



The Michigan Sustainable Winegrape Program
Feasibility Study

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About 5 Lakes Energy

5 Lakes Energy is a Michigan-based policy consulting firm offering a range of services focused on clean energy, sustainability and the environment designed to promote the adoption of energy efficiency technologies, renewable energy and sustainable practices in the public and private sectors.

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Table of Contents

Executive Summary	1
Comparative Research	5
1. Development.....	6
2. Funding	6
3. Staff.....	6
4. Structure.....	7
5. Partnerships	8
6. Self-Assessment	8
7. Certification.....	9
8. Education	11
9. Performance Metrics.....	11
10. MAEAP.....	12
11. Recommendations	12
Survey Results	13
1. Key Findings	13
Market Research Literature Review	17
1. Introduction.....	17
2. Consumer Interest	17
3. Willingness to Pay Price Premium	19
4. Influence on Purchasing.....	20
5. Consumer Perceptions	20
6. Benefits of a Sustainable Operations System	21
Winery Energy Management Implications	23
1. Site Visit.....	24
2. Energy Use	24
3. Energy Conservation Measures.....	25
4. Environmental Implications.....	26
Development Scenarios	27
1. Funding	27
2. Industry Association.....	28
3. MAEAP Expansion.....	28
4. Low Input Viticulture and Enology (LIVE) Framework.....	29
5. Combined Scenarios.....	29
Glossary of Terms	30
Appendices	31

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Executive Summary

Sustainability is often expressed as consideration of people, planet, and profit in regular business practices. The Michigan winegrape industry shines a light on that intersection. Already, Michigan vineyards have made good progress toward environmental sustainability through Michigan Agriculture Environmental Assurance Program (MAEAP) verification, and can build on those efforts to further the sustainability of Michigan winegrapes and Michigan wine. Michigan wineries and winegrape growers are poised to take advantage of a critical time in their industry and accelerate their growth through an industry-led effort to organize, fund more research, and anticipate changes in consumer and regulatory demand.

A sustainability program will meet demand, protect the earth, and reduce costs.

1. A Michigan sustainability program will help meet demand from consumers, retailers, and restaurants for transparent sustainability standards. The Market Research Literature Review [page 17] demonstrates that well educated, younger, and often frequent buyers are influenced by the sustainability credentials of a wine; typically these consumers are also willing to pay a premium for sustainably certified wine. A sustainability program will build the Michigan wine brand and help wineries communicate their sustainability efforts to consumers as well as respond to and anticipate oversight from regulatory bodies like the Michigan Department of Environmental Quality (MDEQ).
2. The program will clearly demonstrate how the industry works to reduce its environmental footprint. Wineries and growers in Michigan are good stewards of the land – including water use, environmental practices, and energy use. A program will support innovative research and best practices to preserve Michigan's agriculture and watersheds for future generations. Working with the existing MAEAP verification and expanding MAEAP to best fit the winegrape industry is a comfortable approach that improves a recognized infrastructure and program.
3. Finally, implementing best management practices (BMPs) can, in some cases, reduce energy, water, and operational costs. The effort to decrease energy use and increase energy and water efficiency will reduce waste and save money. A sustainability program will support the bottom line.

Furthermore, a Michigan sustainable winegrowing program will support the message of local growing and local value. Beyond a commitment to protecting local ecosystems and watersheds, key issue areas like community relations and human resources will help support the local economies and communities.

Wine growing regions around the nation and the world have looked at people/planet/profit and the constantly progressing horizon of sustainability. To support their own practices and also to promote what they do for customers, sustainability programs have been initiated by industry and serve as a source of education to growers and wineries to support continual improvement. Michigan is ready to take the next step.

“DEQ is interested in winery water use and an organized sustainability program will help our industry be prepared to respond to that inquiry and to changing market and regulatory demand.”

– Lee Lutes, Black Star Farms

The Michigan Sustainable Winegrape Feasibility Study was funded through a USDA Specialty Crop Block Grant awarded to the Michigan Grape and Wine Industry Council (MGWIC). The MGWIC retained 5 Lakes Energy (5 Lakes), a Michigan-based clean energy and sustainability consulting firm, to lead the project and conduct the research. The project was overseen by a steering committee comprised of winery and vineyard representatives, Michigan State University, the MGWIC, and the Michigan Department of Agriculture and Rural Development (MDARD). This feasibility study was designed to assess the Michigan winegrape industry's interest in, and need for, a sustainability program and certification, to evaluate the industry's capability to develop, implement, and manage a program, and finally, to make recommendations on how Michigan wineries and vineyards can take action to move forward with development. The project was organized into three components.

