to have the fencing contractor bulldoze it because he or she did not recognize it as valuable habitat. Having the contractor listed as someone to whom you need to communicate your sustainable practices may have avoided the situation.

The list may include any or all of the following groups of people: family, friends, employees, contractors, stakeholders, neighbours, community members, bankers, agricultural advisory committees, agricultural regulators (governmental and private organizations), and environmental and conservation groups. Family members and friends should be listed so you can ensure they know how to react in case of an emergency or accident, for example.

Also list all the operational resources you have that help you to operate your winery. These may include: financial resources, mechanical

resources, equipment and buildings, manuals. You may already have a list of equipment and machinery for insurance purposes.

## DEFINING YOUR PROCESSES

### 1.4. Production Process Diagrams

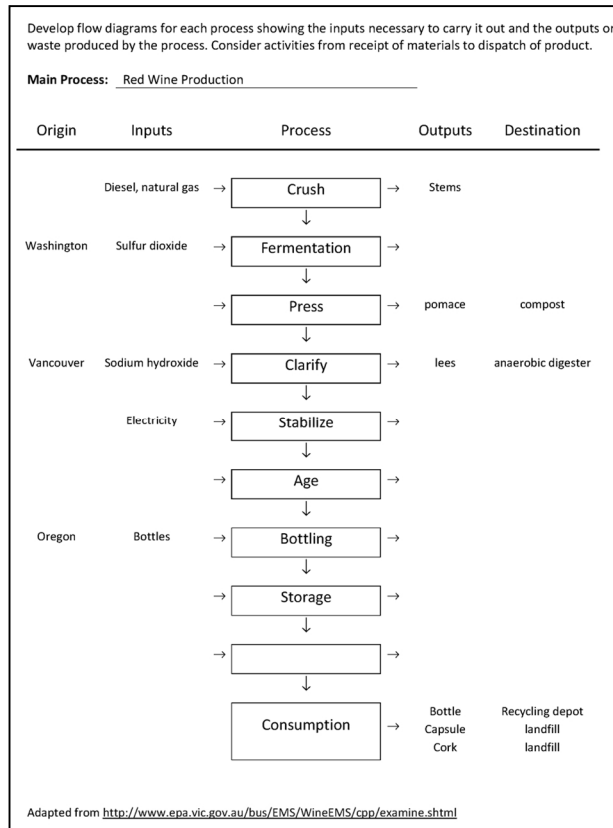
Identifying the flow of materials between process operations is an important visual aid. **The information included in your process descriptions will help you to complete your water, energy, hazardous materials and solid waste assessments and management plans requested in the next chapters.**

A production process description should include the following components:

- A flow chart (or flow charts) of the production processes being undertaken in the winery (e.g. crushing, fermentation, storage, maturation, bottling, sparkling wine production, distillation).
- A clear and concise description of the processes.
- For each process, a list of all input materials (e.g. grapes, grape juice, chemicals, water).
- For each process, a list of all output materials that are reused elsewhere (e.g. various water reuse streams, grape marc, lees, filtered solids, stalks).
- For each process, a list of all losses, or substances that go to waste (e.g. wastewater streams, wastewater sludge).
- Details of annual processing inputs and outputs (e.g. crush size, volume of grape

juice produced, ratio of red to white grapes processed, volume of processed grape product taken in from other sites, volume of grape product sent for off-site processing, and percentage of wine, sparkling wine and spirits).

## PRODUCTION PROCESS FLOW DIAGRAM EXAMPLE



A business plan will provide you with a road map to setting up and managing your winery business. It will help you to:

- organize your thoughts, clarify your goals, and measure progress;
- acquire knowledge and collect information about your industry, customers, and the marketplace;
- anticipate and avoid obstacles your business is likely to encounter;
- communicate your vision, goals, and strategies to management, staff, and customers and be more persuasive to funding sources; and
- understand the financial aspects of your business, including cash-flow and break-even requirements.

Both internal users (e.g. management and key employees) and external users (e.g. lenders, investors, venture capitalists, attorney, accountant, and insurance agent) will be reading and using your business plan.

Elements of a successful business plan are listed below. Your plan will not necessarily include all of the components listed, and its length may range from a few pages to many pages depending on the size of your operation.

## PREPARING A BUSINESS PLAN

### 1.5. Business Planning

Any business is highly competitive, and the winemaking industry is no exception. A thorough, accurate and well-researched business plan is essential to the success of your winery and will provide the foundation for your sustainability program.



## **ELEMENTS OF A SUCCESSFUL BUSINESS PLAN**

(Washington Association of Wine Grape Growers, 2006)

### **Title Page**

- Contact information including name of winery and name, address, and phone of owner(s)

### **Executive Summary**

- Purpose of the plan
- Description of overall business concept including mission statement and company history
- Product(s) and/or service(s)
- Marketing and sales strategies
- Market analysis and description
- Organization and personnel
- Financial data

### **Table of Contents**

- List of main sections, tables, figures, and appendices and corresponding page numbers

### **Purpose of Business**

- What you want to accomplish (i.e. the ultimate purpose for starting the business )
- Mission statement
- Goals and objectives
- Description of business

### **Description of Product(s) and/or Services(s)**

- Definition and benefits of product(s) and/or service(s)
- Ability to meet demands
- Competitive advantages
- Description of current position in life cycle
- Copyrights, patents and trade secrets
- Existing legal agreements
- Research and development activities

### **Market Analysis and Strategy**

- Market research – industry description and outlook
- Distinguishing characteristics and key attributes of primary and secondary target markets
- Barriers to entry into the market
- Identification of key competitors and their strengths and weaknesses
- Regulatory environment
- Financial standards

- Marketing objectives and strategies
- Sales and distribution

### **Organization, Management and Staffing**

- Organizational structure including management personnel, key employees, board, advisory committee, professional services, consultants
- Background and experience level of those who will run the business
- Management skills and professional services that are available in-house and that need to be hired or contracted
- Management compensation and incentives available

### **Milestones and Timelines**

- Critical dates in the development and operation of the business
- Short-term and long-term plans to reach goals (e.g. planting schedules, openings, release dates)
- Barriers or risks and potential solutions

### **Financial Information**

- Start-up and operating expenses
- Generated and required cash flow
- Funds required and their uses
- Financial statements
- Methods of financial reporting

### **Operations and Implementation**

- Description of facilities, production, inventory control, quality control, capacity, productivity, labour, processes, equipment, supply and distribution, order fulfillment and customer service, research and development, financial control, and contingency planning
- Technology plan – software, hardware, telecommunications, personnel
- Operational issues essential to nature and success of your company, provide a distinct competitive edge and/or overcome frequent problems in a business such as yours

### **Appendices or Exhibits**

- Resumes of key managers
- Pictures of products
- Professional references
- Market studies
- Significant contracts

## WORKING WITH OTHERS TO ENSURE SUCCESS

### 1.6. Working with Industry Associations

There are many wine industry organizations in BC. Becoming a member of one or more wine industry associations will help you to keep up-to-date with research, knowledge, and technology, be part of a network of like-minded people, and access marketing opportunities.

### 1.7. Working with Qualified Professionals

Managing a winery is a complicated job that requires input from various professionals at different times to ensure the business is prosperous while minimizing its footprint on the environment. Table 1-1 provides a list of professionals that you may need to consult for advice during design, construction or operation of your winery.

**Table 1-1: Professionals that you may need to consult during design, construction and operation of your winery.**

TYPE	ROLE
Architect	<ul style="list-style-type: none"> <li>• Advise on site selection</li> <li>• Lead the building and landscape design</li> <li>• May specialize in sustainable winery design</li> <li>• Identify approvals and permits required</li> </ul>
Engineer	<ul style="list-style-type: none"> <li>• Ensure adequate structural design and integrity of buildings</li> <li>• Advise on energy, water and waste efficiency</li> </ul>
Winemaker Winery consultant	<ul style="list-style-type: none"> <li>• Determine wine types, styles and volume</li> <li>• Advise on space and layout needed to meet production goals</li> <li>• Equipment recommendation and purchase</li> <li>• Winery consultant may specialize in sustainable winery design</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>• Conduct environmental surveys and assessments</li> <li>• Advise on sustainable site selection and development</li> <li>• Identify (and apply for) environmental approvals and permits</li> <li>• Examples include biologist, geologist, environmental scientist, conservationist</li> </ul>
Financial	<ul style="list-style-type: none"> <li>• Help develop financial aspect of business plan (e.g. start-up and operating expenses, cash flow projections, break-even analysis, etc.)</li> <li>• Identify need for and sources of lending</li> <li>• Examples include lender, accountant, financial planner</li> </ul>
Legal	<ul style="list-style-type: none"> <li>• Assist in obtaining approvals and permits</li> <li>• Assist in land purchase</li> </ul>

## ***Environmental Organizations***

There are three main types of environmental organizations that provide assistance and resources you can use when planning a winery development or expansion or at other times as needed: land trust organizations, stewardship groups, and conservation organizations.

**Land trust organizations** help private land owners with stewardship, purchase private land for conservation and manage conservation covenants on private land on behalf of the province. They work with land owners under a strict code of privacy information. They often help find funds for landowners to assist with costs of fencing and restoration.

**Stewardship groups** encourage private land owners to restore and retain healthy habitat. They usually offer free advice for land owners, but a detailed biological assessment would likely have a fee attached.

**Conservation organizations** have education and outreach as their goals.

Web links to environmental groups and resources that may be useful when constructing and operating a winery are included below.

### **North Okanagan-Shuswap Region**

The **North Okanagan Resource/Habitat Atlas** is a web-based mapping tool that brings together a variety of information about natural and cultural attributes and resources of the North Okanagan region. The contents

of the atlas can assist people in creating a profile of the myriad of ecosystems with which they interact in the North Okanagan. It is available at

[www.shim.bc.ca/atlases/nord/index.cfm](http://www.shim.bc.ca/atlases/nord/index.cfm).

The **North Okanagan Parks and Natural Areas Trust** is registered to hold and administer covenants on lands. These covenants can control access to the lands and preserve them in their natural state in perpetuity. See [www.nopnat.com/](http://www.nopnat.com/) for more information.

The mission of the **Shuswap Environmental Action Society** is to study environmental issues, inform the public about environmental problems and solutions, coordinate activities and share information with other local, provincial, and national environmental organizations, and take actions to improve our local environment. See <http://www.seas.ca/> for more information.

### **Central and South Okanagan-Similkameen Region**

The **Habitat Atlas for Wildlife at Risk: South Okanagan-Similkameen** focuses on 32 species considered "at risk" in the South Okanagan and Lower Similkameen. It is available at

[www.env.gov.bc.ca/okanagan/esd/atlas/index.html](http://www.env.gov.bc.ca/okanagan/esd/atlas/index.html).

The **South Okanagan Similkameen Conservation Program** was created to protect the biodiversity of the Okanagan-Similkameen area, to maintain a viable ecological corridor between the deserts to the south and the grasslands to the north, and to

effect recovery of endangered species to the extent possible. The program website is [www.soscp.org](http://www.soscp.org).

The **Okanagan Similkameen Conservation Alliance** [www.osca.org](http://www.osca.org) provides brochures on species at risk and guidelines designed for agriculture. They are available for free as laminated posters and cards designed to be posted in work yards and sheds.

The **Okanagan Similkameen Stewardship Society** has published many excellent fact sheets for land owners over the past 15 years. Many of these are available in print form from their office and all are on their website at [www.okanagansimilkameenstewardship.ca/p/caring-for-your-space.html](http://www.okanagansimilkameenstewardship.ca/p/caring-for-your-space.html).

### **South Coast Region**

The **South Coast Conservation Program** coordinates and facilitates the implementation of conservation actions to maintain and restore species and ecosystems at risk on the South Coast of BC. The program website is [www.sccp.ca](http://www.sccp.ca).

### **Vancouver Island and Gulf Islands**

The **Garry Oak Ecosystem Recovery Team (GOERT)** coordinates efforts to protect and restore endangered Garry oak and associated ecosystems and the species at risk that inhabit them. Their website, [www.goert.ca](http://www.goert.ca), contains extensive information about Garry oak ecosystems and how to protect them.

The **Islands Trust** is a federation of independent local governments which plans land use and regulates development in the

trust area. The trust area covers the islands and waters between the British Columbia mainland and southern Vancouver Island, including Howe Sound and as far north as Comox. The Island Trust website, [www.islandstrust.bc.ca/](http://www.islandstrust.bc.ca/), provides detailed information on coastal ecosystems and wildlife.

The **Central Saanich Agricultural Resource Atlas** provides a comprehensive overview of the land base of the municipality, with a particular focus on the soils, groundwater resources and climate factors that influence agricultural production. Available at: [www.centrialsaanich.ca/hall/Departments/planning/planning/Agricultural\\_Resource\\_Atlas.htm](http://www.centrialsaanich.ca/hall/Departments/planning/planning/Agricultural_Resource_Atlas.htm)

This **CRD Natural Areas Atlas** is a web-based mapping tool that facilitates well-informed and responsible land-use decisions. In the Atlas, you will find important information such as the locations of salmon bearing streams, spawning zones, old growth forests, endangered ecosystems, record-sized trees and shoreline habitats. It is available at: <https://www.crd.bc.ca/>.

### **All of BC**

The Stewardship Centre for British Columbia has done a great job at pulling together provincial species at risk information on the **Species at Risk & Local Government: A Primer for British Columbia** website located at <http://www.speciesatrisk.bc.ca/>. The website will help you to learn about species at risk and the threats they face, learn which species at risk are in your area, and search for species at risk by name or ecosystem type.

# CHAPTER 2

## BUILDING DESIGN AND SITE DEVELOPMENT

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## 2.0 BUILDING DESIGN AND SITE DEVELOPMENT

**Chapter objective:** To provide key elements and principles of sustainable building design and operation that will reduce the winery's ecological footprint and improve working environments.

### INTRODUCTION

Sustainable building design works to optimize site potential; to reduce non-renewable energy consumption, greenhouse gas emissions, raw materials use, waste output and potable water consumption; and to optimize operational and maintenance practices. In addition to these benefits, sustainably built wineries provide a healthier working environment that can result in higher productivity, less absenteeism, and increased sales.

Many of the practices followed in sustainable design incur no added expense and actually return greater profits because of reduced operating costs and lower energy and water bills. Green building design practices can also enhance asset value, increase profits, optimize life cycle economic risk, and reduce liability risk.

Wineries in British Columbia are often more than just production facilities. Designing a building and landscape that appeals to tourists is increasingly important in the highly competitive market.

Creating a functional winery design requires consideration of the following key elements (Zoecklein, 2008):

- Adequate space for operation and maintenance;
- Shortest routes for material flow and communication;
- Centralized process control, laboratory, and supervision;
- Planning of visitor tours, reception facilities, and retail space;
- An understanding of utilities requirements;
- Aesthetic tourism layout that does not disrupt production;
- Deliberate simplicity;
- Flexibility to facilitate growth as well as changes to processing techniques; and
- Sanitation ease.

The practices in this chapter will help you to create a functional and sustainable winery, whether you are designing from scratch or expanding or renovating an existing winery.

### PRELIMINARY CONSIDERATIONS

#### 2.1. Team Selection

Use a team of professionals to help you develop a business plan, identify and obtain approvals and permits, select the winery location, design the winery, and choose your wine types and volumes. Your team may include all or some of the professionals listed in Section 1-7.

Ultimately, your team will help you to minimize costs and maximize efficiency of production. They will ensure that you create an efficient, functional, flexible and expandable operation. Their advice will also help you avoid unnecessary conflicts with government agencies in areas such as tax compliance, waste disposal and environmental impact.

## 2.2. Green Building Standards and Programs

The Canada Green Building Council ([www.cagbc.org](http://www.cagbc.org)) manages several programs related to green building technologies, including Leadership in Energy and Environmental Design (LEED), Living Building Challenge, WELL Building Standard, and Passive House standard.

### *Leadership in Energy and Environmental Design*

Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is a third-party certification program and an internationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water efficiency, energy efficiency, materials selection, and indoor environmental quality. Certification is based on the total point score achieved. There are

four possible levels of certification: certified, silver, gold and platinum.

### *Living Building Challenge*

Living Building Challenge is a philosophy, advocacy tool and certification program that addresses development at all scales. It is comprised of seven performance areas: Site, Water, Energy, Health, Materials, Equity and Beauty. These are subdivided into a total of twenty Imperatives, each of which focuses on a specific sphere of influence. (International Living Future Institute, 2011)

### *WELL Building Standard*

WELL is the first building standard to focus exclusively on the health and wellness of people in buildings. It combines best practices in design and construction with evidence-based medical and scientific research – harnessing the built environment as a vehicle to support human health and wellbeing.

### *Passive House Standard*

Wolfgang Feist from Germany and Bo Adamson from Sweden developed the concept for the Passive Houses standard and the Passivhaus Institut in Darmstadt, Germany in the early 1990s. The primary goal of Passive House is to minimize the use of energy systems in a home. It accomplishes this goal by using high-quality levels of insulation with minimum thermal bridges, an exceptional level of air tightness, optimized passive solar design providing gain in winter and shading in summer, and mechanical ventilation with highly proficient heat recovery.

### ***Green Globes Design***

Green Globes Design is a guide for integrating green design principles and an assessment protocol. Using confidential questionnaires for each stage of project delivery, the program generates comprehensive on-line assessment and guidance reports. The questionnaire consists of approximately 150 questions, typically of a YES/NO/NA type, that are grouped broadly under seven areas of building environmental performance. See [www.greenglobes.com](http://www.greenglobes.com) for more information on the program.

## SUSTAINABLE SITES

### 2.3. Site Selection

Location is one of the most important winery design considerations. You should consult with industry professionals and government agencies when choosing your site. An inventory and analysis of the ecological attributes, geography, cultural and urban context, slope, and orientation of the site is critical to understanding whether or not it will be suitable for your winery.

Choosing an appropriate site can provide the following benefits:

- lower site preparation costs,
- lower infrastructure development costs,
- opportunities to preserve natural areas,
- reduced risk of erosion and flood damage,
- improved aesthetic and functional quality of the winery for both occupants and neighbours, and

- lower energy use and air pollution from vehicles.

## WINERY SITE SUITABILITY CHECKLIST

### **What is the zoning of the site?**

- Do local zoning bylaws limit commercial?
- Do zoning bylaws prevent urban encroachment?
- What are the environmental regulations relating to site development?

### **What are the environmental values of the site?**

- Is the site natural unmodified habitat?
- Does the site have species at risk associated with the habitat?
- How would the site biodiversity be affected by winery development?
- Has an environmental survey of the site been conducted by a knowledgeable person? (e.g. environmental consultant, knowledgeable local conservancy group representative, etc.) to:
  - Document potential environmental risks and the presence of sensitive areas in the property.
  - Ensure that during development of the site, damage to existing habitat is minimized.

### **What are the water rights and water quality for the property?**

- Are there available water and/or water rights? What is the water quality?
- For information on water quality testing see Chapter 3.

### **What is the site history?**

- Was it used for agricultural purposes or is it non-arable?
- List past irrigation history and systems used.
- List past crop and or animal use and management practices.



- List past insecticide, fungicide, herbicide use and residual carryover potential for each material.
- Have any fumigants been used at the site?
- Was past land use uniform or variable across the site?
- Has the site been levelled, eroded or altered in any significant way?

#### **What is the neighbourhood like?**

- Identify the land uses adjacent to the main property.
- Are the surrounding land uses compatible with a winery operation?
- Is the site conducive to attracting visitors to the winery?
- Describe the general geography.
- What is the distance to urban centres, residential properties, schools, etc?
- Is there a local market for a winery?

#### **What is the site's proximity to utilities, infrastructure, workforce and suppliers?**

- Roads
- Hydro, water, sewer, etc.
- Distance to workforce?
- Distance to public transportation?
- Distance to main suppliers?
- Can you make use of existing facilities on the site?
- Is there a vineyard nearby?

#### **Is the site big enough?**

- Large enough for planned facility and for future expansion?

