

What Does Sustainable Really Mean?

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The word *sustainable* became common vernacular in the wine industry by 2008. Never fully defined, it meant different things to different people, which was likely part of its appeal. It added a virtuous green dimension which often represented some nebulous combination of ecology and the environment. For some, it was a new way of packaging an old idea – corporate social responsibility. For those in the wine industry, it usually meant some professed emphasis on energy, water, chemical, and/or packaging management. In a broad sense, a sustainable winery could be one with the following features (Chancey, 2008):

- *Ecologically Responsive*
- *Economically Viable*
- *Good Neighbor*
- *Bioregional*
- *Healthy and Sensible*
- *Operationally Efficient*

Winery ecological and environmental sustainability usually includes some of the practices listed below (for a webinar discussion on sustainable winery building practices go to www.vtwines.info). There are, of course, levels or tiers of ecological and environmental sustainability building practices. LEED certification, for example, has a range of 25-69 attainable points. The number of points determines the level of certification, from Basic, Silver, Gold to Platinum. Other than LEED standards, more often than not, the activities that have gone under the winery sustainability banner in the last several years have frequently only tenuously related to water, energy, chemical, and/or packaging management. Many wineries appointed ‘sustainability officers’ and printed brochures on recycled paper, with pictures of the beautifully-green nature of our industry, or at least worked to help maintain that image.

- LEED certification
- Building materials
- Earth-sheltered buildings
- Green roofs
- Building orientation/insulation
- Brise soleil/solar blocks
- Alternative energy
 - Geothermal
 - Solar
 - Wind
- Energy/heat capture and recovery
- CO₂ capture
- Natural lighting and venting
- Rainwater collection
- Water recycling
- Materials recycling
- Etc.

Regardless of how sustainability is defined, it is not formulaic. Environmental and ecological aspects of sustainability are site-and operationally specific. Questions to ask include: What is your philosophical disposition with regard to ecology and the environment? What is the true measure of your impact, your footprint at your location?

As an industry, we need to quantify our ecological and environmental sustainability activities, without which we may be guilty of contributing to the cascade of 'green washing' evident in our society. The advantages of quantification and benchmarking lie in our ability to measure, contrast, and chart our true progress. A number of matrices should be reviewed, including those suggested by Michael et al. (2009):

- Wine volume/ton
- Total energy/ton
- Water/volume of wine produced
- Personnel hours/ton
- Wastewater COD and BOD/ton

Wineries need to properly compare and contrast their facilities and performance against others in order to create a benchmark. They must understand the importance of scaling.

For example, energy and water use should be evaluated within a relative production volume or scale, if we are going to compare different size wineries. Big wineries generally have a smaller surface area/wine volume produced than small wineries (Boulton, 2009a). This is highly relevant in benchmarking and comparing the energy and water use within our industry. Carbon dioxide emissions, on the other hand, can be compared directly, based on tons or fermentation volume. In the absence of energy and water scaling our industry will not be able to accurately establish benchmarks or evaluate progress in environmental and ecological sustainability.

By 2009, sustainability began to take on a new ethos, that also placed emphasis on economics. To sustain profits, virtually all in our industry continued to attempt to cut costs. At the same time, there is evidence that a percentage of our consumers became less and less prepared to pay extra for a sustainably-produced wine. In these circumstances, many were tempted to slow down their 'green' initiatives, while still marketing the panache of 'green', all the while emphasizing the value of their products and economic enhancements, such as winery tourism. However, the forces that initially motivated the wine industry to be concerned about environmental and ecological practices have not changed and will not disappear. They relate directly to economic sustainability in at least four areas, as suggested by Selfridge (2009) and McCorkle (2009):

- Can increase product differentiation. Many wineries use sustainable architectural features as a means of branding.
- Can aid in risk management. Becoming less dependent on energy and water use means that a business can be somewhat buffered from the volatility of price and availability.
- Can aid in responding to government regulations. If our industry is not pro-active, we may find ourselves facing impossible peak-use demand surcharges and use restrictions. For example, the EPA announced carbon dioxide monitoring to understand our current contribution to greenhouse gas emissions.
- Can lower production costs. Because of the direct positive correlation between ecological and environmental sustainability and economic sustainability, establishment of a sustainable feature can substantially impact winery operational costs. A common example is natural lighting. Artificially-lit buildings average about 1.5 watts/sf, whereas a day-lit building would use 0.33 to 0.5 watt/sf (Chauncey, 2008), making the savings range 1.0 to 1.22 watts/sf.

The link between ecological/environmental and economic sustainability is well established. Economic sustainability has several vectors worth noting, including the following:

- Sound decision making
- Technology and education
- Realistic understanding of product value

Sound Decision Making. Sound decision making refers to how we make choices. Philosophically and practically, what information is certain and why? How we think about knowledge - what it is, what are its possibilities, how it is acquired, what are its limits and how one goes about acquiring knowledge effects every aspect of human thought and, therefore, how we progress as an industry. Leo Szilard, responsible in part for our understanding of quantum physics, once told a colleague he was thinking of writing a diary, but not for publishing. “I simply want to record the facts for God.” His colleague asked, “Do you think God doesn’t know the facts?” “Yes,” said Leo, “but he doesn’t know my version of the facts.” This illustrates a fundamental issue - the subjective, selective and tangential use of information to support our preconceived ideas.

By the mid 17th century, French Enlightenment philosophers suggested two basic means of understanding the world, roughly categorized by the rational deductive principles of Rene’ Descartes and the inductive, empirical reasoning suggested by John Locke. This dichotomy remains today. It is evident in our industry, by the contrast between those who derive their understanding mainly from science-based knowledge vs. those who rely largely upon empirical observations. To many, our real knowledge is derived from our own observations and experiences. In a craft as old as winemaking, decisions based upon experience are certainly important. However, one person’s observations and experiences, under their particular conditions, do not necessary convey.