- *Industry Input* - an online survey, two roundtable discussions, presentations at industry events, and meetings with industry association staff and stakeholders.
- *Comparative Research* - research and evaluation of existing wine industry sustainability programs and certifications, interviews with program staff, a market research literature review, and site visits and meetings with winegrape sustainability stakeholders in California, Oregon, and Washington.
- *Energy Audits* - 5 Lakes enlisted Keen Technical Solutions to conduct energy audits at ten Michigan wineries to identify cost effective energy efficiency, renewable energy, and wastewater opportunities.

The following analysis and recommendations are based on data and input gathered from Michigan wineries and vineyards from December 2014 through April 2015, and a comparative analysis of existing wine industry sustainability programs. 5 Lakes collected data through an online survey (63 completed surveys), two roundtable sessions (21 participants), and during seven presentations at industry events and meetings that had an estimated 275 total participants (includes industry members who attended multiple meetings).

The steering committee recommends that the MGWIC and Michigan wineries and vineyards:

- Focus on expanding and staffing an existing Michigan winegrape industry association with a dedicated funding stream either through an industry check-off assessment or excise tax. The industry association should be capable of managing research, education, and marketing projects, and potentially a sustainability program.
 - 63% of surveyed industry members indicated that the development of a sustainability program was important or very important for Michigan’s Wine Industry.
 - Existing programs are more successful with annual funding and staff not dependent solely on volunteer time or grant funding.
- Establish regional review committees made up of winery and vineyard staff, MDARD, MAEAP, and issue area experts to evaluate best practices included in existing winegrape sustainability standards. The issue area review committees will play an essential role in the next phase of the sustainability initiative by reviewing energy and water self-assessment checklists for wineries.
 - Survey respondents indicated strong support for an industry led and managed program.
 - Existing wine industry programs have grown out of similar volunteer groups, which has helped increased participation, ensured up to date practices, and established a transparent review process.
- Build partnerships between wine industry associations, academic institutions, MAEAP, governmental agencies, and issue area non-profits or foundations to increase educational opportunities and leverage grant funding for research and implementation of sustainable practices.
 - Survey respondents ranked ‘Educational Workshops’ (weighted average 3.98 out of 5) and ‘Grant Writing’ (weighted average 3.78 out of 5) as the most important priorities for the staff of a sustainability program.
 - Partnerships and grants have helped other programs reduce development costs, and expand education and research opportunities.

“A sustainability program could bring focus and funds to address future challenges of Michigan vineyards and wineries. Building partnerships with MSU and other academic institutions will help to develop solutions and implement the program.” – Rufus Isaacs, Michigan State University

This phase of the project has focused on high level recommendations about how programs are developed and managed; the next phase should use this report to educate wineries and vineyards about different opportunities for development, and identify priority issue areas for further research and education. For example, the evidence of the effects of climate change – exemplified by the crop losses seen during in 2014 and 2015 winter seasons – makes site suitability, variety cold hardiness, and winter vineyard management practices a priority for Michigan vineyards. The Michigan winegrape industry should put some of its initial focus on sustainability toward climate related issues.

The MGWIC has submitted a proposal that is currently under review by the USDA to take action on these recommendations by working with the industry to further define sustainability issues, identify a logical path for development, and educate wineries about self-assessment by drafting winery water use, wastewater, and winery energy use checklists.

Michigan wineries and vineyards have a unique opportunity to build on existing environmental sustainability efforts through MAEAP. The industry should take advantage of the current momentum to further educate industry members about existing programs, certifications, and best management practices to determine what components and practices best fit the needs of growing and producing wine in Michigan.

This report is organized into five sections that are organized to build on one another, highlighting the information that will help Michigan wineries and vineyards contemplate moving forward with developing a sustainability program.

Comparative Research

Based on the development, structure, purposes, strengths, and weaknesses of existing wine industry sustainability programs, Michigan's winegrape industry should consider the following priorities for development: secure a source of annual funding, hire a qualified program manager, explore potential partnerships, and establish regional technical committees.

Market Research Literature Review

Existing research on consumer purchasing behavior and preferences suggests that a sustainability program will help Michigan wineries expand market access to well-educated, regular wine purchasers who are influenced by the sustainability credentials of wine, and who are often willing to pay more for sustainably certified wine.