## **2.4. Natural and Semi-Natural Areas**

Using a harmonious building-site relationship in your winery design will help you conserve existing natural areas and restore damaged areas to provide habitat and promote

biodiversity. Native areas (e.g. wetlands, aquatic areas, riparian areas, forest and woodlands, and grasslands) provide the most important contribution to biodiversity. Semi-natural areas (e.g. shelterbelts, hedgerows, fencerows, buffers, and road margins) also contribute to the conservation of biodiversity. Damage to natural and semi-natural areas can be minimized by:

- acknowledging that land preparation activities, such as clearing and grubbing, have a severe impact on natural areas and not conducting these activities in sensitive areas;
- selecting a suitable building location and designing the building with a minimal footprint to minimize site disruption;
- setting aside land and leaving or establishing native plant species on it. Consider entering into a contract with The Land Conservancy; and
- maintaining a buffer with native vegetation between natural habitat and the winery where possible.

## **RESOURCE CONSERVATION**

The consumption of resources in a winery, such as water, power and inert gases, can be managed by efficient design, good operating practices, and effective process control to reduce usage and costs.

## **2.5. New Technologies**

For a winemaker to maintain a competitive edge the design process must incorporate appropriate existing technologies, as well as

ensure flexibility to allow the introduction of new technologies as they become available (Bailey, Parish, & Baldwin, 2002).

## 2.6. Building Materials

Consider using building materials that include recycled content, are extracted and manufactured within the region, are rapidly renewable, and are FSC-certified (see [www.fsccanada.org/](http://www.fsccanada.org/)).

Rapidly renewable materials are natural, non-petroleum-based building materials that have harvest cycles under 10 years (GreenBuildings.com, 2011). Typical examples of rapidly renewable material are bamboo, wool, cotton insulation, agrifiber, natural linoleum products (such as Marmoleum), wheatboard, strawboard and cork.

Also consider incorporating salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items into building design. Doing so can reduce environmental impacts resulting from extraction and processing of new virgin materials and transportation of materials, and reduce the use and depletion of finite raw materials and long-cycle renewable materials.

Before choosing your materials, ensure they are approved by local building codes.

Include design strategies that minimize premature deterioration of the walls and roof of your winery and which are appropriate to

the region. Examples include installing shading screens, eaves, overhangs, scuppers, continuous air-barrier systems of appropriate strength and the use of drained walls.

## 2.7. Water

Before constructing a winery you need to make sure that you have sufficient water of the appropriate quality for your operation. This is critical! Carefully investigate your water source and consult with the municipality or regional district water department. Check with your local watershed group and health agency to see if there have been any issues with water quality or quantity in the area where you plan to build. If you do find that the water may not be of adequate quality you may need to install a water filtration system.

Key components of water-centric site design is choosing the appropriate plants for your landscaping and making sure you have enough topsoil available to sustain the plants. Keep your lawn areas to a minimum and your native plants to a maximum.

The irrigation system should be chosen with care and installed by a certified person. You may not need an irrigation system depending on where you are setting up your winery and what plants you are choosing. See Section 3.7 for more techniques to reduce your outdoor water use.

Consideration should also be given to water storage and treatment of winery washdowns in the fall for irrigation in the summer. Many

wineries dump the fall washdown water. It is a valuable resource that should be reused – especially in the arid Okanagan.

There are many more practices that you can do to reduce your water use - see Chapter 3 for details.

## 2.8. Energy

How you design and construct your building will have a significant impact on your energy consumption and costs. It is in your best interest to put the work and money into ensuring your building is designed with energy efficiency in mind so you can save money on your utility bills and reduce the need for retrofitting.

Consider engaging a commissioning authority independent of the design team to:

- review the design prior to the construction documents phase,
- review the construction documents near completion and prior to issuing contract documents for construction,
- review the contractor submittals relate to systems being commissioned,
- provide the owner with a single manual that contains the information required for re-commissioning building systems, and
- review building operation with Operations and Maintenance staff.

Make sure to design your winery with meters to measure energy and water consumption in different buildings and at different stages of the production process, appropriate insulation

of buildings and equipment. See Sections 3.3 and 4.3 for more information on meters.

Also consider the inclusion of non-polluting and renewable energy sources (e.g. solar, wind, geothermal, low-impact hydro, biomass, and bio-gas).

If you are considering a gravity flow system be sure to weigh the construction and energy costs and footprint required to build your gravity flow system with the energy savings from using it.

See Chapter 4 for operational energy efficiency measures.

### *Daylight and views*

Sustainable winery design will provide a connection between indoor spaces and the outdoors through the introduction of daylight and views into regularly occupied areas of the building. Using daylight to its full advantage will also contribute to your energy efficiency efforts and reduce you electricity bill. Day lit wineries can reduce lighting watts by as much as 66% (Chauncey, 2007).

Strategies to consider include:

- building orientation (south facing),
- additional windows and skylights or clerestories,
- skylights and solar tubes,
- shallow floor plates,
- increased building perimeter,
- exterior and interior permanent shading devices,
- high performance glazing,

- maximize view opportunities by using glass in roll-up doors and placing skylights in subterranean spaces, and
- use glazing to supply daylighting but control glare.

## WASTE REDUCTION

### 2.9. Wastewater

Your winery design should consider ways to reduce the generation of wastewater as well as innovative wastewater treatment systems that will eliminate or reduce the load to the municipal system. Consider installing on-site wastewater treatment systems (mechanical or natural). The system must be designed and installed by a licensed professional and should handle more than what is produced during peak flows and more than what is produced on a regular basis (this makes future expansion easier).

See Chapter 3 for more information on wastewater treatment practices.

### 2.10. Solid Waste

Sustainable waste management practices reduce the amount of waste generated from the construction and operation of your winery, conserve resources, and reduce environmental impacts as they relate to materials manufacturing and transport. The “Reduce, Reuse, Repair and Recycle” principles should be followed.

Practices that contribute to sustainable construction waste management include:

- establish goals for landfill diversion during construction,
- adopt a construction waste management plan to achieve these goals,
- designate a specific area on construction site for recycling,
- recycle all construction materials that can be recycled,
- identify construction haulers and recyclers to handle designated materials,
- consider reuse of existing buildings to reduce construction waste, and
- track recycling efforts during construction of your facility.

Allocate adequate space for recycling containers and identify haulers and recyclers to handle your materials. Consider other technologies to further enhance the recycling program (e.g. cardboard balers, aluminum can crushers) in your winery design.

See Chapter 6 for more information on solid waste management.

## POLLUTION PREVENTION

Pollution prevention is reducing or eliminating waste at the source by modifying production processes, promoting the use of non-toxic or less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream (United States Environmental Protection Agency, 2010). Pollution

prevention is also referred to as source reduction.

In addition to the many environmental benefits of pollution prevention, there are also cost savings resulting from:

- reduction in raw material losses,
- reduction in reliance on expensive end-of-pipe treatment technologies and disposal practices,
- conservation of energy, water, and raw materials, and
- reduction of the potential liability associated with waste generation.

## 2.11. Stormwater

Your site design should limit the disruption and pollution of natural water flows by reducing or eliminating stormwater runoff, increasing on-site filtration and eliminating contaminants. See Chapter 3 for more information on stormwater management.

Good stormwater management includes:

- promoting infiltration,
- minimizing impervious surfaces,
- reusing stormwater for non-potable uses such as irrigation and toilet flushing, and
- designing mechanical or natural treatment systems such as constructed wetlands, bioswales.

## 2.12. Erosion and Sedimentation

Erosion and sedimentation must be controlled during site development to reduce the potential for negative impacts on water and air

quality. See Chapter 3 for more information on erosion and sedimentation control.

Your erosion and sedimentation control plan should meet the following objectives:

- prevent loss of soil during construction,
- protect topsoil by stockpiling for reuse,
- prevent sedimentation of storm sewer or receiving waterbodies, and
- prevent polluting the air with dust and particulate matter.

Erosion and sedimentation control strategies may include seeding, mulching, earth dikes, silt fencing, sediment traps and sediment basins. Avoid extensive "cut and fill" grading; existing soil is already compacted and stable, while fill must settle for a period of time. Even though fill material is mechanically compacted during site preparation it doesn't drain as well as native slopes. Follow natural slope contours as much as possible.

Erosion control should also be considered in building and landscape design. Strategies include planting sturdy groundcover vegetation, using mulch, placing textile blankets on top of the soil underneath a layer of rock, building retaining walls, and using large rocks to protect the soil on slopes.

## 2.13. Light Pollution

Design considerations that reduce light pollution will eliminate light trespass from the building and site, improve night sky access and reduce development impact on nocturnal environments

## HEALTH AND SAFETY

### 2.14. Indoor Air Quality

Indoor air quality needs to be managed during the construction process as well as for the life of the building. Preparing a construction indoor air quality management plan and choosing design features that increase ventilation effectiveness and reduce the quantity of indoor air contaminants will help sustain the comfort and well-being of construction workers and building occupants.

Strategies for managing indoor air quality include:

- Prepare a construction indoor air quality plan.
- Test indoor air quality prior to occupancy.
- Install a permanent carbon dioxide monitoring system that provides feedback on space ventilation performance.
- Design your cellar floor at grade.
- Design the HVAC system and building envelope to optimize air change effectiveness. Strategies include displacement ventilation, low-velocity ventilation, plug-flow ventilation such as under floor or near floor delivery, and operable windows.
- Test air change effectiveness of building after construction.
- Specify low or non-toxic and low-VOC (volatile organic compounds) materials in construction documents and ensure that VOC limits are clearly stated in each section of the specifications.

- Specify materials with no added urea-formaldehyde resins.
- Provide product cut sheet, MSD sheets, signed attestations or other official literature clearly identifying emissions rates.
- Choose building materials that are moisture resistant to inhibit the growth of biological contaminants in buildings.

### 2.15. Equipment Layout and Workflow Design

Equipment layout and workflow design must consider the safety of operating and visiting personnel as well as the hygiene requirements of the plant and processes (Bailey, Parish, & Baldwin, 2002).

Consideration should be given to:

- grouping the winemakers office, laboratory and tasting room together,
- providing direct access to tank catwalk systems from the winemakers office and laboratory,
- providing a clear line of sight from the winemakers office to the receive and production areas, and
- locating noisy and smelly associated processes away from the tasting area and other locations where they might be a nuisance.

The design of the building must avoid enclosed pits or trenches where carbon dioxide produced during fermentation can collect.

# CHAPTER 3

## WATER AND WASTEWATER MANAGEMENT

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## 3.0 WATER AND WASTEWATER MANAGEMENT

### INTRODUCTION

**Chapter objective:** To provide practices and strategies to effectively obtain, use, conserve, re-use, and discharge water of high quality.

Water is a key resource for successful winery operation. Nearly every step of the winemaking process, from crush to bottle, requires water. Water is used for cleaning, tank and bottle washing, sanitation, and filter rinsing, among other uses.

Wineries have the unique opportunity to be at the forefront in water conservation. Water use can be greatly reduced by adopting good housekeeping procedures, changing products, replacing old equipment with newer technology, formalizing waste minimization measures, modifying processes, and educating staff. When conservation plans have been seriously undertaken by wineries, water use savings of 20-25% are often easily attainable (Storm, 1997).

Not only will water conservation save water, but in many cases energy use will also be reduced, thus having a considerable impact on operating costs for the winery.

On the output side of things, wineries generate a variable quality and quantity of wastewater that includes dissolved substances and high solids, and has a low pH. Pollution

prevention practices are essential to ensuring wastewater production is managed sustainably.

### SETTING UP A WATER CONSERVATION PROGRAM

#### 3.1. Water and Wastewater Assessment and Planning

You need a well-laid out plan to achieve reductions in water use and wastewater generation at your winery. An assessment of wastewater volume and categories and identification of the major sources of water waste increases the potential for saving water by identifying areas where water can be conserved, reused, or recycled. It will also give you a clear understanding of wastewater production so you can find ways of reducing the volume produced.

Total annual volumes, and peak loads and timing are important. You need to understand the annual production cycle of winery wastewater and major sources of water waste for each production stage. The production process descriptions you created in Section 1.4 will help you do this. A checklist you can use to complete your water and wastewater assessment is included below.



## WATER AND WASTEWATER ASSESSMENT CHECKLIST

- How much water is used in each operation at your winery?
  - Equipment cleaning and sanitation
  - Cellar cleaning and sanitation
  - Process (crush pad, wine movements, press operations)
  - Lab
  - Tasting room, kitchen, bathrooms
  - Boilers
  - Evaporative cooling towers
  - Water softening
  - Bottling
  - Landscaping
- How much wastewater is collected and/or discharged at your winery?
  - Wastewater sump
  - Wastewater collection system – intermediate points
  - Wastewater reclamation for reuse
  - Septic system for sanitary wastewater
  - Stormwater runoff
  - Process water runoff
  - Discharge methods
  - Digester
- What are the sources of wastewater generated at your winery?
- What is the capacity of your wastewater containment and discharge?
- What types of housekeeping practices are used to conserve water and limit the quantity of wastewater generated?
- What types of process controls are used to improve process efficiency?
- Are any of the wastewater streams classified as hazardous? What characteristics make them hazardous?
- What regulatory permits are required for your wastewater system and discharge?
- What wastewater monitoring and treatment is necessary to comply with regulations?

Table 3-1 provides a listing of water uses that should be accounted for in your assessment. It can serve as a planning checklist to ensure that no fixture or potential use is overlooked.

**Table 3-1: Range of water use rates for various winery plumbing fixtures and equipment.**

Item	Approximate rate of water use when in operation (L/s except where noted)
Hose connection	0.3-0.6
Portable high-pressure water/steamer	0.3-0.6
Landscape (impulse type) sprinkler head	0.1-0.2
Drip emitter (landscape)	1.9-3.8 L/hour
Process refrigeration condenser cooling water (blow-down makeup)	0.3-0.4
Spray cleaning bar in rotary-drum screen	0.13-0.2
Miniflow toilet (water closet)	4.5-6.1 L/flush
Flushometer (flush valve operated toilet)	7.6-11.4 L/flush
Urinal (flush valve operated urinal)	1.9-3.8 L/flush
Miniflow shower	0.05-0.06
Sink/lavatory	0.06-0.13
Evaporative-type space coolers (3,000-5,000 cfm capacity)	0.03-0.06
Boiler feed water	Highly variable, depending on horsepower rating

(Storm, 1997)

### ***Establishing goals and actions***

Once you have completed your assessment, you will need to set overall goals for the program. Try to establish quantifiable rather than qualitative goals. "To reduce water use by

25% per year” is a quantifiable goal, whereas “implementing a significant reduction of wastewater production to the environment” is a qualitative goal.

The goals of the program should be reviewed periodically and modified to reflect changes in available technology, raw material supplies, environmental regulations and economic climate.

### **3.2. Training and Incentives**

#### ***Program management***

Assign responsibility for managing the water conservation program to someone who is familiar with the winery and its processes and procedures. This person can be anyone on staff who is enthusiastic and interested in the success of the program (i.e. it does not have to be someone from upper management). Education and training may need to be provided to the person to ensure he or she can handle the responsibilities of overseeing the program.

The program manager will be responsible for developing and implementing program goals, leading the water and wastewater assessment, and ensuring proper monitoring and record keeping is completed.

#### ***Getting company-wide commitment***

Involving others in the implementation of water conservation initiatives will be imperative if the practices are to stick. The goal should be to include water conservation in

your company culture so it becomes a way of doing business.

Although the drive for a water conservation program may start on the ground floor and much of the work may be done by winemakers, cellar hands, and other employees, commitment of upper management is very important. Be sure to provide presentations, fact sheets, and other information to the winery managers and executives to ensure they understand the program goals, actions, and costs. Some aspects of water conservation require an up-front investment that may need executive level approval. This approval will be easier to get if management is familiar with the program and supports its goals.

Inform staff, contractors and suppliers of your goals. Incorporate your goals in your training manuals, purchasing policies, and operating procedures. If you have very specific goals and actions, communicate how you plan to accomplish them and by what date (if applicable). If you don't have specific goals at the moment, you can simply state your commitment to continual improvement in this area for now.

Encourage input from employees and recognize staff for improving winery clean up and washdown protocols. Publish comparative (preconservation and postconservation program) water use figures from month to month for the same process step (i.e. bottling, racking, filtering).

### 3.3. Monitoring and Record Keeping

Sound water management requires monitoring and recording the amount and quality of water the winery takes in from wells, municipal systems and surface water, how much water is used for each operation, and the wastewater discharged to ponds, septic systems, or municipal systems.

Use your Water and Wastewater Assessment checklist to guide your record-keeping. The format of your records (e.g. Excel spreadsheet, software program, Word tables filled out manually) will be up to you and will depend on your computer literacy and personal preference.

When comparing records year-to-year, make note of the change(s) and explain in a few sentences why the change might have occurred (e.g. repaired leak in irrigation system, implemented dry cleaning methods in cellar, began recycling wash water). These notes will be invaluable when looking back in a few years, and will save you time in the future by not having to look through your records to find out what may have caused the fluctuations in water consumption.

#### ***Metering***

Water metering provides a visual representation of water consumption and can help in the detection of leaks in the system. Metering usually leads to water conservation efforts, primarily in minimizing water waste.

Flow meters should be installed on wells, pumps, and source water feed lines, and where wastewater leaves your operation (see Table 3-2 for recommendations). The frequency of when you check your meters and record volumes will depend on what stage in the winemaking process you are at. Be sure to do it often enough to track consumption and discharge rates and identify irregular spikes that could indicate a leak in the system. Make sure that any equipment you are using is calibrated as necessary to the manufacturer's standards.

Examples of flow meters commonly used for winery applications include (Kennedy/Jenks Consultants, 2008):

**Transit-time ultrasonic:** Transducers are placed on opposite sides of a pipe and an ultrasonic signal is sent between them. The signal moves faster when it travels with the flow than against it; the flow rate can be determined from this difference. It is easy to install, has low corrosion and maintenance needs and is ideal for temporary use. To track inflow water, use a transit-time ultrasonic flow meter on the source water feed lines.

**Electromagnetic (magmeter):** Measures velocity of flow based on the principle of electromagnetic induction. The meter sets up a magnetic field, in which flow of a conductive fluid produces a voltage proportional to the fluid's velocity. It can be used in any pipe size, either inline or as an insertion. Access may require piping modification, potentially disrupting operations.

**Area velocity:** Uses a submerged sensor (ultrasonic or electromagnetic) to measure velocity and a fluid depth meter to yield flow volume. It can be installed in lines with open channel flow that are gravity-drained, such as trench drains or pipelines. It is typically used with a data logger.

**Table 3-2 Recommended practices for using flow meters to monitor wastewater volumes**  
(Kennedy/Jenks Consultants, 2008)

Operation	Discharge location	Type of Flow Meter	Meter location
Crushing & pressing	Floor drains to sump	Transit-time ultrasonic	Discharge piping from sump pump
	Floor drains to waste-water collection system	Area-velocity	Trench drains or conveyance piping
Wine ion exchange		Transit-time ultrasonic	Spent regenerant discharge line
Tank washing	Floor drain	Difficult to monitor – track inflow water instead	
Plate and frame filter washing	Floor drain	Difficult to monitor – track inflow water instead	
	Holding sump	Transit-time ultrasonic	Sump discharge line
Fining/ Filtration	Floor, trench drain, then main system	Area velocity	Drain
	Floor, holding sump, then main system	Transit-time ultrasonic	Sump discharge line
Centrifuges & Decanters	Floor drains to sump	Difficult to monitor – track inflow water instead	
	Floor, trench drain, then main	Area velocity	Installed upstream and down-

Operation	Discharge location	Type of Flow Meter	Meter location
	system		stream of discharge
Stillage			Stillage discharge line
Barrel washing	Catch basin to main system	Difficult to monitor – track inflow water instead (see Table 3-X)	
Bottling	Floor to trench drains or sumps	Area velocity	Directly in trench drain or sump
Systems	Discharge location	Type of Flow Meter	Meter location
Main sump	N/A	Permanent area velocity	
Cooling tower blowdown/e vaporative condenser bleed	N/A	Transit-time ultrasonic or magmeter	Blowdown discharge line
Boiler water blowdown	N/A	Transit-time ultrasonic or magmeter	Blowdown discharge line

## LOOKING AT THE BIG PICTURE

### 3.4. Knowing Your Watershed

Your winery is located in a watershed. A watershed is an area where surface water captured by precipitation, filtration and stored water, drains into the same water source. Watersheds can be large areas that drain into an ocean or smaller areas that drain into a lake. Activities on the land in a watershed can have both a local environmental impact and an impact downstream. To find out what local watershed your property is located in, contact

your water purveyor or local government (i.e. municipality or regional district).