In a meeting several years ago, Richard Smart commented about ‘pub talk’ (empirical observations shared which may not apply to other’s circumstances). He contrasted this with scientifically-derived information. For example, he posed the following:

- Low yields give better wines
- Small berry size is important for wine quality
- Old vines produce better wines than young vines

Are these statements true and, if so, when, and under what conditions? Information derived from untested opinions should be differentiated from scientifically-derived truths. Such a differentiation is essential to sound decision making.

HACCP is a method to help make sound decisions by linking both empirical observations and science-based data. HACCP (hazard analysis and critical control points) is the controlled integration of chemical, physical, microbiological, and sensory analyses into a formal plan. HACCP planning helps one understand the complex relationships among the kaleidoscope of grape growing and winemaking variables (See *Enology Notes* at www.vtwines.info for information regarding HACCP). Those who employ HACCP perhaps have a core belief-luck is the residue of design. However, to others, HACCP seems *contra natura*, too technocratic and against artistic winemaking. However, one of the problems with relying too heavily simply upon empirical observation, is that if two outcomes are similar, we have a tendency to assume they must have a similar cause. This may or may not be correct. The core principle of a HACCP-like approach goes back to Francis Bacon, who reminded us, “*Genius is like fleet of foot, method is the right path. Fleetness of foot on the wrong path never leads to knowledge.*”

The concept of HACCP, breaking problems down to component parts, is a scientific view at the core of our optimism. We no longer look for miracles, we look to models for simplification and quantification. After all, we can understand the universe in mechanical terms, surely we can understand almost anything. However, a complex system such as wine is not simply a collection of its parts. HACCP, therefore, is simply a tool to help extend our understanding.

Technology and Education. Technology and education are economic sustainability vectors. Answer the following questions:

- How has technology impacted your business?

- How are new technologies created?
- How is that information transferred?
- Why do some people embrace changes, while others do not?

The responsibility to interpret the importance of new developments, conduct research, and relay those findings to industry falls mainly on our university systems. Yet funding for university-sponsored agriculture-based research and extension has not kept up. This limitation has and will continue to impact the US wine industry as it attempts to increase global market share.

Without question, water, energy, chemical, and packaging management will become increasingly more important. To help us understand the potential of ecological sustainability, Dr. Roger Boulton and his colleagues at UC-Davis are developing the first Platinum LEED winery. This unique operation is designed to be self-sustainable and will help to set industry standards for winery operations. Examples of several relatively new technologies include the following (Boulton, 2009b):

- CIP (clean in place), pigging systems
- Capture solutions/green chemistry solutions
- Electrical dialysis for cold stabilization
- In-line white juice flotation for clarification
- Protein adsorption columns for the elimination of the need for bentonite

The link between economic sustainability and environmental sustainability will strengthen only through technology and the implementation of technology through education.

Realistic Understanding of Product Value. Bishop George Berkeley, an eighteenth-century empiricist, argued that our only knowledge of the world is what comes to us through our senses: *Esse est percipi*, “To be is to be perceived.” The problem, of course, is that our senses are errant, not always reliable. This poses a difficulty with regard to sensory evaluation of wines. Even if our senses were objective and reliable, many wineries often do not conduct sensory evaluations in concert with maximizing or

optimizing their economic sustainability. Sensory evaluation should include the following:

- Standardized environment
- Representative sample
- Proper evaluation temperature
- Elimination of bias
- Sample contrasting
- Number of evaluators required to gain a true picture
- 'Expert' opinion vs. consumer preference
- Proper testing methods

We have seen a decline in the price of some ultra-premium wines with the current economic reality. Proper sensory evaluations are key to understanding relative value. Relative value is how the price/quality stacks up to other products in the marketplace. Sample contrasting refers to blind comparison of wines against others in the marketplace. Additionally, there needs to be a clear distinction made between so-called expert opinions (winemakers, wine competitions judges) and consumers. There is an increasing body of evidence that suggests that expert opinions are very different from consumer opinions. Our knowledge of this must increase if we are going to tailor wines to consumer preferences. Certainly, optimum sensory evaluation and the understanding of relative value are economic sustainability vectors.

There has emerged an integration of sustainable thinking in design and practice. Environmental and ecological sustainability are tied intimately with economic sustainability, which is impacted by sound decision making, technology and education, and a realistic understanding of product value. The forces that motivated the wine industry to be concerned about traditional sustainability (image, popular trepidation about global climate changes, and the general need for optimum energy, water, chemical, and packaging resource management) have not and will not disappear. Nothing goes faster than the future-there is an urgent need for scaled benchmarking of water and energy use. New technologies may aid in our attempts to become more environmentally efficient. We must acknowledge- it is what we learn after we know it all, that really counts.

Chancey, 2008. Winery Layout and Design. Wineries Unlimited, King of Prussia, PA.

Boulton, 2009a. Verbal communication. Green Production Practices. Unified Symposium, Sacramento, CA.

Boulton, 2009b. Verbal communication. Beyond LEEDS; New Technologies for Green Winemaking. RAVE 2009. A Focus on Flavor. UC Davis, Davis, CA.

McCorkle 2009. Verbal communication. Why Business Is Embracing Sustainability. Unified Symposium, Sacramento, CA.

Michael, P., Oemcke, D., and N. Scringour. 2009. Benchmarking Winery Production: Developing Benchmarks. Australian and New Zealand Grape Grower and Winemaker. 37th Annual Technical Issue.

Selfridge 2009. Verbal communication. Why Business Is Embracing Sustainability. Unified Symposium, Sacramento, CA.