Survey Results

63% of survey respondents indicated that developing a sustainability program was important for Michigan's wine industry. The survey results suggest that Michigan's wine industry is interested in developing a sustainability program, but further consideration of cost, funding, and management scenarios is needed in order to move forward with development. Survey respondents also expressed a strong desire for self-assessment and performance metrics tools. The respondents' preference for educational workshops, as a service of a sustainability program, and their low recognition of other wine industry sustainability programs suggest that further education on wine industry sustainability should be a priority.

Winery Energy Management Recommendations

The energy management reviews of 10 Michigan wineries highlight significant opportunities for reducing energy consumption and expenditures by investing in energy efficient upgrades to equipment, facilities, and management systems or software. The demand for energy and the opportunities to reduce consumption vary significantly by the size and age of the facility; however, both large and small wineries can benefit by implementing energy conservation measures, and by investing in little to no cost energy conservation opportunities. If the 10 participating wineries reduced their energy consumption by 15% they would collectively save an estimated \$37,978 on energy costs annually.

Development Scenarios

The Development Scenarios lay out three different frameworks for Michigan's industry to consider. The development scenarios are an initial roadmap for the industry to use as it learns more about sustainability and about how best to proceed with the development of a program and certification. It is also important to seek and capture more support for a sustainability program from a greater number of wineries in the state, which will greatly enhance the ability to push such a program forward, and lead to greater adoption of practices.

During the potential second phase of this project, pending grant approval by USDA, the MGWIC could use these development scenarios as examples of how Michigan could proceed with developing a sustainability program. Ultimately, the decision to proceed down a path for development relies solely on the input and engagement of Michigan wineries and vineyards.

Comparative Research

Nationally and internationally the wine industry has been actively developing sustainability programs and certifications specific to the operation and demands of growing winegrapes and producing wine. There are active programs around the world in regions from California to Virginia to New Zealand to Italy. The structure, management, and issue areas included in self-assessment and certification resources vary, but there are distinct commonalities that are found in the majority of the industry programs.

The following programs were chosen for comparison based on the maturity of the program, location, structure, and focus:

- The California Sustainable Winegrowing Alliance (CSWA)
- Lodi Rules for Sustainable Winegrowing- Lodi Winegrape Commission (LWC)
- Long Island Sustainable Winegrowing (LISW)
- Low Input Viticulture and Enology (LIVE)
- Virginia Sustainable Viticulture Program
- Winerywise and Vinewise (Washington)
- South Africa Integrity and Sustainability Certified/ Integrated Production of Wine (IPW)
- Sustainable Australia Winegrowing (SAW) and Entwine Australia
- Chile Sustainable Wines- Wines of Chile (WOC)



These programs were selected to provide a varied snapshot of how each wine region, state, or country has approached the development and management of a sustainability program and certification. The surveyed programs and organizations were selected based on the different types of program structure, management, and development programs. There are numerous other wine regions around the world that have sustainability programs of varying depth. Programs that exist in regions with similar growing conditions to those found in Michigan should be given additional consideration during a review of best management practices if Michigan's winegrape industry decides to develop a sustainability program. Some programs have been in operation for over fifteen years, others only two years, and some programs have full time staff with dedicated funding, while others are operated on a volunteer basis without a consistent source of funds.

5 Lakes collected information through phone calls with program staff, from publicly available documents and reports, and during research trips to California, Washington, and Oregon that included stakeholders from the Michigan wine industry, MDARD, Michigan State University, and MAEAP.

Development

With only a few exceptions, wine industry sustainability programs have been initiated and carried out by winery and vineyard stakeholders. Consultants, universities, non-profits, and governmental agencies have been involved and supported program development, but the industry has typically organized itself. Regional grower groups and industry associations often led, developed, and ultimately planned on managing the program in the future. Growers in Lodi California, Oregon, Australia, and South Africa organized themselves around consolidating information and best management practices (BMPs) related to Integrated Pest Management (IPM) for vineyards. Out of those groups, standards were established. Over the years, as the programs grew, and the standards evolved, industry associations, or groups of volunteers organized into review committees, took on the management and development of self-assessment tools or workbooks, created marketing materials, organized and led educational workshops, wrote grant proposals, and managed research projects with universities and consultants.