## WATER QUALITY

### 3.5. Incoming Water Quality

Water quality is a significant aspect in winemaking. Water of poor quality can carry pollutants, pathogens and minerals that could negatively impact wine quality. It is important to know the source of water your winery uses and understand the factors contributing to its quality. Wineries can access water from a range of sources, including municipal water through a pipe system, surface water from a creek, lake, or other waterbody, or underground water from a well.

If the water is pumped from a private source, water potability testing should be carried out frequently. The parameters you test for will vary depending upon your situation. The most common parameters are listed in Table 3-3. Wineries supplied by a water purveyor should obtain water quality data for their own records.

You may need to pre-treat water if it does not meet quality standards or winery requirements. Examples of pre-treatment systems include: carbon filters for the removal of chlorine, particulate filters to remove sediment and silt, and softening agents to remove minerals that cause hard water.

**Table 3-3: Common parameters analysed in influent winery water.**

Parameter	Standard Units
Electrical conductivity	dS/m
pH	pH units
Sodicity	Sodium adsorption ratio
Sodium (to be used in determining sodium adsorption ratio)	mg/L
Magnesium (to be used in determining sodium adsorption ratio)	mg/L
Calcium (to be used in determining sodium adsorption ratio)	mg/L
Biochemical oxygen demand (or total organic carbon, if BOD/TOC ratio can be determined accurately)	mg/L
Total nitrogen (Total N)	mg/L
Total potassium (Total K)	mg/L
Chloride	mg/L

### 3.6. Wastewater Quality

The following winery wastewater components make it unfit for raw discharge (Eco Management Services Pty Ltd.; Land Energy Pty Ltd.; Chapman, J; ARUP Water, 2003):

- generally low pH (with high pH spikes during caustic washing),
- high biochemical oxygen demand due to high organics load,
- high total suspended solids due to high load of organics and other solids,
- high nutrients content
- sulphurous compounds (disinfection and preservatives), and
- moderately saline.

Table 3-4 describes the potential effects of winery wastewater constituents.

**Table 3-4: Potential environmental impacts of winery wastewater.**

Constituent	Indicators	Effects
Organic matter	Biological oxygen demand Total organic carbon Chemical oxygen demand	<ul style="list-style-type: none"> <li>• Depletes oxygen when discharged into water, which can impact fish and other aquatic organisms.</li> <li>• Odours generated by anaerobic decomposition cause nuisance if waste is stored in open lagoons or land applied.</li> </ul>
Alkalinity/ acidity	pH, Calcium carbonate	<ul style="list-style-type: none"> <li>• Death of aquatic organisms at extreme pH ranges.</li> <li>• Affects microbial activity in biological wastewater treatment processes.</li> <li>• Affects the solubility of heavy metals in the soil and availability and/or toxicity in waters.</li> <li>• Affects crop growth.</li> </ul>
Nutrients	Nitrogen, phosphorus, potassium, sulphur	<ul style="list-style-type: none"> <li>• Cause eutrophication or algal bloom when discharged to water or stored in lagoons algal blooms can cause undesirable odours in lagoons.</li> <li>• N as nitrate and nitrite in drinking water supply can be toxic to infants.</li> <li>• Toxic to crops in large amounts.</li> </ul>
Salinity	Electrical conductivity, Total dissolved solids, Chloride	<ul style="list-style-type: none"> <li>• Imparts undesirable taste to water.</li> <li>• Toxic to aquatic organisms.</li> <li>• Affects water uptake by crops.</li> </ul>
Sodicity	Sodium adsorption ratio Exchangeable sodium percentage	<ul style="list-style-type: none"> <li>• Affects soil structure, resulting in surface crusting, low infiltration and hydraulic conductivity, hard and dense subsoil.</li> </ul>
Metal contamination	Cadmium, chromium, cobalt, copper, nickel, lead, zinc, mercury	<ul style="list-style-type: none"> <li>• Toxic to plants and animals.</li> </ul>
Solids	Total suspended solids	<ul style="list-style-type: none"> <li>• Reduces soil porosity, leading to reduced oxygen uptake can reduce light transmission in water, thus compromising ecosystem health.</li> <li>• Smothers habitats.</li> <li>• Odour generated from anaerobic decomposition.</li> </ul>

Source: (South Australia Environmental Protection Authority, 2004)

## WATER CONSERVATION

### 3.7. Reducing Water Use

A small winery uses approximately 75 litres of water to produce one case of wine. Under this scenario, a typical small winery producing 10,000 litres of product uses water at a rate of 200 litres per day in the summer and 300 litres per day in the winter. The 200 litres per day rate is comparable to that of a domestic household. The amount of water per case declines as production increases (see Table 3-5).

**Table 3-5: Estimated range of unit water use in litres per case of 750 mL bottles.**

Production capacity (cases/year)	Water use (L/case)
>1,000,000	38-53
200,000-1,000,000	53-61
50,000-200,000	61-68
<50,000	68-95

(Storm, 1997)

Areas where water is used in the winery (and therefore where water conservation measures can be implemented) include (Kennedy/Jenks Consultants, 2008):

- crushing and pressing equipment rinsing and sanitizing,
- bin washing,
- ion exchange regeneration,
- tank washing,
- pressure leaf filters, small plate and frame presses and other separator equipment washing,
- centrifuge/decanter cleaning, sealing, chase and in/out activities,

- distillation activities,
- barrel washing and sanitizing,
- barrel testing for leaks,
- bottle washing and sanitizing,
- boiler operation,
- cooling tower operation,
- cellar cleaning,
- laboratory testing, and
- landscaping.

Water use varies throughout the year depending on what is underway at the winery. Table 3-6 shows the typical monthly distribution of annual water use of a winery.

**Table 3-6: Typical monthly distribution of annual water use.**

Month	Range of % of annual use	Remarks
January	6	
February	9	
March	7	
April	8	Bottling
May	8	Bottling
June	7	Bottling
July	7	
August	10	Prep. for crush
September	12	Crush
October	11	Crush
November	7	
December	8	
TOTAL	100	

(Storm, 1997, p. 141)

#### ***Cleaning and Sanitation***

Cleaning and sanitation account for the bulk of water use at a winery. Water use can be greatly reduced by adopting good housekeeping procedures, changing products used, replacing old equipment with newer technology,

formalizing waste minimization measures, modifying processes, and educating staff.

Cleaning and sanitation options include (in order of water use efficiency) cold-water hose stations, hot water hose stations, high pressure washers, wheel-mounted steam/hot water generators and clean-in-place (CIP) systems.

High pressure cleaning is used to increase the mechanical force, aiding in removal. In high pressure cleaning chemical detergents are often used along with increased temperature to make removal more effective.

CIP (fixed or fixed) is a system of pipes, valves, pumps, and controls for winery tanks and product process equipment and piping (Storm, 1997). Fixed utilizes a permanent system of piping and valves to convey cleaning and disinfecting compounds and rinse water throughout the units to be cleaned. The most sophisticated systems can be operated from a single programmable controller, which can perform all the necessary cleaning or product transfer cycles.

In small wineries (less than 25,000 case capacity), it is generally difficult to justify the installation (capital cost) of clean-in-place systems (Storm, 1997).

### ***Processing***

Processes associated with wine clarification and stabilisation also require water.

With rotating drum vacuum (RDV) filters, the outermost layer of diatomaceous earth is

continuously sliced off to remove the filtered solid components of the juice. A considerable amount of water is required to replace the earth coat to the correct consistency. This may need to be done twice daily during vintage.

Ion exchange columns used to acidify wine and/or stabilise tartrate in wine are regenerated using a mineral acid. Several washings are then needed to remove the sulphate/chloride residues.

### ***Heating and Cooling***

Juice and wine must be kept cool to avoid spoilage. Evaporative towers use up to 20% of the total volume of water used within a winery (Chapman, Baker, & Wills, 2001).

### ***Landscaping***

The goal of any irrigation program is to supply the plant with enough water to survive and grow, while minimizing loss due to percolation and runoff.

Native trees, shrubs and flowers will require less of your time and money to maintain because they are typically better adapted to the local climate and soil conditions. They generally will require less watering and are more resistant to local disease and pests than non-native species.

Sufficient topsoil is fundamental to healthy, lower maintenance plants. Often, valuable topsoil is removed during site preparation and replaced with a thin layer of soil (sometimes the original soil) put on top of clay or other



hard substrate. This situation is not conducive to deep root growth and long-term establishment of landscape vegetation. Instead, make sure a sufficient layer of high-quality topsoil is used for your plants.

Choose the most effective, resource efficient irrigation system for your landscaping. Because drip irrigation systems deliver moisture directly to the roots of plants, there is far less water lost to evaporation and wind drift than with traditional spray irrigation systems, and there is no risk of accidentally watering roads, driveways and pathways. Water is delivered slowly and steadily to the plants so there is less likelihood of overwatering, less wastage due to runoff, and less risk of plant disease as a result of pooling water.

Irrigation systems must be designed and installed correctly. You should use a Certified Irrigation Designers (CIDs) to help you design and install your system. Visit [www.irrigationbc.com](http://www.irrigationbc.com) to find a CID in your area.

Once your system is designed and installed it is up to you to make sure it is being used (scheduled) and maintained properly. The IIABC provides an online irrigation calculator that can be used to help develop watering times and amounts for landscape irrigation. See [www.irrigationbc.com](http://www.irrigationbc.com) for the calculator and instructions on how to use it.

Routine checks of your entire system will help ensure proper functioning and reduce water

waste. Check your irrigation lines for leaks and look for defective emitters and sprinkler heads.

Other irrigation practices that will help you save water include:

- use timers and set them to water during the early morning when it is cooler and evaporation is minimal,
- do not water on windy days,
- apply mulch around the roots of shrubs and trees, and in flower beds, to reduce evaporation and discourage weeds, and
- when establishing a lawn, water thoroughly but not too frequently. This will encourage vegetation to develop a deeper root system that will help plants and grass to utilize more water from the ground, thereby reducing the amount of water you'll need to apply.

### **3.8. Recycling and Reusing Water**

Recycling and reuse involve transformation of potential waste materials into products. Recycling and reuse techniques can reduce waste and save energy. Determine whether discharges from any operation can be substituted for fresh water supplied to another operation.

Discharges that can potentially be reused are:

- final rinses from tank cleaning and fermenters,
- bottle soak and rinse water,
- barrel cleaning water,
- cooler flush water, filter backwash, and
- sterilizer water.

Areas of possible reuse are:

- first rinses in wash cycles,
- filter backflush,
- caustic dilution,
- boiler makeup,
- refrigeration equipment defrost,
- equipment cleaning, floor and gutter wash, and
- irrigation.

Note: Sodium can be replaced with potassium for alkaline cleaners. The water can then be reclaimed for irrigation without the fear of creating too much salinity. A similar situation exists for cleaners that use TSP as a wetting agent; the water can be recycled for CIP (Cleaning-In-Place) where possible.

## WASTEWATER MANAGEMENT

Winery wastewater quality and volume vary greatly depending on the processes being carried out at any given time during the year. Wastewater production consists of fairly steady daily volumes during non-vintage periods, increases during bottling and washing (i.e. tanks and other equipment), and peaks during vintage.

Generally speaking, winery wastewater has a high organic load in the form of large suspended matter (i.e. grape skins, stems and seeds), smaller suspended particles (i.e. dead yeast cells, grit, dirt, diatomaceous earth and bentonite), and dissolved contents (i.e. sugars, ethanol, organic acids, microbial fermentation products, soaps and detergents, and cleaning chemicals).

Winery wastewater comes from a number of sources including (Kennedy/Jenks Consultants, 2008) (South Australia Environmental Protection Authority, 2004):

- crush and press rinsing and sanitizing activities,
- Wine/juice ion exchange regeneration,
- tank washing,
- cleaning and sanitation of filtration units,
- centrifuge and decanter cleaning, seal water, chase water, and watering in/out activities,
- stillage discharge,
- barrel washing,
- bottling,
- spent water softener regenerant,
- boiler water blowdown,
- cooling tower blowdown and evaporative condenser bleed,
- laboratory wastewater,
- hosing down of floors and equipment,
- rinsing of transfer lines,
- spent wine and product losses, and
- stormwater diverted into, or captured in, the wastewater management system.

Cleaning waste is by far the biggest contributor of wastewater. Caustic washing alone can produce up to one third of the annual volume of wastewater generated by a winery.

### 3.9. Pollution Prevention

Pollution prevention is reducing or eliminating waste at the source by modifying production processes, promoting the use of non-toxic or

less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream (United States Environmental Protection Agency, 2010). Pollution prevention is also referred to as source reduction.

In addition to the many environmental benefits of pollution prevention, there are also direct and indirect cost savings resulting from:

- reduction in raw material losses,
- reduction in reliance on expensive end-of-pipe treatment technologies and disposal practices,
- conservation of energy, water, and raw materials, and
- reduction of the potential liability associated with waste generation.

A broad range of pollution prevention techniques are potentially applicable to wineries. Most fit in the following general categories.

#### ***Production planning and sequencing***

Plan and sequence production to maximize raw materials.

#### ***Product substitution or elimination***

Replace existing products with others that produce less waste, or a non-toxic waste.

#### ***Good housekeeping and loss prevention***

Conduct preventative maintenance and the management of equipment and materials to minimize opportunities for leaks, spills, and evaporative losses. Housekeeping changes to

storage and clean up procedures (e.g. using dry cleaning methods) can also be effective in reducing waste production.

#### ***Process or equipment modification***

Change the process, parameters or equipment used in that process to reduce the amount of waste generated. Proposed process modifications should be discussed with winemakers, production personnel, maintenance personnel, manufacturers or other experts.

#### ***Waste segregation and separation***

Avoid mixing different types of wastes. If you minimize the number of different constituents in any given waste stream recovery or treatment will be easier.

#### ***Operating procedures***

Incorporate waste minimization measures into formal written processes and standard operating procedures (SOPs) for the winery. These may include testing, maintenance, and treatment system operating procedures.

#### ***Water conservation***

Water conservation methods will reduce the quantity of wastewater produced, but the lower volume of water may carry a correspondingly higher concentration of toxins. However, with more concentrated effluent, the efficiency of recovery or treatment may be improved. See Section 3.7 for more information regarding water conservation practices.

### ***Recycling and reuse***

For wastes that cannot be reduced at the source, recycling is the next best option. See Section 3.8 for information on recycling and reusing water.

### ***Employee education and training***

Provide employees with the information and the incentive to minimize waste generation in their daily duties. Employees must understand and support pollution prevention goals. Train employees to use equipment and supplies properly.

## **3.10. Wastewater Treatment**

Because no universal method for winery wastewater treatment exists, each winery must determine the technique most suitable to its situation. The main purpose of a wastewater treatment process is to reduce the organic matter content or biological oxygen demand to produce a more stabilised effluent and sludge (FSA Consulting, 2006). Wastewater treatment also lowers nitrogen levels and settles out other nutrients, such as phosphorus. Wastewater treatment processes include solids separation or settling, anaerobic treatment, and aerobic treatment. Treatment options include wastewater to municipal treatment plants or on-site treatment systems, or a combination of both.

Problems with wastewater treatment systems generally result from: poor maintenance, system overloading, irregular flow rates, excessive holding times before treatment, and/or inappropriate design.

## **SURFACE WATER MOVEMENT**

Surface water run-off from excess irrigation or precipitation events, can collect and carry pollutants to nearby watercourses and degrade water quality. Pollutants can include pesticides, fertilizers and sediment. A properly designed drainage system can go a long way in reducing or preventing negative environmental impacts.

### **3.11 Stormwater Runoff**

Stormwater originates from roofs, paved and non-paved areas within the winery. Unmanaged stormwater flow can substantially increase the risk of overloading the wastewater storage and treatment system.

Runoff quality degrades as it moves and collects pollutants, and ends up in surface water or groundwater bodies. It may form rills or gullies on unprotected soil, which can lead to channel and stream bank degradation. Areas bordering water bodies such as streams, lakes, ponds and wetlands should be protected from pollution by setting up a buffer strip of undeveloped land, preferably with native vegetation, between the water body and human activity or development.

Look into the feasibility of using separated non-contaminated stormwater in your winery. It can be used for cooling towers, external cleaning or process operations that do not lead to direct contact product, landscape watering, and to dilute winery wastewater prior to irrigation.

Make sure to inspect banks along streams for erosion during and after heavy storm events, especially if they are unstable. Any erosion problems that are identified should be fixed on a timely basis.

### **3.12 Drainage**

Adequate drainage can help increase soil strength, control salinity and alkalinity in some cases, and improve nutrient uptake. Significantly higher volumes of precipitation on the BC coast make subsurface drainage necessary to control saturation of the root zone, soil compaction, runoff and erosion. Inadequate drainage can lead to flooding, which can lead to increased amounts of pollutants being washed into water bodies.

# CHAPTER 4

## ENERGY EFFICIENCY

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# 4.0 ENERGY EFFICIENCY

## Chapter objective:

To help wineries optimize their energy use in all aspects and areas of production and to consider the use of alternative energy sources.

## INTRODUCTION

In British Columbia, energy is produced from natural gas, crude oil, hydro, biomass and coal. According to *Canada's Energy Outlook: The Reference Case 2006*, published by Natural Resources Canada, energy demand is expected to continue to grow as the Canadian population and economy continue to grow (11% and 43% respectively, by 2020). Coupled with rising energy demand will be rising energy costs.

Energy efficiency and conservation are two effective ways to help meet our future energy needs and reduce the necessity and timing for new energy development.

In addition to changing practices within your winery, you can also consider external factors such as material sourcing (e.g. glass, cork). This has indirect implications such as transportation emissions and fuel consumption.

Some of the benefits of conserving and using energy efficiently are (Council of Energy Ministers, 2007):

- reduced impacts on the environment as lower energy consumption translates into

- lower emissions of greenhouse gases (carbon footprint) and other air pollutants,
- extending existing energy sources and infrastructure by doing more with what we have, which reduces the need for new conventional energy supplies (oil and gas) and their environmental impact,
- may soften impact of rising energy prices, and
- long-term financial savings due to reduced use of energy.

This chapter will help you look at how the processes in your operation consume energy, and how to use your existing technology more efficiently or upgrade to more efficient technology, measure the results of your efforts, and engage workers to make lasting changes you can be proud of.

## SETTING UP AN ENERGY EFFICIENCY PROGRAM

### 4.1. Energy Use Assessment and Planning

Before embarking on any new program you need to know where you are starting from. Knowing where, when and how much energy you use will be essential to setting goals for the future.

You should start by doing an energy efficiency audit of your operation, conducted by someone internally or by an outside auditor. The goal will be to provide a plan of action that

can be your template for future things to implement.

There are two kinds of assessments you should complete for your organization: an **initial energy audit** and **ongoing energy management assessments**.

An initial energy audit provides a baseline of where and how energy is being used in your facility and where potential savings can be made. It is completed by doing a walk-through of your workplace to identify energy use and losses and potential improvements. The audit can be completed by you and your staff, or by a professional energy management specialist. **If you decide to conduct an energy audit yourself, consider the steps outlined below. Be sure to get a breakdown of energy consumption per process.**

Whoever you designate to conduct your energy audit, should have access to energy bills so the use information can be logged into a database. If your utility bill is handled by an accountant or bookkeeper, for example, you should make sure the energy use information on the bill is communicated to the person who looks after energy use.

## STEPS FOR COMPLETING AN ENERGY AUDIT:

(Pembina Institute for Appropriate Development, 1999)

1. Assign overall responsibility to one person.
  - If your operation is large, set up a committee to help that person.
2. Gather and review data, including:
  - Monthly utility bills for the past year or for a typical 12-month period
  - Operating and design manuals of your equipment
  - Daily logs and maintenance schedules
  - Recent system changes and renovations
  - Any other records relevant to energy use

Some utilities provide historical data online that can typically be accessed by registered users. For example, BC Hydro provides updates of recent electricity usage, electricity consumption history, billing summary and account balance, plus “Power Smart” tools to help customers conserve energy.