As winegrape sustainability programs and certifications have grown, the managing bodies have adapted, and grown. While the programs across the country are in different stages of development, they have all struggled with similar challenges, and they have developed similar ambitions for the future of environmental social and economic standards within the wine industry. The following commentary centers on key components of existing programs that have ensured their success: funding, staff, partnerships, self-assessment, education, and certification.

Funding

Over the past six months, Michigan's wine industry has expressed significant interest in developing a sustainable winery and vineyard program (See Section 2: Survey Results), but has simultaneously indicated hesitation about pursuing development without a reliable funding mechanism.

Some programs, like CSWA, and Lodi Rules had an initial pool of funding directly from wine industry associations. Others, like LISW and Virginia, do not have a large funding sources, and some programs like LIVE, Chile, and SAW generate funding through a combination of membership dues, certification fees, and grant funding. It is clear that there is not one funding mechanism that fits perfectly. Instead the programs and the industry associations that support them rely on a combination of:

- Dedicated funds from industry groups (LWC, CSWA)
- Membership dues (LISW, LIVE, SAW, Chile)
- Fee structure (SAW, Entwine, Chile)
- Grant funding (Almost everyone, Washington 100%)
- Assessments on grapes or finished wine (LWC)

Michigan should consider all of the options above, but focus on the possibility of a check-off assessment (See development scenarios page 27 for further details).

Grants

Grants from the USDA, State Agencies, NGO's, and foundations have been a vital supplement to CSWA and LIVE, and in the case of Winerywise and Vinewise, the only source of development funding. While grants are widely available and should be utilized by the wine industry to support new research, expand services, and develop new tools or resources, the staff members 5 Lakes contacted stressed the need to establish a reliable source of funding outside of grants to ensure continuity in staff, services, and the maintenance of resources (website, database, marketing materials, etc.).

Staff

Programs like those in Virginia, Washington, and Long Island, still rely on volunteer staff time to manage the program activity. Larger programs like Chile, CSWA or SAW have staff dedicated to fulfilling the mission of the organization, typically a 501(C) 3; they are supported by in-kind staff from partner organizations. On top of the existing staff, the organizations

often bring in consultants to manage research projects or lead the development of new tools, which temporarily expands the organization's capacity. The core organization or program staff fulfills the following type of positions:

- Executive Director
- Administrative Assistant
- Project Coordinator
- Project Manager
- Certification Manager

More often than not, individuals fulfill multiple roles within the organization as both Administrative Assistant and Coordinator or Project and Certification Manager. Regardless, Michigan's wine industry will have to build a role similar to those found in other industry organizations, but with a specific skill set to handle a wide range of responsibilities and experience in:

- Event/ workshop planning
- Non-profit administration
- Grant writing
- Grant management
- Project development and management
- Public speaking
- Member outreach
- Research
- Website maintenance
- Database management
- Project coordination

Structure

A number of the programs are housed in existing industry associations; Wines of Chile manages Chile Sustainable Wine, Lodi Winegrape Commission manages Lodi Rules, and the McLaren Vale Grape Wine and Tourism Association manages Sustainable Australia Winegrowing. As previously noted, this type of relationship allows the organization to dedicate annual budget, staff, and in-kind staff to support the sustainability program. Other programs like LIVE and LISW are membership based industry organizations directed specifically to administer and manage the sustainability program and certification.

Technical Committees

Across all of the programs, steering committees, grower groups, or technical committees are an essential addition to the organization staff and board members. The committees are comprised of growers, vintners, board members, consultants, university researchers, 'issue' area experts, government agencies, and non-profits. CSWA's joint committee of over 50 members edited and reviewed the 3rd edition of the California Code of Sustainable Winegrowing. Similarly, LIVE has regional technical committees to "address issues of discussion and to facilitate decision-making" or to review research, data, and standards to ensure that LIVE protocols are current.

The technical committees are an important extension of the program staff. They help increase transparency, keep the standard up to date, and provide winegrape industry members a direct means of communicating how BMPs are working, or not working.

“Farming decisions at Domaine Drouhin Oregon are entirely based on our commitment to our vineyards, and the understanding that no amount of winemaking can compensate for mediocre grapes.

Fine wine consumers are often intensely interested in all aspects of viticulture and enology: it is powerful to be able to share information that reinforces or confirms interest in what we do.

Every chance to stand for something – whether it’s a varietal focus, a farming standard, tough labeling laws, rigorous land use zoning – is an opportunity to give consumers a chance to focus attention.” – David Millman, [Domaine Drouhin Oregon](#)

Partnerships

As with technical committees, programs expand their services to the winegrape industry through strong partnerships with other industry associations, non-profits, universities, and utilities. Chile, Lodi, LISW and Virginia have strong ties with local or state universities to facilitate research, review standards, or conduct educational workshops. CSWA worked with Pacific Gas and Electric (PG&E) on educational case studies and videos to educate wineries and vineyards about water and energy efficiency practices, technology, and available rebates or incentives to make upgrades. South Africa’s Integrated Production of Wine (IPW) partnered with World Wide Fund for Nature (WWF) to established the Biodiversity and Wine Initiative (BWI) to strengthen IPW practices that will help protect the Cape Floral Kingdom.

Also, sustainability programs work together. Lodi Rules or Sustainability in Practice (SIP) certified grapes can be used to meet the ‘85% of grapes from certified vineyards’ requirement to communicate Certified California Sustainable Winegrowing (CCSW) claims. Other partnerships help split the responsibilities of managing a sustainability program and a certification; Sustainable Australia Winegrowing (SAW) is a countrywide sustainability program that manages vineyard self-assessment, but not certification, which is handled by Entwine Australia. SAW focuses on education and assessment specific to vineyards, whereas Entwine handles the certification of vineyards that have followed SAW’s practices, and wineries as well. Similarly, LIVE has incorporated Salmon Safe Farming practices into its protocols so that a farm, or vineyard, certified by LIVE will also carry a Salmon Safe Certification.

Self-Assessment

Generally, wine industry organizations have built self-assessment programs around issue areas like IPM - as was the case with LIVE, South Africa, and Lodi - and expanded the standard as the program grew to include additional chapters like human resources, water or energy management, or environmentally preferred purchasing, etc. The growth over time process has helped reduce costs by leveraging partnerships and grants to create new chapters, and has increased industry involvement in the review process of additional chapters.

Self-assessment tools are typically free to access for industry members, and contained within the organization’s website and database, or as stand alone hardcopy workbooks. The technical review committees have used standards like [FIVS Global Wine Producers Environmental Sustainability Principles](#) (GWPESP), and existing industry standards to compile, and evaluate the potential of best management practices. The review process identifies which practices fit the regional growing and production demands, and which do not. An established process for reviewing the standards keeps the protocols current, and increases transparency with stakeholders.

Accreditation

In some cases, programs are using third party standards as the basis for their self-assessment and are endorsed or accredited by that organization. LIVE is accredited by the [International Organization for Biological and Integrated Control](#) (IOBC). Additionally, LIVE has integrated [Salmon Safe Farming](#) standards into their protocols to expand and

strengthen their best practices for winegrape growing. Protected Harvest accredits Lodi Rules, and Entwine Australia, a certification developed by the Winemakers Federation of Australia, accredits Sustainable Australia Winegrowing.

These accreditations, like partnerships, expand the available resources for wineries and vineyards, increase the transparency of the standard, and ensure the validity or rigor of the practices based on the best available science.

Issue Areas

While the process behind developing a self-assessment workbook or tool is similar for most of the surveyed programs, the specific best practices that make up the workbooks vary. The differences in best practices are a result of the review process by the technical committee to identify what practices are, or are not, the most appropriate fit for local winegrowing operations. Some practices are not universal because they are very specific to local or regional climates and ecosystems. The practices are grouped in three broad areas: Social, Environmental, and Economic. The self-assessment chapters, split between vineyards and wineries, can include, but are not limited to, variations of the following areas:

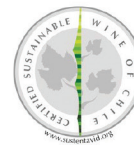


- Soil Management
- Viticulture
- Vineyard Water Management
- Pest Management
- Wine Quality
- Ecosystem Management
- Energy Efficiency
- Winery Water Conservation And Quality
- Material Handling
- Solid Waste Reduction And Management
- Environmentally Preferred Purchasing
- Human Resources
- Neighbors And Community
- Air Quality
- Sustainable Business Strategy

While some programs have prioritized pest management and business strategy, the Michigan winegrape industry will have to identify which issue areas to develop resources around first. While winery water use and wastewater is a priority for wineries, vineyards are dealing with two difficult winters, and their long term economic sustainability would benefit from additional research on site suitability, site selection, variety cold hardiness, and climate change.