3. Record the following information from your utility bills:
  - Electric power costs – current rate structure, discounts or taxes, demand and consumption readings
  - Natural gas costs – current rate structure, discounts or taxes, amount purchased monthly
  - Other energy purchased – unit cost, major usage, amount purchased monthly
4. Do a walkthrough of your facility and check for the following:
  - Cracks and gaps around doors and windows
  - Energy losses due to inefficient use of space or equipment
  - Equipment maintenance
  - Operation of furnaces and cleanliness of filters
  - Operation of all motors
  - Lighting layout compared to needs
  - Operation and settings of thermostats
  - Operation of meters



## QUESTIONS TO CONSIDER IN ONGOING ENERGY MANAGEMENT ASSESSMENTS:

Your ongoing energy management assessments should include asking the following questions on a regular basis as part of your business management:

1. How much did you spend on energy in the last month/quarter/year?
  - How much energy did you use (kWH) in the given time period?
  - Review energy efficiency. Identify areas for improvement.
  - Break complex processes into smaller components. Examine each component and measure energy consumption if possible.
  - Are there resources available presently that could help operators do this?
2. In what processes was this energy spent?
3. What processes or controls do you have in place to manage energy consumption? These can include:
  - Meters to determine where energy being used
  - Programmable thermostats
  - Internal energy audit
  - External energy audit
  - Energy smart training

### *Calculating your carbon footprint*

Using energy in your winery or driving or flying to meetings and events generates greenhouse gas emissions, such as carbon dioxide (CO<sub>2</sub>). These greenhouse gases act like a blanket, trapping heat near the earth's surface and warming the planet.

Scientists predict that if this warming continues we may be facing potentially extreme climate changes—causing more

frequent and intense heat waves, rising sea levels affecting coastal areas, and other serious impacts.

Your "carbon footprint" is a measure of your impact on the environment, and is related to the amount of carbon dioxide emitted as a result of your daily activity. The carbon footprint is reported in units of tonnes (or kg) of carbon dioxide equivalent.

There are several calculators available online that can be used to calculate the carbon footprint of your winery. The International Wine Industry **Greenhouse Gas Protocol and Accounting Tool** was developed through a partnership between the Wine Institute of California, New Zealand Winegrowers, South Africa's Integrated Production of Wine program, and the Winemakers' Federation of Australia for use by the global wine industry. The calculator is free, easy-to-use, wine industry specific and can be used to measure the carbon footprints of winery and vineyard operations of all sizes. It is available online at [www.wineinstitute.org/ghgprotocol](http://www.wineinstitute.org/ghgprotocol).

The **Pacific Gas and Electric (PG&E) carbon footprint calculator** is another tool that may be useful to you. It is available at: [www.pge.com/carbonfootprint/](http://www.pge.com/carbonfootprint/).

The BC Sustainable Energy Association at ([www.bcsea.org/solutions/citizens-and-homeowners/calculate-your-carbon-footprint](http://www.bcsea.org/solutions/citizens-and-homeowners/calculate-your-carbon-footprint)) provides several resources about calculating your carbon footprint and offsetting.

### ***Establishing goals and actions***

Once you have completed your assessment, you will need to set overall goals for the program. Try to establish quantifiable rather than qualitative goals. "To reduce energy use by 25% per year" is a quantifiable goal, whereas "implementing a significant reduction in energy use in order to reduce our carbon footprint" is a qualitative goal.

The goals of the program should be reviewed periodically and modified to reflect changes in available technology, raw material supplies, environmental regulations and economic climate.

Use the self-assessment to identify actions that will help you achieve your goals. Write the actions on your action plan and give each a tentative date for completion, starting with those most easily achievable. Make sure to incorporate pertinent recommendations into the capital budget.

## **4.2. Training and Incentives**

### ***Program management***

Assign responsibility for overseeing the energy conservation program to someone in your company who is familiar with the winery and its processes and procedures. This person can be anyone on staff who is enthusiastic and interested in the success of the program (i.e. it does not have to be someone from upper management). Education and training may need to be provided to the person to ensure he or she can handle the responsibilities of overseeing the program.

The program manager will be responsible for developing and implementing program goals, ensuring energy conserving practices are implemented and followed, and ensuring proper monitoring and record keeping is completed.

### ***Getting company-wide commitment***

Involving others in the implementation of energy efficiency initiatives will be imperative if the practices are to stick. The goal should be to include energy conservation in your company culture so it becomes a way of doing business.

Although the drive for an energy efficiency program may start on the ground floor and much of the work may be done by winemakers, cellar hands, and other employees, commitment of upper management is very important. Be sure to provide presentations, fact sheets, and other information to the winery managers to ensure they understand the program goals, actions, and costs. Some aspects of energy efficiency need an up-front investment that could require executive level approval. This approval will be easier to get if management is familiar with the program and supports its goals.

Inform staff, contractors and suppliers of your goals. Incorporate your goals into your training manuals, purchasing policies, and operating procedures. If you have very specific goals and actions that you set for your company, communicate how you plan to accomplish them and by what date (if applicable). If you don't have specific goals at the moment, you can simply state your commitment to continual improvement in this area for now.

Encourage input from employees and recognize staff for energy efficient practices. You may wish to share quarterly reports on energy consumption with your staff. For example, this could be done by posting a simple graph of energy consumption (kWh) for the last quarter compared to the same period the year before.

Another way of introducing changes to your practices is to create or update documentation for decision-making. For example, having a form with a list of questions you want answered before purchasing a piece of equipment. For instance, how efficient is this new piece of equipment (e.g. energy star rating), what will be its ongoing energy requirements?

### **4.3. Monitoring and Record Keeping**

Your energy efficiency program will provide a baseline of your current energy use (from the audit), the reduction goals you are targeting, and the actions that will take you there.

Monitoring and record-keeping will provide the means for you to evaluate whether or not you are reaching your goals. You can obtain your general electricity consumption from your utility bill, but you may also want to keep track of internal meter readings, fuel consumption records, etc. If you do not have a formal system for monitoring and recording this information, be sure to create one.

Use the Questions to Consider in Ongoing Energy Management Assessments (Section 4.1) to guide your record-keeping. The format

of your records (e.g. Excel spreadsheet, software program, Word tables filled out manually) will be up to you and will depend on your computer literacy and personal preference.

When comparing records make note of the change(s) and explain in a few sentences why the change might have occurred (e.g. implemented "lights out at night" policy, caulked drafty windows, replaced old furnace with more efficient one, replaced old gasoline vehicle with new fuel-efficient model, etc.). These notes will be invaluable when looking back in a few years, and will save you time in the future by not having to look through your records to find out what may have caused the fluctuations in energy consumption.

#### ***Metering***

Power meters are widely available, in dozens of configurations. You can check total power consumption at the street, but with a portable meter, you can check things such as pumps and refrigeration.

See [www.powermeterstore.com](http://www.powermeterstore.com) for information on the types of meters available for use.

## **OPTIMIZING ENERGY USE**

### **4.4. Purchasing**

Your purchasing decisions should always consider the energy efficiency level of the equipment you are considering. See [www.nrcan.gc.ca/energy/efficiency](http://www.nrcan.gc.ca/energy/efficiency) for more information on energy efficient products.

## 4.5. Lighting

Lighting can be both the highest energy cost and the greatest savings opportunity for your business. On average, lighting consumes 40% of electricity in commercial buildings. Most conventional lighting also produces heat, which can increase a building's cooling costs by up to 20% (BC Hydro, 2011).

Modern lighting technologies such as CFLs and LED lights consume much less energy and products are now largely available that provide similar, if not better, lighting than conventional incandescent lights. Some of the benefits associated with moving to modern lighting technologies may be an improvement in the quality of lighting, a reduction in maintenance costs due to longer product life spans, and a reduction in electricity costs.

**Helpful Hint:** Replacing five 75-watt incandescent light bulbs with 19-watt compact fluorescents (CFLs) can reduce your carbon footprint by 275 lbs of CO<sub>2</sub> per year.

Several other practices, from turning lights off when not in use to upgrading your lighting system, are included in Section 4.5 of the self-assessment.

FortisBC and BC Hydro provide extensive information about energy efficient lighting. BC Hydro also provides an excel tool to predict energy savings through a lighting retrofit – contact them for more information and to request the tool.

## 4.6. Space Heating and Cooling

The heating and cooling of buildings is one of the leading uses of energy in Canada. Reducing the impact of this necessary activity can be done in different ways:

**Heat or cool only those spaces that require it.** Where possible, minimize the space to be heated or cooled; perhaps some rooms can be isolated and heated/cooled to different temperatures, appropriate for each room.

**Widen the range of acceptable temperatures.** If you haven't already done so, consider widening the range of acceptable temperatures in your building. According to LiveSmartBC, for every one degree you lower your thermostat, you save two percent on your heating bill.

**Adopt design and construction methods that conserve energy.** Implement methods discussed in Chapter 2.

**Maintain appliances on a regular basis.** Furnaces and Heating, Ventilation and Air Conditioning (HVAC) systems need to be serviced by a professional on an annual basis to ensure safe and efficient performance. Air filters should also be checked monthly, especially during the winter months, as dirty air filters can hinder heating performance.

**Make upgrades to your existing HVAC system.** A number of energy-saving upgrades can be made to existing HVAC systems: heat recovery systems, air-side economizer controls, digital control systems, adjustable

speed drives, and installation of heat pump (geothermal or air-sourced).

When deciding where to invest your money, your local power utility may be able to help you figure out what the best "bang for your buck" is for your type of building. Most power utilities have programs that offer incentives for switching to more energy-efficient technology. For example, FortisBC often offers rebates for HVAC upgrades. These upgrades benefit you and the utility as they save you money in the long run and the utility prolongs the service life of existing infrastructure.

**LIVSMARTBC: EASY STEPS TO SAVE ENERGY AND MONEY**

[www.livesmartbc.ca](http://www.livesmartbc.ca)

- You can save \$100/ year by turning your computer and monitor off when not in use.
- You can save 2 per cent on your heating bill for every 1 degree you lower your thermostat.
- It takes 10 times as much energy to make a piece of paper than it does to copy onto it.
- Recycling a four-foot stack of newspapers saves the equivalent of one 40-foot fir tree.
- CFLs use 75 per cent less energy than incandescent bulbs and last ten times longer.
- Most of computer electricity goes to the monitor – new LCD monitors use 80-90 per cent less energy.
- LED signs and holiday lights reduce energy consumption by 90 per cent and last 10-25 years longer.

## 4.7. Water Heating

Using hot water more efficiently is the best way of reducing energy consumption for this activity. This can be accomplished by implementing some or all of the following practices as recommended by BC Hydro.

### Maintenance

Prevent the build up of sediment, which can degrade performance, by flushing out your hot water tank on a regular basis according to your owner's manual.

### Insulation

Temperature retention of exposed piping and of older hot water tanks may be improved by wrapping them with insulation. Note that gas-fired hot water tanks should always be insulated by a heating professional as improper installation can create health hazards.

### Lower water heater temperature to 60°C

Reducing the water tank's temperature will save energy and reduce mineral build up and corrosion of the tanks and pipes. Avoid lowering the water temperature below 55°C to prevent the growth of bacteria in the tank.

### High-Efficiency Water Heaters/Boilers

In addition to the conventional storage tank water heater, there are several other, more efficient, technologies available.

#### *Solar water heaters*

Solar hot water technology is durable and can be used in a variety of locations. It can provide up to 50% of total hot water needs. As technology improves, this number is expected to increase.

### ***Natural gas on-demand water heater***

Natural gas on-demand water heaters can offer up to 30% savings versus a standard natural-gas storage tank water heater. This is because water is heated as needed rather than heated, stored and maintained at a certain temperature for when it is required (which can be a long time). On-demand electric water heaters are not recommended as electric resistance is an expensive way of generating heat.

### ***Condensing water heater***

Condensing hot water heaters are the most efficient tank-based water heater there is. It recycles the heat that's normally vented out from natural-gas water heaters; thereby reducing energy spent and related costs.

Expert advice will be required when selecting a heater for your particular operation. Your overall hot water usage will firstly dictate whether this technology is right for your needs, the capacity you need and/or the number of on-demand water heaters you'll need. Make sure to take advantage of the various incentives and resources offered by power utilities when switching to a more efficient unit.

Some factors to consider when selecting your new water heater are:

- **Fuel type, availability and cost** - will have an effect on annual operation costs, size of system and degree of energy efficiency.
- **Size** – A water heater needs to be properly sized for the intended use to supply enough hot water and at the same time minimize waste.

- **Energy efficiency** – Different water heaters will utilize energy at different levels of efficiency.
- **Costs** – Compare the estimated annual operating costs of the water heaters you have shortlisted.

### **RETScreen INTERNATIONAL CLEAN ENERGY DECISION SUPPORT CENTRE**

<http://www.nrcan.gc.ca/energy/software-tools/7465>

The RETScreen Clean Energy Project Analysis Software is a unique decision support tool developed with the contribution of numerous experts from government, industry, and academia. The software, provided free-of-charge, can be used worldwide to evaluate the energy production and savings, costs, emission reductions, financial viability and risk for various types of Renewable-energy and Energy-efficient Technologies (RETs). The software (available in multiple languages) also includes product, project, hydrology and climate databases, a detailed user manual, and a case study based college/university-level training course, including an engineering e-textbook.

## **4.8. Equipment and Appliances**

As the business ages and production changes you may want to consider replacing older equipment with newer and more efficient technology. Any replacement should be with modern, energy efficient alternatives. Although more efficient technologies may have a higher up-front cost, it is important to factor in the long-term savings.

Make sure older equipment is disposed of properly at your nearest recycling facility.

**Helpful Hint:** FortisBC PowerSense will help you to upgrade or add new motors to your operations, providing they exceed the Provincial Government Standards.

## 4.9. Refrigeration Systems, Tanks and Lines

Refrigeration system(s) should be serviced as per the manufacturer's directions to keep everything running at optimal efficiency.

### *Tank Placement*

Tank placement is an important consideration when designing (or re-designing) your winery. Place tanks in a location that will reduce heating and cooling needs. Having to cool tanks in a room that is simultaneously being heated can consume lots of energy, so consider placing your tanks in an area where you can use seasonal temperatures to your advantage. Tanks placed in a cooler area of your winery will save energy post-fermentation and for storage. Emphasis should be placed on managing the access to cool air by setting up double layered access areas in the building (e.g. double doors).

### *Insulation*

Well-insulated tanks and glycol lines provide long-term benefits by reducing the amount of energy needed to run the refrigeration system. The system will work less as it will be able to maintain the desired temperature for a longer period of time. Less work means the

system will last longer and will lead to a reduction in maintenance costs. The more stable temperatures provided by proper insulation will also improve wine quality and shorten turn-around times for processing (White, Adamson, & Rankine, 1989).

Proper insulation can also minimize the amount of condensation that forms on a tank. Condensation can be a problem in some wineries as it can lead to concerns over hygiene (mold) and safety (slippery floors).

### *Operation*

Most refrigeration systems are designed to handle maximum capacity during the crush. This means the system is oversized for most of the year. Because of this, it is important to come up with a strategy for periods of reduced production.

Consider harvesting at night when the grapes are cooler, "crispier", and considered a better quality to work with. Less energy is spent cooling down the fruit. Some estimates put the savings in cooling costs at around 25%.

Options available for insulation of tanks and refrigerant lines include: spray-on insulation, foil over bubble wrap, and rigid foam with outer shell.

Replacing refrigerators that are more than 10 years old with a modern Energy Star model could reduce your annual carbon emissions by more than 500 lbs.

## ALTERNATIVE ENERGY

### 4.10. Renewable Energy Sources

The use of renewable energy reduces your ecological footprint, reduces carbon generated from your business, and can assist in positioning your business as a more environmentally friendly enterprise. Renewable energy may come from many sources such as sun, wind, biomass, wastewater, waves or tides, free flowing water and geothermal energy.

#### *Geoexchange energy*

Geoexchange energy is produced by drilling deep holes and setting up a horizontal or vertical array of pipes to extract or dump heat to/from the earth. This heat exchange system is then hooked onto the building's cooling and heating system and can provide significant energy savings when compared to other conventional cooling and heating fuels or electricity.

Earthtubes are low-tech, sustainable, non-electric, zero-energy passive geothermal solar heating and solar cooling systems. If you are going to use earth tubes to cool or heat your winery, you are in somewhat uncharted territory, so do your homework. See [www.earthtubes.ca](http://www.earthtubes.ca) for more information.

#### *Solar energy*

Solar energy can be used to provide electricity in homes or buildings and can also be used directly to provide heat. Photovoltaic (PV) solar panels convert solar energy into useful electrical energy which can be stored in batteries. Passive solar systems can be used to

circulate water through a series of pipes engineered to collect solar radiation in the form of heat. This can be set up to complement the existing hot water system. Both solar energy systems can provide big savings on monthly energy bills.

#### *Wind energy*

Wind turbines generate electricity from the kinetic power of the wind that rotates the blades. Electricity is created with these blades rotate a central shaft that moves a magnetic field in the generator. Wind turbines typically have to comply with local by-laws and regulations so make sure you check with your local government before installing one.

#### *Offsetting*

Once you have calculated your emissions, and have taken steps to reduce your carbon footprint (see Section 4.1), you can “offset” your remaining emissions to become carbon neutral by investing in a project that will reduce the same amount of CO<sub>2</sub> somewhere else.

See [www.carboncatalog.org/providers/canada](http://www.carboncatalog.org/providers/canada) and [www.carbonify.com/finder/offset-tag-companies.htm](http://www.carbonify.com/finder/offset-tag-companies.htm) for a list of carbon providers in Canada.

### 4.11. Alternative Fuels

The term ‘alternative fuels’ refers to non-traditional fuels that pollute less and are, for the most part, derived from sources other than petroleum, some of which are renewable resources.

The Natural Resources Canada (NRC) website has a page on alternative fuels



(<http://www.nrcan.gc.ca/energy/alternative-fuels/3487>) that contains information on alternative fuels, their benefits, safety and performance information, vehicle and fuel availability, as well as related research and programs available.

When replacing older vehicles consider modifications or newer models that make use of alternative fuels such as biodiesel, compressed natural gas, electricity, ethanol, hydrogen, liquefied natural gas or liquefied petroleum gas. Preference should be given to renewable fuel sources.

#### **4.12. Fuel Efficiency**

As fuel prices spiral upwards, any reduction in fuel consumption will have a positive impact on the bottom line of the company in addition to providing benefits for the environment.

Tracking fuel consumption of company vehicles can help identify and repair/correct the least fuel efficient models. Reducing engine idling and adhering to the speed limit has been proven to be more fuel efficient. And last but not least, optimizing daily routines can go a long way in saving fuel.

#### **4.13. Responsible Transportation**

Providing alternative transportation options will help to lower energy use and reduce pollution and land development impacts from automobile use.

Alternative transportation options include, but are not limited to, the following:

- secure bicycle racks and/or storage and convenient shower and changing facilities;
- high efficiency hybrid or alternative fuel vehicles for employees;
- carpool/vanpool programs for employees and customers;
- parking capacity sized to meet, but not exceed, minimum local zoning requirements; and
- preferred parking for high efficiency vehicles, carpools, van pools and car co-ops.

# CHAPTER 5

## HAZARDOUS MATERIALS HANDLING

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## 5.0 HAZARDOUS MATERIALS HANDLING

**Chapter objective:** To prevent pollution through sound material handling practices and to reduce or eliminate hazardous materials and wastes at your winery.

### INTRODUCTION

Hazardous materials are any materials whose quantity, concentration, or physical or chemical characteristics may pose a hazard to human health or the environment. Hazardous materials include: flammable and combustible material, toxic material, corrosive material, oxidizers, aerosols, and compressed gases.

Some of the most common hazardous materials used at wineries are (California Sustainable Winegrowing Alliance; Wine Institute; California Association of Winegrape Growers, 2006):

- sulphur dioxide,
- anhydrous ammonia,
- inert gases (e.g. carbon dioxide, nitrogen),
- cleaning agents (e.g. tri-sodium phosphate, organic acids),
- sulphurous acid,
- gasoline,
- diesel, and
- propane.

The types of hazardous waste typically found at wineries include oil, solvents, antifreeze and paint (California Sustainable Winegrowing Alliance; Wine Institute; California Association of Winegrape Growers, 2006).

Material handling requires compliance with all federal, provincial and local regulations. In general, this chapter does not deal with the regulatory requirements governing hazardous materials handling, but rather focuses on practices that will help you to systematically and properly manage the hazardous materials and waste at your winery.

### SETTING UP A MATERIALS HANDLING PROGRAM

#### 5.1. Materials Assessment and Planning

You will need a plan to achieve successful material handling at your winery. A hazardous material handling program will help you comply with regulations, improve worker health and safety, prevent pollution, and inventory the types and quantities of materials you use at the winery.

The purpose of the assessment phase is to develop a comprehensive set of waste minimization options, and to identify the options that deserve more detailed analysis. You should begin the assessment by collecting and compiling all the data you need to understand how and where hazardous materials are used in your winery and what your current waste management practices are.

### *Prioritizing Hazardous Waste Streams and/or Operations to Assess*

Although your eventual aim will be to assess all hazardous waste streams, prioritization of certain streams to assess is often necessary when available funds and personnel are limited.

Typical considerations for prioritizing hazardous waste streams to assess include (US Environmental Protection Agency, 1988):

- compliance with current and future regulations,
- costs of waste management (treatment and disposal),
- potential environmental and safety liability,
- quantity of waste,
- hazardous properties of waste (including toxicity, flammability, corrosivity, and reactivity),
- other safety hazards to employees,
- potential for (or ease of) minimization,
- potential for removing bottlenecks in production or waste treatment, and
- available budget for waste minimization assessment and projects.

Consider using outside people to help you conduct your assessment. They can bring a wide variety of experience and expertise that may be lacking in smaller companies who may not have in-house expertise in the relevant waste minimization techniques and technologies.

### **QUESTIONS TO CONSIDER IN A HAZARDOUS MATERIALS AND WASTE ASSESSMENT**

- What are the hazardous waste streams generated from the winery? How much is generated by each stream?
- Which processes or operations do these hazardous waste streams come from?
- What makes them hazardous?
- What are the input hazardous materials?
- How much of a particular hazardous material enters each waste stream?
- How much of a raw material can be accounted for through fugitive losses (i.e. leaks)?
- How efficient is the process or operation?
- Are unnecessary wastes generated by mixing otherwise recyclable hazardous wastes with other process wastes?
- What types of housekeeping practices are used to limit the quantity of wastes generated?
- What types of process controls are used to improve process efficiency?

## INFORMATION TO COLLECT FOR A HAZARDOUS MATERIALS AND WASTE ASSESSMENT

(US Environmental Protection Agency, 1988)

### Design Information

- Process flow diagram(s)
- Material and heat balances (both design balances and actual balances) for production processes and pollution control processes
- Operating manuals and process descriptions
- Equipment lists
- Equipment specifications and data sheets
- Piping and instrument diagrams
- Plot and elevation plans
- Equipment layouts and work flow diagrams

### Environmental Information

- Hazardous waste manifests
- Biennial hazardous waste reports
- Waste analyses
- Environmental audit reports
- Permits and/or permit applications

### Raw Material/Production Information

- Product composition and batch sheets
- Material application diagrams
- Material safety data sheets
- Product and raw material inventory records
- Records of hazardous material receipts, volumes, and use
- Operator data logs
- Operating procedures
- Production schedules

### Economic Information

- Waste treatment and disposal costs
- Product, utility and raw material costs
- Operating and maintenance costs
- Departmental cost accounting reports

### Other Information

- Company environmental policy statements
- Standard operating procedures
- Organization charts

### *Identifying Options*

Table 5-1 shows a hierarchy of waste management and provides examples for each activity. The hierarchy demonstrates the desirability of pollution prevention (also known as source reduction) as the preferred means of minimizing waste.

Pollution prevention, also known as P2, is about avoiding the creation of pollution and waste, rather than trying to clean it up or manage it after the fact.

Pollution prevention techniques and practices (further discussed in Sections 5.4 to 5.8) generally focus on the following areas (Environment Canada, 2010):

- substances of concern,
- efficient use and conservation of natural resources,
- material substitution,
- product design/product reformulation,
- process changes,
- reuse and recycling on-site,
- training,
- purchasing techniques,
- equipment modifications, and
- operating efficiencies/clean production.

Recycling techniques allow hazardous materials to be put to a beneficial use. Recycling activities may be performed onsite or at an offsite facility designed to recycle waste. Most, if not all, recycling of hazardous waste generated at your winery will need to be done offsite.

**Table 5-1: The environmental protection hierarchy.**

ACTIVITY	EXAMPLE		
Product Changes or Improvements	<ul style="list-style-type: none"> <li>• Replace environmentally-harmful product with environmentally-responsible product</li> <li>• Redesign or reformulate product to make more environmentally-responsible throughout life cycle e.g. extend product life, design for reuse</li> </ul>	} Pollution Prevention	
Process or Technology Improvements	<ul style="list-style-type: none"> <li>• Redesign process or change technology, to make more efficient use of materials or to avoid/minimize generation of pollutants/waste</li> </ul>		
Input or Raw Material Changes	<ul style="list-style-type: none"> <li>• Minimize raw material use</li> <li>• Minimize water use</li> <li>• Minimize energy use</li> <li>• Change purchasing practices/specifications to substitute environmentally-preferable materials (including less toxic substances)</li> </ul>		
Operating Improvements	<ul style="list-style-type: none"> <li>• Optimize operating efficiency, scheduling</li> <li>• Improve maintenance procedures</li> <li>• Change inventory/purchasing practices to reduce waste</li> <li>• Improve housekeeping practices</li> <li>• Avoid/minimize losses/leaks/spills</li> </ul>	} Traditional Pollution Control and Waste Management	
Reuse or Recycling (possibly preceded by control or containment*)	<ul style="list-style-type: none"> <li>• Reuse materials on-site</li> <li>• Close process loops</li> <li>• Recycle materials on-site</li> <li>• Off-site reuse of waste/by-product materials</li> <li>• Waste exchange</li> <li>• Off-site recycling, reprocessing, material recovery, reclamation</li> </ul>		
Waste-to-Energy	<ul style="list-style-type: none"> <li>• Combustion of wastes/by-products for energy value, e.g. municipal waste incineration, landfill gas power generation</li> </ul>		
Treatment or Destruction (possibly preceded by control or containment*)	<ul style="list-style-type: none"> <li>• Biological treatment, including municipal sewage treatment</li> <li>• Physical treatment</li> <li>• Chemical treatment, e.g. neutralization, stabilization</li> </ul>		
Disposal (possibly preceded by control or containment*)	<ul style="list-style-type: none"> <li>• Secure disposal, storage, encapsulation</li> <li>• Landfill</li> </ul>		
Reclamation or Mitigation	<ul style="list-style-type: none"> <li>• Site/soil remediation</li> <li>• Ecosystem restoration</li> <li>• Impact mitigation, increased health care requirements</li> </ul>		

↑ Closer to the Root Causes of Pollution ↑

\*e.g. precipitation, scrubbing, baghouses, cycloning, screening, settling, filtration, dewatering, berming, shrouding, sumps, on-site spill cleanup, etc.

Adapted from: (Environment Canada, 2010)

### ***Establishing goals and actions***

Once you have completed your assessment, you will need to set overall goals for the program. Try to establish quantifiable rather than qualitative goals. "To reduce hazardous waste by 5% per year" is a quantifiable goal, whereas "implementing a significant reduction of toxic substance emissions into the environment" is a qualitative goal.

The goals of the program should be reviewed periodically and modified to reflect changes in available technology, raw material supplies, environmental regulations and economic climate.

Use the self-assessment to identify actions that will help you achieve your goals. Write the actions on your action plan and give each a tentative date for completion, starting with those most easily achievable. Make sure to incorporate pertinent recommendations into the capital budget.

## **5.2. Training and Incentives**

### ***Program management***

Assign responsibility for managing the materials handling program to someone who is familiar with the winery and its processes and procedures. This person can be anyone on staff who is enthusiastic and interested in the success of the program (i.e. it does not have to be someone from upper management). Education and training may need to be provided to the person to ensure he or she can handle the responsibilities of overseeing the program.

The program manager will be responsible for developing and implementing program goals, leading the hazardous waste assessment, and ensuring proper monitoring and record keeping is completed.

### ***Getting company-wide commitment***

Involving others in the implementation of hazardous materials handling and waste management initiatives will be imperative if the practices are to stick. The goal should be to include proper handling and disposal in your company's culture so it becomes a way of doing business.

Although the drive for a hazardous materials program may start on the ground floor and much of the work may be done by winemakers, cellar hands, and other employees, commitment of upper management is very important. Be sure to provide presentations, fact sheets, and other information to the winery managers and executives to ensure they understand the program goals, actions, and costs.

Inform staff, contractors and suppliers of your goals. Incorporate your goals into your training manuals, purchasing policies, and operating procedures. If you have very specific goals and actions that you set for your company, communicate how you plan to accomplish them and by what date (if applicable). If you don't have specific goals at the moment, you can simply state your commitment to continual improvement in this area for now.

Recognize employees for improving material handling and finding alternatives to hazardous materials or for hazardous waste disposal.

### **5.3. Monitoring and Record Keeping**

Measuring hazardous waste streams and compositions is something that should be done periodically. By tracking wastes, seasonal variations or single large waste streams can be distinguished from continual, constant streams.

Use the Information to Collect for a Hazardous Materials and Waste Assessment checklist above to guide your record-keeping. The format of your records (e.g. Excel spreadsheet, software program, Word tables filled out manually) will be up to you and will depend on your computer literacy and personal preference.

When comparing records year-to-year, make note of the change(s) and explain in a few sentences why the change might have occurred. These notes will be invaluable when looking back in a few years, and will save you time in the future by not having to look through your records to find out what may have caused the fluctuations in hazardous waste generation. Review and amend your monitoring program regularly to allow for changes in production methods and scale.

## **POLLUTION PREVENTION/ SOURCE REDUCTION**

### **5.4. Product Changes**

Product changes are performed by the manufacturer of a product with the intent of reducing waste resulting from a product's use.

Product changes include substitution, conservation, and changes in composition. You can encourage your suppliers to make changes to the products they sell you to make them less toxic.

### **5.5. Input Material Changes**

Some commercially available products contain toxic ingredients, as indicated by warning labels. Once those products leave the winery through drain pipes or in garbage bags, they can be released into water systems or leach into soil. Input material changes accomplish waste minimization by reducing or eliminating the hazardous materials that enter the production process. Input material changes include material purification and material substitution.

### **5.6. Technology or Process Changes**

Technology changes are oriented toward process and equipment modifications to reduce waste. After an analysis of a process, it may be decided that one or more steps could be reconfigured, reduced or eliminated without compromising the integrity of the product.

### **5.7. Good Operating Practices**

Good operating practices are procedural, administrative or institutional measures that a winery can use to minimize hazardous waste.



These practices may include:

- waste minimization programs,
- management and personnel practices (e.g. employee training, incentives and bonuses),
- material handling and inventory practices (e.g. programs to reduce loss of input materials due to mishandling, expire shelf life, and improper storage conditions),
- loss prevention (i.e. avoiding leaks and spills),
- waste segregation (i.e. preventing the mixing of hazardous and nonhazardous wastes),
- production scheduling (e.g. judicious scheduling of production to minimize frequency of equipment cleaning), and
- purchasing practices that reduce hazardous waste (see Section 5.8).

## 5.8. Sustainable Purchasing

Sustainable purchasing is the process by which an organization buys goods and services taking into account not only the economic value for money (price, quality, availability, functionality) but also the environmental, social, and ethical impacts of these goods and services.

For example, sustainable purchasing of products considers (BuySmart Network, 2010):

- whether the purchase needs to be made,
- what the product is made from and how long it lasts,
- the energy, material, and emissions "footprints" associated with its manufacture and transport,

- who made it, how it is made, and under what working conditions, and
- how it will ultimately be disposed of.

Reducing the amounts of hazardous materials used at your winery through sustainable purchasing practices can bring financial, management, environmental and socio-economic benefits.

Financial benefits include: reduces direct costs, enhances image and brand, eases regulatory burden, and improves access to capital

Management benefits include: alignment with organizational values, reduced business risks, improved supply chain management and product innovation, and more effective human resources

Environmental benefits include: reduces and prevents waste, reduces resource use, reduces pollutions and toxins, reduces greenhouse gas emissions, and maintains biodiversity

Socio-economic benefits include: develops markets for sustainable products, promotes strong local economy and reduces infrastructure load and local taxes, supports vulnerable groups, provides community services and reduces public expenditures, and improves conditions in the developing world.

Internal communication is a very important component of an effective sustainable purchasing program. Those responsible for accounting, receiving, facilities management and production must all talk to each other so there is a clear understanding of how supplies

are delivered, how they are used, how much they cost, and how much waste is generated.

### 10 Ways to Enhance or Improve Your Sustainable Purchasing Program

(BuySmart Network, 2010)

1. Find Allies in your Organization
2. Tap Into Key Resources
3. Find Ways to Use Less of What You Already Have
4. Make a "Top 10" Sustainability Shopping List
5. Take a "Total Cost of Ownership" Approach to What You Buy (consider direct and indirect costs across the product life cycle, from raw material to disposal and recycling).
6. Draft a Policy Statement
7. Start a Sustainability Conversation with Current Suppliers
8. Choose New Suppliers Committed to Sustainability
9. Set Goals and Track Your Activities
10. Communicate and Reward Achievements

## HANDLING, STORAGE AND DISPOSAL

Hazardous wastes produced in a winery can include waste cleaners, solvents, waste pesticides, oils and lubricants. Laboratories can generate potential hazardous wastes that may be regulated by legislation. Special approval may be needed for the disposal of certain hazardous wastes.

In BC, the *Environmental Management Act* and the Hazardous Waste Regulation outline the legal and regulatory requirements for generators, carriers and receivers of hazardous waste to ensure that they handle, store, transport, treat and dispose of it in a manner

that is safe for human health and the environment.

Wastes can be classified as "hazardous" if they originate from paints, oils, solvents, acids, heavy metal-containing sludges and pesticides. They tend to be corrosive, ignitable, infectious, reactive and toxic, and can harm human health and the environment in the short-term (acute hazard) or over long periods of time (chronic hazard).

Check with your regional district and/or municipality to see what wastes are accepted at landfills and recycling depots in your region.

### 5.9. Storage

Potentially hazardous materials and wastes must be stored in a fashion that prevents pollution and maintains a safe work environment. All hazardous materials should be stored away from drains and secondary containment should be used as needed. Potentially poisonous, corrosive, volatile, flammable or dangerous materials or liquids must be stored in structurally sound facilities to prevent leaks and spills.

An up-to-date inventory of hazardous materials and wastes stored on site should be readily in case of emergency.

Publications that provide further information on hazardous material storage include British Columbia Environmental Farm Plan Reference Guide, Designing Facilities for Pesticide and Fertilizer Containment, and National Farm Building Code of Canada.

## 5.10. Janitorial Supplies

Some janitorial products contain chemicals associated cancer, reproductive disorders, respiratory ailments, eye or skin irritation, and other human health issues. They may also contain toxic materials that adversely affect plant and animal life, deplete the ozone layer, and accumulate in the environment.

How do you know if a cleaning product is safe?

**Read The Label** - Avoid products that have the words "Danger", "Poison", or "Warning". When you must use a strong product to get the job done, protect yourself by wearing gloves and goggles, and be sure that your work area has plenty of fresh air.

**Read The Safety Data Sheet** - Most labels have an "800" number to call with questions. The customer service staff can send you a Material Safety Data Sheet (MSDS), for the product. This sheet explains what is in the cleaner, how the ingredients might harm you, and how to protect yourself while using it.

Table 5-2 provides examples of chemicals to avoid in cleaning products.

**Table 5-2: Chemicals to avoid in cleaning products.**

Chemical	Chronic Effects
Acetone	Potential reproductive effects, liver & kidney damage, central nervous system depression
Alkylphenol Ethoxylates	Hormone disrupter, damages fish
Ammonia/ Ammonium Hydroxide	Derived from petroleum and known to cause asthma

Chemical	Chronic Effects
2- Butoxyethanol	Absorbs through the skin and poisons blood, liver and kidneys
Chlorine	Lung and skin irritant, lethal if ingested
Diethylene Glycol Monobutyl Ether	Kidney damage, central nervous system effects
Formaldehyde	Affects the neurological connectors
Glycol Ethers	Causes nerve damage & infertility, air contaminant
Hydrochloric acid	Can cause blindness
Monoethanolamine	Can damage eyes and skin. Absorbs through skin; damages blood, liver, kidneys, & developing baby.
Naphthalene	Possible carcinogen, damage to GI tract, blood, liver, kidney and reproductive system
Phenol	Burns the skin, central nervous system damage
Phosphoric Acid	Can cause blindness and severely damage skin
Phthalates	Hormone disrupter, damages fish
Polyethylene Monophenyl Ether	Endocrine disrupter
Sodium Hydroxide	Can cause blindness, harm lungs, and severely damage skin
Sodium Hypochlorite (Bleach)	Irritates the eyes, skin and respiratory tract
Tetrachloroethylene	Possible carcinogen, can cause eye and skin burns, severe liver and kidney damage and damage to developing baby
Toluene	Central nervous system impairment, liver and kidney damage
Triclosan	Possible carcinogen, builds up in soil & fish

## 5.11. Tires, Batteries, Oils, Paints and Coatings

Tire Stewardship BC runs a province-wide tire recycling program. The program collects an Advance Disposal Fee, commonly referred to as an eco fee, on the sale of every new tire. Most tire retailers will accept up to 4 off-rim tires per visit for free. To find retailers near you that accept used tires, visit [www.tirestewardshipbc.ca/pickupdropoff.php](http://www.tirestewardshipbc.ca/pickupdropoff.php).

The Rechargeable Battery Recycling Corporation recycles nearly all rechargeable batteries, including Nickel Cadmium (Ni-Cd), Nickel Metal Hydride (Ni-MH), Lithium Ion (Li-ion), Nickel Zinc (Ni-Zn), and Small Sealed Lead (Pb). These batteries are commonly found in cell phones, power tools and laptop computers. RBRC collects batteries from nearly 20 different retail chains across Canada and the US. To find retailers near you that accept rechargeable batteries visit [www.call2recycle.org](http://www.call2recycle.org).

Currently there is no province-wide recycling program for alkaline (non-rechargeable) batteries used commonly in flashlights, radios or children's toys. Retailers who collect alkaline batteries for free recycling include Best Buy, Future Shop and IKEA.

Automotive (lead-acid) batteries are recycled as part of a provincially regulated recycling program. Retailers are encouraged by the Ministry of Environment to accept at least one used battery in return for each retail battery sold. This take-back program is voluntary, but a majority of retailers are

accepting used batteries. Contact your local automotive battery retailer to inquire.

BC implemented a used oil recycling program in the summer of 2003 that is managed by the BC Used Oil Management Association. This provincially regulated program has a network of approximately 500 return collection facilities for safe disposal of used oil, used oil filters and empty oil containers for free drop off. To find retailers near you that will recycle used oil visit <http://bcusedoil.com/recycling-centres/>.

Product Care manages product stewardship programs for hazardous household and special waste across Canada. Products included in the BC program are household paint, flammable liquids, pesticides and waste gasoline. There are over 100 depots in BC where consumers may return these products. Find the nearest depot by calling the RC BC Recycling Hotline at 1.800.667.4321 or by visiting <http://productcare.org>.

Some communities offer hazardous waste collection events where small businesses can drop off hazardous waste for little or no charge. Contact your local municipality or regional district for more information.

## 5.12. Light Ballasts and Bulbs

Light ballasts manufactured prior to 1980 may contain polychlorinated biphenyls (PCBs). Some ballasts manufactured between 1979 and 1984 used diethylhexylphthalate (DEHP). PCBs and DEHP were used as insulating agents (oily liquids or waxy solids). They may be found in old electrical equipment

such as transformers, capacitors, switches, and ballasts.

The adverse health and environmental impacts these substances can have classify them as hazardous substances. Exposure to PCBs can cause skin disfigurement, nausea, dizziness, eye irritation and bronchitis. Ingestion can cause damage to the digestive system and especially the liver. Check with your municipality or regional district waste management department for recycling locations for ballasts.

CFL bulbs contain mercury. Mercury is an extremely hazardous waste and is a major health concern when it comes in contact with humans and animals. In humans, mercury can cause brain and kidney damage. Check with your municipality or regional district waste management department for recycling locations for CFL bulbs.

### 5.13. Electronic Waste

The Electronics Stewardship Agency of British Columbia is a not-for-profit program set up by the major producers and retailers of electronics in British Columbia. The program is designed to ensure that end-of life electronics are diverted from the landfill, processed and recycled in a manner that safeguards the environment, protects worker health and safety, and prevents electronics from being exported to developing countries. See [www.return-it.ca/electronics](http://www.return-it.ca/electronics) for a complete list of acceptable items and a description of fees.