Certification

Certifications based on specific practices contained within the self-assessment workbook or tool have grown out of sustainability programs. Organization staff, and technical committees identified practices that can be audited (some practices cannot be audited) and should stand as requirements to achieve certification. After the winery or vineyard completes self-assessment, a third party is hired by the winery or vineyard to perform the on-site audit, work with the business on creating an action plan to shore up low-scoring practices, and submit a recommendation to the organization about whether or not the winery or vineyard meets the standard.



Only Winerywise and Vinewise, The Virginia Sustainable Viticulture Program, and Sustainable Australia Winegrowing (SAW) do not have an accompanied certification attached directly to the program. However, SAW has been accredited by Entwine Australia, so wineries and vineyards are free to pursue certification through Entwine. Out of programs that do have certification, only CSWA, Chile, LIVE, and Entwine have winery specific certifications, the rest only apply to vineyards.

Even though the requirements for certification vary by region and program, the certifications can be classified into two types: practice-based and process-based.

Practice-based

Unlike a process-based certification, a practice-based certification has an established minimum threshold that must be reached for the winery or vineyard to be certified. Practices and chapters are awarded points, and some practices are considered mandatory. If a winery or vineyard does not accrue the required number of points for each chapter, and all the chapters as a whole they cannot pursue certification. Once the operation has met or exceeded the score threshold, they are eligible for certification.

Lodi Rules, and Sustainability in Practice (not surveyed in depth), are the most recognized and longest lasting of practice-based certifications.

Process-based

During self-assessment, wineries and vineyards rank their practices along a spectrum, for example as 1-4 (1-most basic, 4 most complex). To be certified, wineries and vineyards have to achieve certain scores for specific practices. If the operation scores too low on a required practice, the winery and vineyard work with the auditor to create an action plan to move their operations further along the sustainability continuum. The auditor follows up on action plan progress in the following years. With sufficient scores, and actions plans, the winery can then pursue certification.

CSWA – Certified California Sustainable Winegrowing (CCSW) is the strongest example of process based certification.

“To qualify for practice based certification a winegrape grower needs to do a prescribed set of vineyard practices. Most programs award points to each practice and a grower needs to achieve a minimum number of practice points. To qualify for a process-based certification, a grower needs to demonstrate continuous improvement in practices over time. To achieve this they need to continue to adopt new practices. They do not need to be at a particular level of sustainability but need to show continuous improvement over time.”

— Clifford P. Ohmart, PhD, VP of Professional Services, Sureharvest

Considerations

An umbrella certification called Oregon Certified Sustainable Wine was created to reduce confusion about the multiple types of certification within the Oregon wine industry: LIVE, USDA Organic, Demeter Biodynamic, and Food Alliance. However, the certification did not last long from what appears to be a lack of funding and appropriate staff. It is unclear if a similar umbrella certification would be an effective tool for marketing, and communicating certification to buyers.

A number of Michigan wineries and vineyards have expressed interest in a tiered certification similar to LEED where businesses are recognized along a spectrum for their current level of sustainability practices. Chile and SAW appear to be the only programs that have moved in that direction, but only for participation in the program or self-assessment scores; it is not clear how their tiered system is expressed in certification. The MAEAP is moving to a tiered system due to the passage of recent legislation, which will acknowledge growers for their participation in the program.¹

Education

At the core of all the surveyed sustainability programs is grower and vintner education. Self-assessment workbooks and tools are resources that should contain the most up-to-date vineyard and winery management practices, which help the industry members learn about more effective or new methods of production. To varying extents, the programs have established education outreach through website publications, blogs, published research, and educational workshops. Lodi Rules has successfully engaged small growers in their program. The growers see significant value in participating in workshops because there is little cost to them, and they trust the content produced by the Lodi Winegrape Commission. Similarly, programs like LISW, CSWA, Chile, or LIVE conduct educational workshops to educate industry members about the program, self-assessment, certification, or when they publish new research.

Performance Metrics

Through the online survey and roundtable meetings, Michigan's growers and vintners have expressed strong interest in performance metrics as a component of a sustainability program. Most of the programs do not have performance metrics fully integrated into their online systems. LIVE has a spreadsheet for tracking and comparing water use, and a GHG emissions tool. Entwine Australia has a similar GHG emission calculator and reporting tool that is a mandatory requirement for certified members. These type of online spreadsheets for tracking and monitoring water, energy, or fuel use are free and available online.