### 5.14. Analytical Chemicals

Laboratory methods to determine alcohol content, titrable and volatile acidity, pH, soluble solids and sulfur dioxide of musts and wines are an integral part of a quality control program at a winery.

Chemicals that may be used in a winery laboratory include acetic, hydrochloric, gallic, sulfuric, malic, lactic, tartaric, and phosphoric acids; sodium hydroxide, thiosulfate, carbonate, bicarbonate, oxalate, arsenate, and sulfate; phenolphthalein, potassium hydrogen phthalate, meta-bisulfate, iodate, iodide, and tartrate; ferric chloride, hydrated copper sulfate, lead acetate, methylene blue, disodium hydrogen phosphate, anhydrous, ammonium molybdate, hydrogen peroxide, methanol, iodine, N-butanol, N-amyl alcohol, acetaldehyde, ethanol, and formaldehyde.

Many chemicals cannot be poured down the drain, or must be neutralized or buffered before being disposed of down the drain. Consult local regulations and manufacturer documents, including material safety data sheets, to determine how to dispose of various laboratory chemicals and reagents.

Stability and storage of chemicals in the lab is also an important consideration. Most dry chemicals can be stored in cupboards or shelves in the lab and are stable for many years. Liquids frequently require special considerations including low temperature, minimal light exposure, compatibility with other chemicals and flammability. Liquid chemicals are relatively unstable and either require frequent standardization or

replacement periodically. The chemical label and MSDS should provide storage directions; if not, contact the manufacturer.

Certain lab tests use very toxic chemicals for accuracy. It might be appropriate to sacrifice accuracy for safety in some cases. You may also be able to purchase equipment that can complete the test for you with fewer or no chemicals. Making a conscious decision to test wine using the least toxic of chemicals as possible should be one of your hazardous materials program goals.

New tests and technologies come out every few years and some tests become outdated. It is important to stay informed about what safe and environmentally responsible alternatives are available.

## 5.15. Sanitation Chemicals

Common cleaning agents include:

- alkaline based (tartrate removal):
  - Strong alkali – caustic soda, caustic potash,
  - Mild alkali – sodium metasilicate, trisodium phosphate (TSP), sodium carbonate (soda ash),
- acid based (scale/mineral deposit removal and prevention):
  - phosphoric acid,
  - various organic or inorganic acids, and
- low foam or high foam surfactants.

Common sanitizing agents include:

- caustic soda,
- quaternary ammonium compounds,
- peracetic acid compounds,
- hydrogen peroxide, and
- ozone.

Written standard operating procedures detailing when and how to clean and sanitize all equipment types throughout the year and regular employee training on procedures is an important component of proper handling and disposal of these chemicals.

Wineries can be more environmentally friendly by applying simple principles, for example by using potash soda (potassium hydroxide) instead of caustic soda (sodium hydroxide) to wash tanks and anorganic acids, such as phosphoric acid or sulphuric acid instead of citric acid, for the subsequent neutralising action.

## 5.16. Landscaping Chemicals

Pesticides, herbicides, and fungicides used for landscaping can negatively impact soil, air and water and can also be dangerous to those using them if not handled properly.

Integrated pest management (IPM) and integrated weed management (IWM) methods should be used at your winery. The main goal of IPM is to utilize a variety of management practices to reduce the need for chemicals and, when they are needed, to use products that are least damaging to the plant, non-target organisms, humans and the environment. The main goal of IWM is to maintain weeds at manageable densities and to prevent more aggressive weeds from taking hold. Both programs focus on prevention, with chemical methods as a last resort.

## 5.17. Fuel

Appropriate guidelines must be followed when setting up fuel storage facilities to ensure that environmental and fire safety concerns are met. Siting and labeling regulations vary depending on sizes of fuel tanks and whether storage is aboveground or underground. Disposal of used oil products and the recycling of used petroleum are subject to regulation.

## 5.18. Waste Bin Area Housekeeping

Good housekeeping practices for your dumpster area are essential to preventing pollution. Waste bins should be placed on an impervious surface (e.g. concrete pad or asphalt) where spills can be contained and covered to protect from precipitation. If your dumpsters cannot be covered, you should keep the lids closed to keep water out. The bins should be regularly inspected for leaks, spills and litter. Post signs near the bins to indicate what can and cannot be disposed of in each bin and regularly check to make sure employees are following the signage.

## HEALTH AND SAFETY

### 5.19. Employee Safety

You should provide your employees with the following:

- WHMIS Training
- Material Safety Data Sheets
- Material Handling Procedures
- Refreshers on Material Handling

### WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEMS

Workplace Hazardous Materials Information Systems (WHMIS) is the Canadian standard in place to protect workers from the adverse effects of hazardous materials. The system uses labels and material safety data sheets (MSDSs) that provide specific information on handling, storing, and disposing of hazardous materials.

### 5.20. Emergency Response

An emergency plan outlining steps to be taken in the event of a spill or leak should be posted near the entrance of every facility in which agri-chemicals are stored. Each emergency plan should include information on the location of emergency and first aid equipment, emergency phone numbers, and clean-up instructions.

The Spill Reporting Regulation of the *Environmental Management Act* outlines when spills should be reported to the Provincial Emergency Program at 1-800-663-3456. For example, a spill of a petroleum product greater than 100 litres must be reported.

See the BC Wine Grape Council's *Health and Safety for Small- and Medium- Sized Wineries* publication for more information on how to develop and implement an emergency response plan.

# CHAPTER 6

## SOLID WASTE MANAGEMENT

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## 6.0 SOLID WASTE MANAGEMENT

**Chapter Objective:** To help you determine the types and quantities of solid waste generated at your winery, and to implement practices that promote waste minimization and segregation together with the recycling of waste materials.

### INTRODUCTION

Solid waste management at a winery that includes reduction, reuse, reclamation and recycling generates a multitude of environmental, economic, and social benefits. Waste reduction helps conserve valuable natural resources, reduces pollution and saves energy. Less waste is created when materials are reused and recycled, extending the life of existing landfills and reducing or at least delaying the need for new solid waste processing facilities.

Preventing the generation of waste in the first place (i.e. source reduction) is the preferred management option. Sustainable purchasing practices are critical to source reduction. Reusing items by repairing, donating or selling them is also a preferred option because no reprocessing is required. Talking to suppliers about reducing the amount of packaging they use, incorporating more recycled content into their packaging, and taking back their packaging from you will also contribute to source reduction.

This chapter discusses some of the main solid waste products from a winery and provides

information on how they can be reduced, reused or recycled. It will show you how to complete a solid waste audit and prepare a waste reduction and recycling program.

Please note: the disposal of residual solids from the sanitary and process wastewater systems are discussed in Chapter 3.

### SETTING UP A SOLID WASTE MANAGEMENT PROGRAM

#### 6.1. Solid Waste Assessment and Planning

You need to understand your winery's waste stream before you can implement waste reduction initiatives. A solid waste assessment looks at your purchasing practices and the types and quantities of solid waste generated and disposed by each operation in your winery.

The goal of conducting the assessment is to help you identify areas in your operation where you can implement waste reduction strategies that will lessen your impact on the environment and potentially result in financial savings through avoidance of unnecessary purchases, reduction of waste removal costs and maybe even a little revenue generated from recyclables.

The first time you conduct an assessment you may need to hire an external consultant, unless you have someone in your organization with ample knowledge of solid waste

management. Without properly establishing a baseline of what you generate and how it is dealt with, it will be very difficult to measure the success of your waste reduction practices.

A checklist that you can use to conduct your solid waste assessment is provided below.

Having a waste reduction and recycling program in place at your winery that has executive level commitment and employee participation will allow you to strategically plan and set annual goals to reduce, reuse and recycle waste. Your program will help guide decisions on inventory, packaging, procurement and procedures.

A comprehensive and successful waste reduction and recycling program is based on the principle of “zero waste”, using the 3R hierarchy as the guiding principle: first reduce then reuse and only then recycle.

### ***Establishing goals and actions***

Once you have completed your assessment, you will need to set overall goals for the program. Try to establish quantifiable rather than qualitative goals. “To reduce solid waste by 5% per year” is a quantifiable goal, whereas “implementing a significant reduction of solid waste from our operations” is a qualitative goal.

The goals of the program should be reviewed periodically and modified to reflect changes in available technology, raw material supplies, environmental regulations and economic climate.

Use the self-assessment to identify actions that will help you achieve your goals. Write the actions on your action plan and give each a tentative date for completion, starting with those most easily achievable. Make sure to incorporate pertinent recommendations into the capital budget.

As you design your program, keep in mind the questions listed in the Waste Reduction and Recycling Program Checklist.

## SOLID WASTE ASSESSMENT CHECKLIST

- List all types of solid waste generated at your winery. Your list may include:
  - Fiberboard, steel and/or polyethylene drums
  - Pomace
  - Fermentation lees
  - Additives and packaging
  - Filtration lees
  - Filter pads
  - Filter cartridges
  - Diatomaceous earth
  - Bentonite
  - Yeast and ML cultures
  - Barrels
  - Wood adjuncts
  - Wine bottles and cartons
  - Rejected labels and unusable label glue
  - Label backings
  - Capsules
  - Tasting room corks and bottling line broken corks
  - Paper
  - Cardboard
  - Styrofoam
  - Pallets
  - High density polyethylene (HDPE) containers
  - Stretch wrap and pallet straps
  - Other plastics
  - Metals
  - Food and beverage waste
  - Aluminum cans
  - Paper towels
  - Spent oils, lubricants, batteries, tires
  - Light bulbs and ballasts
  - Fire chemicals from portable fire extinguisher
  - Spent propane tanks
  - Landscape clippings
  - Electronic waste
- Quantify how much solid waste is generated by each operation in your winery.
  - Janitorial maintenance
  - Facility maintenance
  - Lunch Room
  - Offices
  - Processing
  - Filtration
  - Ageing
  - Bottling
  - Lab
  - Bathrooms
  - Grounds maintenance
- Describe what you currently do to reduce waste for each operation.
- Quantify how much solid waste is generated per litre of wine produced.
- Quantify how much solid waste generated at your winery is reused.
- Quantify how much solid waste generated at your winery is recycled.
- Quantify how much solid waste generated at your winery goes to landfill.
- Identify the costs associated with the collection, reuse, recycle or disposal of solid waste.
- List and describe your documented protocols and/or operating procedures for handling and disposal of solid waste.
- List the person or persons responsible for oversee solid waste management at the winery.
- List the employee training you provide regarding solid waste management

## WASTE REDUCTION AND RECYCLING PROGRAM CHECKLIST

(BC Hydro, 2010a)

### Reduce

- How can we use less?
- How can we reduce or eliminate packaging?
- How can materials and resources be used more efficiently?
- Are there alternative products that are more repairable or durable?
- Which products have longer shelf life?
- How can we save money on disposal and hauling costs?

### Reuse

- What items can be reused?
- Can an item be repaired rather than replaced?
- Can an item be reused somewhere else in the facility?
- Can an item be offered to someone else within or outside of the industry?

### Recycle

- What can be recycled?
- Are these recyclables worth anything?
- Are the recycling bins accessible to employees?
- What recycling services (drop off and pick up) are available?
- How can I educate all employees about the recycling program?
- What is the best way to get employees to participate in the recycling program?
- Are there any opportunities for recycling or exchanging materials with other business or organizations?

### Purchasing

- Can we reduce the amount of materials and supplies we purchase?
- Can we purchase recycled materials?
- Will purchasing in bulk or concentrate reduce waste and cost?
- How green are our suppliers?
- Will our suppliers take back packaging, old equipment and other items.

## 6.2. Training and Incentives

### *Program management*

Assign responsibility for managing the solid waste management program to someone who is familiar with the winery and its processes and procedures. This person can be anyone on staff who is enthusiastic and interested in the success of the program (i.e. it does not have to be someone from upper management). Education and training may need to be provided to the person to ensure he or she can handle the responsibilities of overseeing the program.

The program manager will be responsible for developing and implementing program goals, leading the solid waste assessment, and ensuring proper monitoring and record keeping is completed.

### *Getting company-wide commitment*

Involving others in the implementation of hazardous materials handling and waste management initiatives will be imperative if the practices are to stick. The goal should be to include proper handling and disposal of solid waste in your company culture so it becomes a way of doing business.

Although the drive for a solid waste management program may start on the ground floor and much of the work may be done by winemakers, cellar hands, and other employees, commitment of upper management is very important and hugely beneficial. Be sure to provide presentations, fact sheets, and other information to the winery managers and executives to ensure

they understand the program goals, actions, and costs.

Inform staff, contractors and suppliers of your goals. Incorporate your goals into your training manuals, purchasing policies, and operating procedures. If you have very specific goals and actions that you set for your company, communicate how you plan to accomplish them and by what date (if applicable). If you don't have specific goals at the moment, you can simply state your commitment to continual improvement in this area for now.

Employee training and refresher training should include information on waste reduction efforts at the winery. Your waste reduction and recycling program goals should be posted where workers can see them regularly (e.g. in the lunchroom).

### **6.3. Monitoring and Record Keeping**

You should monitor and record waste generation throughout the year and use that information to evaluate your current waste reduction strategies, set goals for the upcoming year, and update your waste reduction and recycling program.

Measuring solid waste streams and compositions is something that should be done periodically. By tracking wastes, seasonal variations or single large waste streams can be distinguished from continual, constant streams.

Use the Solid Waste Assessment checklist to guide your record-keeping. The format of

your records (e.g. Excel spreadsheet, software program, Word tables filled out manually) will be up to you and will depend on your computer literacy and personal preference.

When comparing records year-to-year, make note of the change(s) and explain in a few sentences why the change might have occurred. These notes will be invaluable when looking back in a few years, and will save you time in the future by not having to look through your records to find out what may have caused the fluctuations in solid waste production.

## **PURCHASING**

### **6.4. Sustainable Purchasing**

Waste prevention, also known as source reduction, means using fewer materials and resources to get a job done. Waste prevention methods create less waste in the first place. Reducing what you buy will help to reduce purchasing costs and decrease materials that will later need to be recycled or discarded. Sustainable purchasing involves looking at what products are made of, where they come from, how they were made and how they are disposed of (BC Hydro, 2010b).

When choosing your equipment make sure to consider the technical support that comes with it (i.e. is there a repair person locally available) and the cost and accessibility of replacement parts. Considering these factors will help you minimize the wastefulness of throwing equipment away because it is cheaper to buy a replacement rather than fix it. It will also help you to save time and money.

## QUESTIONS TO CONSIDER IN YOUR PURCHASING PRACTICES

(BC Hydro, 2010b)

1. Is it necessary to purchase an item in the first place and, if so, why?
2. What are your top or priority purchases and/or suppliers (either by volume or money spent)? Develop criteria or specifications for reducing impacts from those goods.
3. Can you purchase products that are durable, concentrated, reusable, high quality?
4. What is the length of warranty and availability of repair services for the equipment?
5. Can you invest in technologies that eliminate or decrease the need for materials?
6. Can you buy products with fewer toxic materials (e.g. vegetable-based inks, water-based glue, markers and paint)?
7. Can you buy products that have less packaging?
8. Can you buy Energy Star certified products?
9. What are the life cycle costs and benefits? What is the timeline for replacement and the cost of consumable materials required?
10. How can you reduce transportation impacts?
11. How can your suppliers help you achieve your sustainability goals? Do they take back packaging and old equipment, for example?

The following sections provide best practices for the dealing with the main types of waste in the winery. The sections are categorized into the major waste streams: grape waste, wine production waste, packaging waste and other waste (food and beverage, landscaping).

## GRAPE WASTE

### 6.5. Pomace and Lees

The crushing and pressing of grapes produces waste material known as pomace (dry component - stems, skins and seeds) and lees (wet component). Several strategies are available to recycle, reuse or otherwise utilize this material.

Composting of pomace and lees can be conducted on-site or by an independent composting company off-site. Compost is a natural process through which organic material is converted into a soil-like product or humus. The process works with the help of micro-organisms such as bacteria and fungi combined with air and moisture. Compost needs to be properly tended to ensure the end product is useable and to minimize leachate and odours.

The solid residues of the compost can be applied to the soil in your vineyard or landscaped areas of your winery; provided that analysis of a representative sample indicates it is safe to do so. Be sure to obtain any required approvals from the government before application.

Some wineries sell their pomace to silage processors who turn the oil and fibre-rich grape skins, as well as other agricultural "waste," into feed supplements for cattle. Others truck their pomace to feed lots, where it is mixed with manure and returned to the vineyard in the spring, as compost.

Several other options for pomace and lees, which are not feasible for BC wineries at this time but could be considered in the future, are described below.

Anaerobic digestion can be used to turn pomace and lees into bioenergy. The grape waste yields methane gas (a by product of organic decomposition) that can be harvested to generate electricity. The digestion process also produces a useful coproduct – liquid organic fertilizer (it must be separated from the sludge that comes out of the digestion process).

Grape pomace can also be used as substrate for microbial production of citric acid. Citric acid is widely used in the food and beverage industry, pharmaceutical industry and elsewhere. Pomace must be sorted before it will be purchased by pharmaceutical companies.

Pomace can also be turned into other grape-based products by simply soaking pressed white skins in water and fermenting the mixture to make a weaker, “second wine.” Another technique for recycling spent skins is to steep and then distill alcohol-rich red pomace to make a spirit.

## TURNING GRAPE POMACE INTO POWER

Several Vincor wineries in the Niagara area are partnering with Vandermeer Greenhouses to create clean electricity from grape pomace using a process called anaerobic digestion. Anaerobic digestion is the breakdown of organic matter in an oxygen free environment. As the organic matter breaks down it produces methane, which can be captured and used to run an engine that produces electricity and heat.

The anaerobic digester is located at Vandermeer Greenhouses in Niagara-on-the-Lake. 5,000 tonnes of grape pomace are put into the digester annually, along with chicken manure, greenhouse clippings and other organic material as available. The generator produces 335kW of electricity per year, which is enough to power 250 homes. It is used to offset the peak electrical 890 kW demand of the greenhouse in the winter and, in the summer when the demand is 90 kW; electricity is fed into the local power grid.

For more information, visit [www.vandermeergreenhouses.ca/innovations.html](http://www.vandermeergreenhouses.ca/innovations.html).

Lastly, pomace can be sold to third-party plants that grind the seeds to extract grape seed oil and mine the skins as a source of cream of tartar.

## WINE PRODUCTION WASTE

### 6.6. Filtration and Fining Materials

Solid residues from clarification or stabilisation operations, such as spent filter aid, fining deposits and tartrates should be re-processed wherever possible to recover useful and active materials. Any residues unable to be reprocessed should be disposed of in a manner that minimizes impacts on the environment and the local community. (International Organisation of Vine and Wine, 2008)

#### *Plate and Frame Filters*

The plate and frame filter consists of a number of plates and frames corresponding in size and shape which are arranged alternately and which are supported on a pair of rails. The plates have ribbed or waffle surface to facilitate the flow of filtrate. They may be constructed of stainless steel or plastic.

Do not dispose of plate and frame filters in the garbage. Plate and frame filters can be composted, applied as a soil amendment, or used for weed suppression.

#### *Membrane Filters*

Membrane filters are constructed out of a wide range of synthetic materials, including cellulose acetate, cellulose nitrate, polyamide, polycarbonate, polypropylene and polytetrafluoroethylene.

#### *Cartridge Filters*

Cartridge filters are made of plastic (polyethersulfone or polypropylene). The cartridges can be cleaned and reused, to a limit. Polyethersulfone is a "7" plastic and polypropylene is a "5" plastic.

#### *Diatomaceous Earth*

Diatomaceous earth (DE) is the fossilized remains of diatoms, a type of hard-shelled algae. The deposits are ground into a fine powder and treated with acids and alkali until all that remains is silica. When these particles are formed into a bed they produce an effective filter by forming a porous barrier with numerous channels.

DE handling can pose a serious inhalation hazard because it can cause silicosis, a form of lung disease. It is important to limit the amount of DE used and to train employees on proper use and disposal.

Crystalline silica is chemically inert in the environment so composting, however, making composting the most logical means of disposal. Local use and disposal regulations for DE vary widely. Some localities do not allow it to be dumped in landfills, others allow composting and others place no restrictions on disposal. Make sure to check with your local municipality.

The cost savings of reducing or eliminating DE from your winery can be substantial: from purchasing, to storage, employee handling, respirator masks and final removal.



### ***Cellulose Filters***

Cellulose filter media can be used as an alternative to DE in precoat filtration on most filtration systems. They are available in varying degrees of fineness for different requirements in wine and sparkling wine filtration. They are completely biodegradable and easy to compost. Longer filtering cycles are possible with the cellulose fibers due to higher output.

### ***Crossflow Filtration***

Crossflow filtration is also an effective substitute for DE and other bulk filter media. In cross flow filtration, wine constantly brushes the filter surface, cleaning it, while also migrating through to the clean end. The benefit of cross flow is that relatively high solids wine can be filtered with very little labor input. Cross flow machines can be run automatically for long periods of time to process large quantities of product without supervision. The units use fiber media that should have a working life of 5-8 years in normal conditions and uses membranes that are easily regenerable.

### ***Centrifuging***

Centrifuging can also be used to remove particles from wine. The removal of suspended solids from the new wine saves time, energy and space in the later process of racking from the lees. The machines are, however, very expensive. While larger wineries may have the capital necessary to purchase a centrifuge, in most cases it makes better economic sense for smaller wineries to continue to use traditional methods of clarification.

### ***Bentonite Clay***

Bentonite is a special type of clay that is formed from volcanic ash. Bentonite is a negatively charged substance and when hydrated and added to wine, it attracts the positively charged particulate in the wine. The weight of the molecules cause the matter to drop to the bottom of the container and become what is known as "finings." Bentonite can be collected and dried and then added to your compost.

## **6.7. Barrels**

Consideration should be given principally to durability, integrity and possibility of recyclability of material in contact with wine (International Organisation of Vine and Wine, 2008).

French oak barrels are currently the most environmentally sustainable cooperage available, but may not be economically sustainable for you to use at your winery. You could consider used French oak barrels, which are resold at 50-70% of their original price. Look for these barrels in trade journal ads and various online exchange sites.

Used barrels should be reused or recycled within your operation or elsewhere. There are several options for reusing or recycling your barrels, and the best option will depend upon your operation.

Used barrels can be sent on to either make liquors such as brandy, or sold to various artisans or dealers. The barrels can be used to make furniture, planters, and other things.

Barrels can also be refurbished through shaving. The practice of shaving barrels in order to reuse them is centuries old, but is currently receiving renewed attention. It entails shaving off approximately six millimetres from the inside of the dowels, after which they are toasted again. Potential problems associated with shaving include off-odours and leakages.

Another refurbishing option is a new technique that involves cleaning the inside of the barrel using carbon dioxide particles at supersonic air current speeds. The advantage of this process is that the original toasting of the barrel is not altered.

A barrel tracking system that tracks age, date received, current use and location can prove valuable in increasing productivity by reducing mistakes.

#### **PEFC CERTIFICATION**

The PEFC Council (Programme for the Endorsement of Forest Certification schemes) is an independent, non-profit, non-governmental organization that supports sustainable forest management globally. PEFC certification guarantees the oak is sourced from a sustainably managed forest. PEFC is the world's largest forest certification umbrella organization with members from Africa, Asia, Europe, North America, South America, and Oceania. [www.pefccanada.org/](http://www.pefccanada.org/)

## **PACKAGING WASTE**

The following materials are recyclable and efforts should be made to efficiently manage

this waste (International Organisation of Vine and Wine, 2008):

- packaging containers made of glass, plastic, or plastic-lined paper or metal products,
- container seals made of cork, plastic or plastic-coated metal products, and
- outer packaging such as capsules, labels, and cartons made of plastic, metal and paper-based.

Packaging materials should be minimized while still permitting an optimal conservation and presentation of the product. Work with your suppliers to reduce the amount of packaging that comes with the materials and supplies you order. All recyclable material should be delivered to the nearest recycling depot or arrange for a private company to transport it for you.

If you are wondering where to recycle a certain material, make sure to check out the Recycling Council of BC's Recyclepedia at [www.rcbc.bc.ca/recyclepedia](http://www.rcbc.bc.ca/recyclepedia).

### **6.8. Bottles and Other Glass**

A wine bottle's weight, size and shape can have a large impact on its carbon footprint. In addition, the resources required in producing the bottle, its ability to be recycled, and the materials it is made up of are all important environmental considerations. The traditional glass bottle is heavy and is more resource-intensive to produce and to recycle than either plastic bottles or cans.

How can a wine bottle's environmental impact be reduced? Options include recycling or

reusing traditional glass bottles, using bottles with recycled content and/or using light-weight bottles.

A glass bottle can take up to a million years to break down in a landfill but, in some instances, only about 30 days for it to be recycled and appear on a store shelf as a new glass container. Most glass can be recycled repeatedly and safely reused with no loss of quality. It can also be used for creating decorative tiles and landscaping material, and to rebuild eroded beaches.

One tonne of recycled glass can help conserve a considerable amount of natural resources: as much as 1,300 pounds of sand, 410 pounds of soda ash; and 380 pounds of limestone by some estimates (West, 2009).

Light weight wine bottles are another option that is becoming common place in Australia, South Africa, and the United Kingdom. In general, light weight bottles are between 18 to 28% lighter than traditional bottles.

## 6.9. Wine Closures and Capsules

Keeping with the theme of this chapter, this section does not present the advantages and disadvantages of different types of closures, but briefly discusses what to do with the small amount of closure waste associated with your bottling operation.

Cork can be recycled, composted, reused or sold. Aluminum screwcaps can also be recycled. You can also ask your capsule supplier(s) to take back capsules, plastic trays

and shipping materials. Tin capsules and plastic capsules can both be recycled.

## 6.10. Pallets and Other Wood Products

Do not discard of pallets in the garbage. Ask your pallet supplier(s) to take back wooden pallets for reuse. Repair broken pallets when possible. Send unusable pallets to a biomass energy-generating facility, where possible. Make sure your pallet reuse and recycling practices are communicated to staff.

## 6.11. Plastics, Cardboard, Paper and Metal

### *Shrink Wrap and Plastic*

Millions of tons of fossil fuels are burned every year for the creation of new plastic, which are everywhere in our everyday life, from beverage bottles, to grocery bags, to product packaging. Plastics that end up in landfills are incinerated (in some jurisdictions) to save space. This releases a toxic mix of chemicals into the atmosphere.

Fortunately, plastics can be recycled into a variety of products by expending a lot less energy than creating new plastic. Recycled plastic can be found in some carpeting, paintbrushes, clothes, industrial strapping, shower stalls, drainpipes, and flowerpots (Professors House, 2007).

To encourage plastics recycling in your operation, provide recycling bins/containers in high-use areas, and track and record the amount of plastic recycled per year. Also

inform staff about the different plastic recycling codes (i.e. through posters).

It is good practice to review your operation to identify ways of reducing plastic waste. Talk to your suppliers to see if they can use less plastic in their products or take it back for reuse (e.g. packaging).

### ***Cardboard***

There are a number of good reasons for recycling cardboard. These include saving trees, reducing the impact of ozone depleting chemicals and emissions from the manufacturing of new cardboard, and reducing the use of plastic or Styrofoam packaging.

To reduce your output of cardboard, review your packaging operation every year to identify ways of reducing cardboard waste. Talk to your supplier(s) and see if they can take back their cardboard for reuse or see if they can reduce the use of it in their product.

You can also explore alternative uses for cardboard in our operation (e.g. packing material, mulch, vermiculture bedding).

### ***Paper Products***

Using both sides of a page and reusing scrap paper (e.g. for rough drafts, internal memos, etc.) are first steps to be taken in optimizing the use of paper. Electronic means of communication should be used when possible.

When buying paper, consider recycled paper as an alternative to conventional paper. High quality recycled paper can be found these days in most office supply stores. The price of 30% post consumer paper is now only pennies

more per box than regular paper so at the very least the winery should be using that.

According to the Green Press Initiative ([www.greenpressinitiative.org](http://www.greenpressinitiative.org)), the manufacturing of recycled paper produces 38% less greenhouse gases and consumes 44% less energy than conventional paper. Fewer trees are used, less water is consumed and less waste is produced.

Make paper recycling bins/containers available in high-use areas such as offices to encourage staff to recycle. Track and record the amount of paper recycled each year and try to identify ways of reducing waste in the future.

Other options for used paper may include packaging material, mulch, vermiculture bedding, etc. Make sure to explore these fully before proceeding as there may be unforeseen obstacles to its application (i.e. ink).

Labels and label backings should be safe for humans and the environment, should preferably be made of recycled materials, and should also be recyclable or biodegradable.

### ***Metal***

Metals should not be discarded in the garbage. Make sure to have metal recycling containers available at points where metal waste is generated. Some metals, such as aluminum, are a valuable commodity so you may want to look into options for sale.

## OTHER WASTE

### **6.12. Food and Beverage**

Composting food waste can help reduce the amount of garbage your winery produces. Food waste should be composted on-site or taken to another location where this is possible. Containers for compost collection should be made available in lunch rooms and wherever food and beverages are consumed.

Disposable plastic utensils and Styrofoam cups should be avoided whenever possible. Use reusable cups and metal utensils instead. If utensils need to be disposable, ensure they are biodegradable or at least made from recycled material.

### **6.13. Landscaping Waste**

Yard waste, including lawn cuttings and chipped brush, should be composted on site whenever possible. Alternatively, it can be taken to the landfill and disposed of in the yard waste section, if available. Some yard waste can be used as mulch and other composted for future use.

# CHAPTER 7

## SOCIAL SUSTAINABILITY

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# 7.0 SOCIAL SUSTAINABILITY

**Chapter objective:** To provide practices that will contribute to a positive working environment for you and your employees and enhance your relationship with your neighbours and community.

## INTRODUCTION

Recruiting, training and retaining good employees, promoting a safe work environment, and building positive employee relations play a major role in the level of productivity, competitiveness, innovation, liability, and profitability of your winery.

Implementing sustainable practices at your winery requires willing, dedicated and skilled employees that feel committed to the winery and care about its success. In other words, your employees are critical to achieving tangible results from your sustainable practices program.

Your winery can contribute to social equity through job creation, bringing tourism and other revenue to your community, and educating the public about sustainability through winery tours and other events.

The better you are at anticipating conflict and educating and communicating with your neighbours and community the less likely you and/or your employees will have to spend valuable time responding to complaints. A good reputation with your neighbours and

community will go a long way - these same people could also be your customers!

## HUMAN RESOURCES

Whether you have 5 or 75 employees, clear, consistent and documented human resources (HR) policies and practices are fundamental to maintaining positive employee relations. The next sections will help you learn more about practices that can be used to promote HR sustainability.

### 7.1. Staffing and Recruiting

#### *Understanding Staffing Needs and Labour Availability*

A strategy that analyses your staffing needs for 2 to 5 years into the future will help you hire the correct number of employees with the appropriate skills to successfully operate your winery. Understanding your staffing needs will enable you to prepare budgets for wages and salaries, recruiting costs, and employee education and training.

Consider the following questions when developing your staffing strategy:

- What type of labour do you need (i.e. skilled, unskilled or highly skilled; seasonal or permanent)?
- When are your peak periods? When are your slower periods?
- Do your peak periods coincide with another local industry and, if so, how will that affect your potential labour pool?

- Can any of the work be moved to avoid peak labour demands?
- Are there any major activities in the region that could affect your ability to get the right people at the right time?
- Can you accomplish the same amount of work with fewer people over a longer period of time (i.e. full-time, long-term employees)?
- Can you round up instead of down for the number of employees you need? For example, if you determine you have enough hours and budget for 4.5 employees, can you round up to 5 employees instead of down to 4?

Flow charts and schedules are useful when planning your staffing needs on a long term, annual, and seasonal basis.

### ***Standard Job Description***

Clear, concise, and realistic individual job titles and descriptions will help employees understand what is expected of them and provide them with a sense of direction. Standard job descriptions will also help to alleviate conflict among staff and management and will ultimately increase productivity.

Consider including the following points in your standard job descriptions:

- how to complete the job,
- why the job must be completed a certain way,
- when the job needs to be completed,
- why the job needs to be completed within a specific time frame,

- what the job performance expectations are, and
- what the employment conditions and terms are.

Publish your standard job descriptions in an employee handbook (see Section 7.3). Make sure to update them on an annual basis.

### ***Recruiting***

Recruitment is the process of identifying and hiring the best-qualified candidate for a job vacancy, in a most timely and cost effective manner.

Your recruiting methods may differ depending on whether you are looking for temporary or full-time employees. You will need to establish a budget for recruiting that is based on your evaluation of staffing needs.

Examples of recruiting methods include:

- relationships with labour contractors or temp agencies,
- word of mouth,
- keeping contact information on those seeking work for use at a later date,
- advertising in local and regional newspapers and industry publications,
- advertising on the Internet,
- attending job fairs, and
- relationships with community colleges or universities.

It is important to use consistent messaging in your job descriptions and to coordinate your hiring, especially if you have different managers hiring for the vineyard, winemaking operations and winery hospitality services.



### ***Standard Interviewing Format***

Your job position descriptions and employee background profiles will help you to fairly and quickly screen resumes and applications that you receive and determine who is most suitable for an interview.

A standard interviewing format will help you to:

- provide consistent and fair interviews,
- ask all of the pertinent questions needed to fully evaluate the potential employee,
- avoid questions that are inappropriate, and
- effectively evaluate people applying for the same position against each other to choose the best person for the job.

Interview questions should be related to the job description and generally fall into five categories:

1. previous work experience that may be relevant to the position,
2. general skills and aptitudes related to job criteria,
3. education,
4. attitudes and personality, and
5. career goals and occupational objectives.

### ***Exit Interviews***

An exit interview is a meeting between at least one representative from a company and a departing employee. An exit interview will help you gather information for improving working conditions and retaining employees. Exit interviews are most commonly conducted with employees who have voluntarily resigned, but are also useful to conduct with casual employees to learn how the employee enjoyed

his or her term and whether or not he or she is planning on returning next season.

In small wineries it may not make sense to track statistics of number of employees leaving because the numbers may be very small. However, it is still important to determine why an employee leaves and to document the reason in the employee file.

## **7.2. Employee Orientation**

The orientation of new employees to their work environment and associated task(s) is an essential component of due diligence on behalf of the employer. Orientation is an ideal time to introduce employees to your company's sustainability policies and practices. Also, make sure that your company's health and safety policies and practices are included in the orientation and that applicable employees are given WHIMIS and First Aid training.

An Employee Orientation Checklist is included in below. Your employee orientation should include most or all of the following components.

## **EMPLOYEE ORIENTATION CHECKLIST**

### **Employee Handbook**

- Provide Employee Handbook to the new employee and use it to guide orientation

### **Overview of Company**

- Organizational structure
- Mission and values
- Goals and objectives
- Products, priorities and strategies
- Sustainability philosophy and practices

### **Overview of Position**

- Job description review (provide copy to employee)
- Specific performance standards and expectations
- Probationary period and probationary review process (if applicable)

### **Company Policies and Procedures**

- Work procedures such as timekeeping, dress code, work schedule, time off, overtime, breaks
- Grievance and complaint system
- Discipline policies, including for specific issues such as tardiness, absenteeism, drug and alcohol use, violence, harassment
- Process for performance evaluations
- Benefits and eligibility requirements
- Transportation and travel policies
- Health and safety policies

### **Health and Safety**

Your health and safety training will vary depending on the job description. It may include the following:

- Availability and interpretation of Material Safety Data Sheets (MSDS)
- Hazardous materials handling
- Solid waste handling
- First aid
- Importance of personal hygiene
- Prevention of heat stress
- Equipment operational and confined space safety
- Fork lift
- Personal protective equipment
- Fall protection
- Respiratory protection
- Hearing loss protection

### **Work Site Familiarization**

- Tour of operations
- Introduction to immediate supervisor
- Introduction to other employees and others she/he will regularly interact with in her/his job

### **Employee Documentation**

- Employee signing of required documents such as employment contract, handbook receipt, etc.

### 7.3. Employee Handbook

Having an accurate, clear, and up-to-date employee handbook enables the employee and employer to have a firm understanding of their relationship and various responsibilities. It results in less worker confusion, mistakes and complaints and can reduce the risk of potential costly legal suits.

An employee handbook serves to inform employees about company policies, procedures and practices and to communicate expected standards of performance and conduct. The size, format and content of your employee handbook will vary depending on the size and operations of your winery. For a small owner-operated winery, a few pieces of paper stapled together may be sufficient; however a larger operation may require a fully developed, bound handbook or an outline format on the company website

Common employee handbook contents include:

- Welcome and Purpose
- Disclaimer (specify that handbook is not a contract of employment)
- Company Strategy and Values
- Sustainability Philosophy and Practices
- Employee Definitions (distinguish between full-time staff and contract employees)
- Communication and Grievance Policies
- Work Schedules and Compensation Policies
- Benefits and Time Off Policies
- Transportation and Travel Policies

- Performance Management and Discipline Policies
- Environmental Health and Safety Practices

Important legal considerations regarding employee handbooks include:

- Have your handbook reviewed by a lawyer to ensure your policies are clear and consistent and cannot be misconstrued
- Update your handbook as needed to reflect the actual practices of the company
- Implement handbook policies and procedures because if you do not implement them as outlined in the handbook, your company can be held legally liable
- Ensure that your handbook is regarded as a resource of policies and guidelines rather than a contract or employment
- Obtain written acknowledgement of Employee Handbook receipt and of any revisions or updates to by having your employee sign a document.

Below is an example acknowledgement of receipt.

*I, \_\_\_\_\_, acknowledge that I have received a copy of the (Your Company Name) Employee Handbook dated: (date).*

*By my signature below, I acknowledge, understand, accept and agree to comply with the information contained in the Employee Handbook. I understand that this handbook is intended as a guide only, and is not intended to be a complete description of employer's policies and procedures. Furthermore, I understand that this handbook is neither a contract of employment nor a legally-binding agreement.*

*Employee signature: \_\_\_\_\_*

*Date: \_\_\_\_\_*

#### 7.4. Internal Communications

Clear, continuous lines of communication throughout all levels of employment, from supervisor to seasonal workers, are critical to a well-functioning workplace. The more employees know, the more they feel part of the company.

Communication methods include:

- regular staff meetings,
- one-on-one meetings with each employee,
- newsletters or bulletins,
- informal, brief "tail-gate" sessions to discuss safety and/or sustainable practices,
- company Intranet,
- Email and phone calls,
- bulletin board with current information,
- posters promoting safety, health, and good housekeeping procedures, and
- employee handbook (see Section 7.3).

Communication is as much about listening as it is about talking. Make sure you pay attention to your employees when they speak about their ideas, problems, needs or suggestions. If managers are accessible and encourage staff to share their thoughts, both the business and employee will benefit.

Conduct all verbal communications in the primary language of the employees, or ensure a translator is present. Also, translate communication materials (e.g. job descriptions, applications) into primary language.

#### 7.5. Employee Relations

This section provides information on policies that you should consider in order to create a positive company culture, increase employee job satisfaction and productivity, and decrease the risk of legal liability issues.

The following topics are covered: complaints and grievances, performance evaluation, discipline and recognition, and compensation and benefits.

Your policies related to these topics may differ for casual versus long-term employees.

##### ***Complaints and Grievances***

A step by step employee grievance process avoids uncertainty and anxiety that may arise from uncomfortable situations and demonstrates that the communication channels are open and issues will be dealt with in a professional, confidential, and timely fashion.

### ***Performance Evaluation, Discipline and Recognition***

A performance management system should document the following information:

- How employees will be evaluated for job performance (e.g. one-on-one meetings, written performance reviews).
- How often their performance will be evaluated and when (e.g. once per year at the end of the year, every six months).
- How the performance management system is linked to pay and promotions.

Work with your key employees to develop annual goals and assess their progress at their performance reviews. Train your managers and employees on how your performance management system works.

Consider having a post-production wrap-up meeting to discuss things that went well during the year and those that did not. Use the results of this meeting to improve your operations the next year.

Employee recognition can enhance job satisfaction and performance, promote cohesiveness among employees, and promote sustainable practices. Recognition may be given to acknowledge good work ethic, good safety performance, contribution to sustainable practices, length of service, teamwork, or community service.

Prepare a written discipline policy and explain it to your employees before you need to use it. The policy should include stepped and progressive procedures and must be uniformly implemented.

### ***Compensation and Benefits***

Questions to address when documenting your compensation and benefits philosophy and strategy include:

- Do you pay all employees competitive wages at or above the average wage for your region?
- How do you determine salaries for each job or job family? How often do you update your salary structure? How is it organized and documented?
- Do you participate in wage surveys?
- What benefits do you provide to employees? Document complete list, including government required benefits such as workers compensation. Describe why you offer each benefit and how the benefits administered (i.e. who does it, when, and what are the eligibility requirements)?
- How are wages and benefits communicated to employees?
- How is payroll administered (i.e. who does it, when, and what methods are used)?

### ***Family Support Services***

Examples of family support services include, but are not limited to, the following:

- housing opportunities referral information and resources,
- community resources referral information,
- childcare referral program,
- nutrition, health and wellness resources and/or referrals,
- employer participation in groups dedicated to increasing housing opportunities, and
- employer donating money and other resources to local housing groups.

## 7.6. Education and Training

Your employees are an integral part of the team that successfully works together to produce quality wines. They need basic education and training required to complete their job to a satisfactory level. They should also be provided with opportunities to enhance their understanding and skills in the workplace, especially if that training covers sustainable practices.

An effective training and professional development program ensures that employees that have the skills needed to accomplish their work, increases employee satisfaction, and enhances job performance.

You should develop an annual education and training plan for you and your employees. The plan should include specific training that is required for each major job category, based on what you can afford. Consider where your winemaking and business knowledge is lacking and consider how your business can improve by providing education to key employees.

A good understanding of your employee's career goals and aspirations is key to ensuring job satisfaction and reducing turnover rates.

Your training plan will need to consider the different job categories at your winery. Management staff will require different education and training than regular employees. Managers need to be well versed in all areas of your winery operations and share your vision. They need to have the skills, management style, personality, and value system conducive to managing employees in

this type of employment situation. They also need to be clear on all job titles and expectations and be knowledgeable of labour laws and compliance issues.

You may also want to provide different opportunities for key employees than for casual or seasonal workers. That said, your casual staff are more likely to come back year after year if they are rewarded with exciting professional development opportunities that enhance their job satisfaction.

Education and training ideas include:

- academic or industry workshops, seminars, and continuing education courses,
- Wine and Grape Associations annual meetings and other events,
- membership in local vintners' associations,
- winemaking publications, technical bulletins, and newsletters,
- in-house education by inviting a speaker or teaching your employees yourself,
- organizing tours through suppliers (e.g. tour of glass factory that makes bottles),
- visiting other wine regions,
- cross-training (having employees work in different parts of the business), and
- attending industry conferences and other networking opportunities.

Document all education and training provided to employees.

## 7.7. Health and Safety

Worker health and safety is a major contributor to the social equity component of your sustainable business.

The kind of program you have depends on the number of regularly employed workers in your workforce (“regularly employed” means those who work at least one continuous month in a year, whether full time or part time). Wineries with more than 20 workers must have a formal written program, while wineries with less than 20 workers must have a more informal program based on regular meetings with workers.

Resources to help you prepare your health and safety plan include:

- The Health and Safety for Small-and Medium-Sized Wineries, published by the BC Wine Grape Council.
- WorkSafe BC [www.worksafebc.com](http://www.worksafebc.com).
- FIOSA - MIOSA Safety Alliance of BC <http://fmiosa.com/>.
- FARSHA's Vineyard and Orchards Coordinator and the Regional Safety Coordinator for your area. Contact information is available from the main FARSHA office <http://www.farsha.bc.ca/contact-us/>.

## 7.8. Succession Planning

In BC, family-owned estate wineries are common and many will soon be faced with a transfer of ownership. Succession planning is a continuous process to plan for the transfer of knowledge, skills, labour, management, control and ownership of the business between one generation and the next or to new owners outside the family (Coughler, 2004). Succession planning is usually only done at the top management team level.

The goal of succession is to enable the business to operate and prosper without the day-to-day involvement of the current leader or leaders. Current leader or leaders must identify the next leaders, mentor them, and provide detailed and well-documented systems and frameworks in which to operate and then step back.

Lack of succession planning can contribute to friction among family members and/or financial losses for a business.

Each winery is unique and no single approach works for everyone. However, succession planning can be thought of as a six-step process. The steps are not necessarily completed in a sequence or in a set order. Some steps must be completed one after the other, but others can be done at the same time and still others can be completed in random order.

The steps in succession planning include (Coughler & Anderson, Ontario Ministry of Agriculture, Food & Rural Affairs, 2004):

- Step 1: Open the Lines of Communication
- Step 2: Collect and Analyze Information
- Step 3: Generate Options
- Step 4: Make Preliminary Decisions
- Step 5: Design, Develop and Review (write succession plan)
- Step 6: Implement and Monitor

A description of the six-steps for succession planning is included below. The format of your written succession plan will vary depending on the situation, but you should consider all of the components described below.

## STEPS IN THE SUCCESSION

### PLANNING PROCESS

(Coughler & Anderson, Ontario Ministry of Agriculture, Food & Rural Affairs, 2004)

#### Step 1: Open the Lines of Communication

- Define personal, family (if applicable) and business objectives and goals
- Identify successor:
  - Does the next generation wish to be involved in the business?
  - If yes, the process moves forward within the framework of transitioning to the next generation.
  - If no, the discussions and decisions will focus on preserving family wealth and the transition out of farming.
  - Assess the compatibility of objectives and goals.
  - Work towards reaching consensus between the founder(s) and the successor(s) on major objectives and goals.
  - Consider hiring a trained outside facilitator to assist in these discussions.
- Identify a team of advisors to help you through the process.

#### Step 2: Collect and Analyze Information

- Collect relevant technical information (particularly financial)
  - Compile and review documents such as the legal will, the power of attorney, property deeds, mortgage and loan information, tax returns, bank account information, financial statements, current financing arrangements, retirement savings position, business and legal agreements, current list of suppliers and service providers, production and performance records
  - Identify missing pieces
- Analyze financial viability and profitability of the business

- Compare the financial performance of the vineyard to industry benchmarks
- Develop projected cash flow and income statements
- Review additional specific technical information
  - This includes details related to methods of transfer, financing options, tax and legal implications, business structure options, business agreements, and tenancy issues

#### Step 3: Generate Options

- Address the various issues related to, but not limited to:
  - Ownership transfer options- purchase, rent, gifts, bequests
  - Financing options
  - Business organizations/structure (i.e. sole proprietorship, partnership, corporation)
  - Legal considerations (e.g. will, power of attorney)
  - Tax strategies and implications
- Generate numerous options that consider the information gathered in Step 2
- Investigate different “what if” scenarios and develop contingencies to address such things as disagreement, disaster, death, disability and divorce

#### Step 4: Make Preliminary Decisions

- Start narrowing down your options and make preliminary decisions on the direction of the plan

#### Step 5: Design, Develop and Review

- Write the succession plan
- As decisions are documented, your team of advisors should review the plan and provide detailed feedback, advice and comments

#### Step 6: Implement and Monitor

- Provide copies of the plan to all those involved
- Follow the timetable laid out in the plan
- Monitor progress as the plan is implemented
- Modify the plan as needed



## COMPONENTS OF A WRITTEN SUCCESSION PLAN

(Coughler & Wenger, Components of a Farm Succession Plan, 2010)

### A. Business Overview

- Executive Summary of the overall plan
- Action points to implement the plan
- Description of current business, including relevant points such as:
  - Size and location of the operation
  - Products
  - Production amounts
  - Organizational structure
  - Type(s) of business arrangement(s)
- Include enough detail to set the stage for the rest of the plan, but not so much that it is overwhelming

### B. Description of Business and Personal Goals and Expectations

- Describes the business and personal goals and expectations of the founder(s) and the successor(s)
- The rest of the process and the resulting plan should flow from this section

### C. Retirement Plan

- Deals with two issues – financial and lifestyle
- Lifestyle includes how the founder(s) will be involved in the business, living arrangements, desired activities for the founder(s)
- Financial component includes where retirement money will come from, an explanation of any retirement-income strategies and how the money will be spent

### D. Training and Development Plan for Successor

- Outlines the necessary skills and knowledge required by the successor(s) to successfully operate a winery
- Includes a “skills profile” of the successor compared to the founder, a gap analysis and an action plan to address those gaps

- A “skills profile” breaks down common activities to operate a winery and the skills needed for each
- The action plan may include such things as additional training, responsibility sharing, job shadowing, etc.
- A performance review process is also outlined under this component; it helps identify both strengths and where improvements are needed
- In all cases a regular meeting should take place to review the successor’s progress. It should focus on what has worked, what has not, why, and what could be done differently. This should be a two-way discussion and a positive experience for both the founder and the successor — a chance to share and learn.

### E. Business Plan

- Describes how the winery business will meet the needs of both the founder and the successor
- Includes a financial analysis of the business – past, present and future – to determine if it is profitable and viable
- Describes the future direction of the business (e.g. maintaining the same scale, downsizing, expansion, diversification, etc.) and how this direction will affect the business

### F. Operating Plan

- Outlines how to manage everyday business activities
- Identifies the roles, responsibilities and authorities related to day-to-day operations and how decisions are made
- Outlines the plan for family business meetings to discuss the transfer process, including how they will function, who will be involved, who will be responsible for what, where the meetings will take place

### G. Management, Control and Labour Transfer Plan

- Related to the operating plan [F]

- Describes how the transfer of management, control and labour to the successor will take place
- Includes a timetable for transition (linked to implementation timetable[I])
- Also needs to be closely connected to the successor development plan [D]

#### **H. Ownership Transfer Plan**

- Outlines how the business is currently structured and how it will change during the transfer process, including a description of the business arrangement that will be used (e.g. sole proprietorship, partnership, corporation)
- Link to business overview [A]
- Explains how the transfer of asset ownership will be handled, including a description of the transfer mechanism (e.g. purchase, gift, bequest, combination)
- Also may include:
  - an explanation of the financing required, the various sources available and the preferred financing option(s)
  - an inventory and valuation of assets and liabilities
  - an explanation of the tax implications of the proposed transfer process along with a description of how these items will be addressed
  - an outline of the insurance requirements related to life, disability, disaster and related insurance tools and a description of the legal agreements (e.g. employment contracts, partnership agreements, shareholder agreements, buy-sell agreements). Copies of these could be attached as appendices for reference purposes.
  - A copy (or copies) of the legal will(s) and any prenuptial agreements could also be attached for reference.

#### **I. Implementation Timetable**

- Provides a timetable to complete key activities that are prioritized with deadlines

#### **J. Communications Plan**

- A description of how those involved communicate about transition and succession planning (link to operating plan [F])
  - Rules of meetings and discussions
  - Schedule for regular meetings
  - Outline of who will participate in the meetings
  - Meeting locations and meals
  - Meeting responsibilities and decision making processes (e.g. who will set up the meeting and agenda, chair meetings, take minutes)
  - an outline of the ground rules for the discussion (e.g. everyone has a turn to talk, not interrupting, no blaming, stay focussed on the agenda item).
- A discussion of how disputes are managed and resolved (e.g. voting, third-party mediation)

#### **K. Contingency Plan**

- Outlines what will happen and who will ensure the implementation of contingency measures in such situations as illness, death, disability, divorce, disagreement, disaster, business downturn or failure
- Includes reference to the insurance requirements and selected mechanisms (link to ownership transfer plan [H])

## 7.9. Documentation and Record Keeping

Proper documentation is important throughout the employment process, from hiring to disciplinary action to job termination. Documentation helps you review and evaluate your HR plans and policies and make necessary improvements. Certain documentation is also required for compliance with federal and provincial labour laws.

Consider the following regarding documentation and record keeping:

- Ensure supervisors are aware of what should be documented, and when and how it should be documented.
- Determine the roles and responsibilities for record keeping.
- Record the list of employee records and documents you maintain (e.g. employee applications, performance appraisals, discipline records).
- Describe where you keep the records and how long you keep each document.
- Make sure you are complying with legislative requirements for length of time you need to keep records and what records you need to keep.
- Describe your process for preparing and submitting required documents to government.
- Make sure your documentation is completed in a timely, consistent manner, and using a comprehensive format that will stand up in court and is free of personal opinion.

## NEIGHBOUR AND COMMUNITY RELATIONS

Many wineries in British Columbia are located in rapidly changing areas, where competition for land can bring agriculture/rural areas and urban/suburban areas close together. Rapid population growth in many winegrowing areas of BC is putting a strain on resources such as water, energy, and on air and environmental quality. There is also increasing public concern and awareness about environmental and social issues and more interest in how businesses address these issues. For these reasons it has become imperative for wineries to establish good neighbour and community relations.

To maintain a harmonious relationship with your neighbours and community, it is important to take the time to research local issues and learn various perspectives, anticipate and minimize nuisances, and educate the public about your processes so they understand how and why you do certain things through the year.

There are many potential positives to the community from your winery practices and operations. It is important to maximize these benefits by informing your neighbours and community about your sustainable values, initiatives, production practices, products and technologies.

The purpose of this section is to identify potential issues that can arise at the agricultural-urban interface and to help you better understand, communicate about, and engage in positive problem solving solutions.

## 7.10. Identifying Potential Concerns

A proactive plan that emphasizes education and communication will minimize conflicts and maximize the potential benefits of your winery to society. The first step in proactive planning is to anticipate potential concerns and sources of conflict and develop solutions before they occur.

Potential concerns of your neighbours and/or the community may include the following:

- transportation and traffic
  - increased traffic at peak labour times and tourist season
  - traffic on winery roads and ancillary roads
  - delivery trucks
- water quality and supply
  - competing uses
  - water pressure
  - sedimentation of water supply due to erosion
  - chemicals and pesticides affecting water quality
  - changes to stormwater runoff patterns
- noise and vibrations
  - machinery noise
  - vehicle movement
  - outdoor events
- visual impacts
  - lights in winery and yard security lights
  - viewsheds
  - site aesthetics
- air quality/odour
  - dust (traffic on unpaved roads, soil erosion by wind from access roads)
  - emissions from boilers and generators
  - building exhaust/venting

- odours from pomace compost
- cut off access to recreation areas
- employee and guest housing

Other community issues that your winery may directly or indirectly impact include housing, education, health care, and urban sprawl.

## 7.11. Outreach and Communication

Formal and effective outreach and communication is essential to identifying and addressing potential concerns and to developing positive relationships with your neighbours and community. Consider the following when developing your outreach and communications plan.

### **Get acquainted with winery neighbours and your local community and generate goodwill:**

- Get to know those that may be impacted by your operations in a friendly setting. Invite them to tour your winery (for example).
- Be involved in community events and civic and charitable groups to work alongside community members.

### **Educate your neighbours and community and yourself:**

- Share your sustainable winery goals and how they benefit the surrounding community.
- Inform your neighbours and community about your company outlining the sustainable practices you use, when, and why.

- Find out what issues are important to neighbours and fellow community members and learn and understand various perspectives.
- Pay attention to local and regional zoning laws and growth management plans.
- Attend meetings and workshops with community members to ensure that your perspective is represented.
- Host neighbour/community events at your winery and be involved in community events and civic and charitable groups.

#### **Communicate with your neighbours and local community:**

- Be open to discussing their concerns and questions and respect their views.
- Find a neutral setting to discuss their concerns.
- Seek common areas of interest.
- Alert them to upcoming potential nuisances before they begin.
- Ensure that your neighbours know how to contact you and consider providing an after hours phone number.
- Communicate with neighbours often through such methods as periodic visits, phone calls, community parties, postcards to alert of spraying, etc.
- Explore changes to practices that could smooth tensions (e.g. rescheduling objectionable activity to when neighbours are at work and not on weekends when they are likely to be outside).
- Make sure your employees are educated and trained to answer questions and speak on your winery's sustainability initiatives with consumers and community members.

#### **Develop a relationship with local media:**

- Invite reporters to your winery and give them newsworthy information.
- Share your sustainable practices and explain what your operation is doing to reduce pesticide use, water use, etc.
- Respond promptly if media does call. If you do not have the information they are asking for then contact them with the name of someone who can help.

### **7.12. Responding to Complaints**

Even the best proactive planning may not entirely avoid complaints from your neighbours. The following practices should be used to deal with complaints:

- Develop a written procedure for addressing complaints from neighbours.
- Train all employees in the procedure.
- Delegate one person to managing the complaints process.
- Document all complaints with understanding and tact.
- Ensure all complaints are followed up on.

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# Glossary

**Alternative fuels:** any materials or substances that can be used as fuels, other than conventional fuels. Some well-known alternative fuels include biodiesel, bioalcohol (methanol, ethanol, butanol), chemically stored electricity (batteries and fuel cells), hydrogen, non-fossil methane, non-fossil natural gas, vegetable oil, and other biomass sources.

**Biodiversity:** the richness and variety of all life forms plus the habitats and natural processes that support them.

**Biogeoclimatic zone:** an ecosystem spread over a large geographical area that can be characterized by its climate, vegetation, soils and animal life.

**Carbon footprint:** a measure of the amount of carbon dioxide emitted as a result of your daily activity. The carbon footprint is reported in units of tonnes (or kg) of carbon dioxide equivalent.

**Carbon offset:** a reduction in emissions of carbon dioxide or greenhouse gases made in order to compensate for or to offset an emission made elsewhere. For example, an individual might purchase carbon offsets to compensate for the greenhouse gas emissions caused by personal air travel.

**Climate change:** occurs when long-term weather patterns are altered — for example, through human activity. Global warming is one measure of climate change, and is a rise in the average global temperature.

**Conservation:** preserving and renewing human and natural resources to assure their highest environmental, economic or social benefits.

**Erosion:** the wearing away of the earth's surface by running water, wind, ice, or other geological agents.

**Fossil fuels:** hydrocarbons found within the top layer of the earth's crust. Fossil fuels include natural gas and coal, as well as the more familiar fuels refined from crude oil including gasoline, diesel, and fuel oils. Fossil fuels are non-renewable resources because they take millions of years to form, and reserves are being depleted much faster than new ones are being made.

**Geexchange energy:** energy that is produced by drilling deep holes and setting up a horizontal or vertical array of pipes to extract or dump heat to/from the earth.

**Greenhouse effect:** the heat-trapping quality of the atmosphere caused by gases that absorb long-

wave radiation emitted by the Earth.

**Greenhouse gas (GHG):** gases that affect the temperature of the earth's surface. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

**Habitat:** the living area of a community of plants and animals. It includes the air, soil, water, food and cover components upon which plants and animals depend upon to carry out their life processes.

**Hazardous materials:** are any materials whose quantity, concentration, or physical or chemical characteristics may pose a hazard to human health or the environment.

**Integrated Design Process:** a design process that views the building structure, site, lighting systems, heating, ventilation, and air-conditioning systems (HVAC), indoor environment and the end use of the building as a whole building system rather than a number of separate, independent systems.

**Material safety data sheet:** is a technical document that provides detailed and comprehensive information on a hazardous product.

**Pollution prevention:** reducing or eliminating waste at the source by modifying production processes, promoting the use of non-or-less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream.

**Rapidly renewable materials:** natural, non-petroleum-based building materials that have harvest cycles under 10 years.

**Renewable energy:** energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable (naturally replenished).

**Runoff:** the flow of water from the land to oceans and lakes by overland flow and stream channels.

**Species at risk:** Indigenous species, subspecies, and distinct populations that are at risk of becoming extinct at a local or global level.

**Stakeholder (in the wine industry):** any individual or party (i.e. organization or company) who influences or is affected by decisions and actions for the production of wine and winegrapes.

**Stormwater runoff:** unfiltered water that reaches streams, lakes, sounds, and oceans by means of

flowing across impervious surfaces. These surfaces include roads, parking lots, driveways, and roofs.

**Sustainability:** many definitions of sustainability and sustainable development exist. All the definitions have to do with: living within the limits so future generations can meet their needs, understanding the interconnections among economy, society, and environment, and equitable distribution of resources and opportunities.

**Watershed:** the region draining into a river, river system, or other body of water. Other terms used interchangeably with watershed include *drainage basin* or *catchment basin*.

**Workplace Hazardous Materials Information Systems (WHMIS):** is the Canadian standard in place to protect workers from the adverse effects of hazardous materials.