CSWA has developed the most comprehensive performance metrics tool that is fully integrated into their online self-assessment tools. It covers:

- Energy use (vineyards and wineries)
- Water use (vineyards and wineries)
- GHG emission (vineyards and wineries)
- Nitrogen use (vineyards)

While CSWA has the most in-depth tool, most of the programs, Chile, LIVE, Virginia or SAW, have all developed comparative tools for wineries and vineyards to run reports to see internal progress on implementing sustainability, as well as a comparison or ranking against other participating wineries or vineyards scores.

“Michigan’s young, growing wine industry is still learning about the dynamics of sustainability and how they can impact our industry’s future. From the standpoint of the three E’s of sustainability— economic, environmental and socially equitable — the current MAEAP program could easily evolve beyond viticulture to include winery sustainability practices.”

— Robin Osborne, East of Eden Vineyards

¹ https://www.michfb.com/MI/News/Press_Releases/MAEAP_funding_measure_headed_to_governor/?utm_source=Informz&utm_medium=Email&utm_campaign=Michigan+Farm+Bureau

MAEAP

Like the winegrape industry sustainability program, the MAEAP evolved out of partnerships between farmers, commodity groups, state and federal agencies, and conservation and environmental groups. There a number of similarities between MAEAP and wine industry programs in terms of goals, practices, and structure. The biggest differences are that MAEAP was developed to cover a wide range of Michigan crops so the self-assessment tool does not have the educational components for winegrape growing, MAEAP is very specific to environmental management practices, and MAEAP is not structured or intended to verify processing facilities like wineries.

The strength of MAEAP's established and trusted infrastructure of technicians, something no other program has, and the similarity with winegrape self-assessment tools make MAEAP an ideal foundation for Michigan's winegrape industry to start building a program. The process and growth of winegrape sustainability programs around the world affirms the value of MAEAP to Michigan's industry and identify opportunities for Michigan wineries and vineyards to work with MAEAP on building program components or practices that have been valuable to the growth of other wine regions.

Recommendations

Michigan can build a roadmap to develop a sustainability program by learning from existing programs, and work to craft a plan that fits the available resources and needs of the Michigan industry. Given variation in the size, funding, staff, and resources of existing wine industry sustainability programs, Michigan's development of a sustainability program can happen in many ways. Virginia and LISW have been able to incubate and manage a sustainability program with only volunteers. California supports a number of regional programs and a state-wide sustainability program through industry funding, extensive grant work, and partnerships. All of the programs have produced tools and resources that Michigan can access to speed development time, and reduce costs. All of the staff members 5 Lakes contacted expressed interest and desire to help answer any questions Michigan might have, and a willingness to share insights on the strengths and weaknesses of their program development, and management.

Based on the development, structure, purposes, strengths and weaknesses of existing wine industry sustainability programs, Michigan's winegrape industry should consider the following priorities for development:

1. Secure a source of annual funding
2. Hire a qualified program manager with strong grant writing and coordination skills to manage early develop
 - a. Plan to hire an assistant or full time coordinator in the future
3. Explore potential partnerships with Michigan utilities, national sustainable agriculture foundations, and issue area non-profits
4. Establish regional technical committees to evaluate and build a self-assessment tool for priority issue areas like winery wastewater, or variety cold hardiness
5. Identify and evaluate an internationally recognized 3rd party for possible accreditation in the future
6. Evaluate the cost/benefit of working with a certification body like LIVE

Survey Results

The online survey and roundtable discussions were designed by 5 Lakes with input from the steering committee to answer three main questions:

1. Is Michigan's wine industry interested in developing and managing a sustainability program and certification for wineries and vineyards?
2. How far along the sustainability spectrum are Michigan's wineries and vineyards?
3. If the industry is interested in a program, what specific components, resources, and tools are most valuable to Michigan's industry?

Key Findings

The responses and feedback collected through the online survey, roundtable meetings, and during presentations at industry events indicate that Michigan's winegrape industry is interested in the development of a sustainability program, but has concerns about the development cost and management of the program. The industry has also expressed a desire to learn more about existing wine industry sustainability programs, especially the best management practices and issue areas they cover. Based on these two main findings, the steering committee recommends that the next phase of work on a possible Michigan Sustainable Winegrape Program focus on developing the industry's organizational structure, funding mechanisms, and educating the industry about existing sustainability programs, standards, and the options for development in Michigan.

Michigan wineries and growers agree, it is
63% VERY Important or IMPORTANT
to develop a sustainable wine program.



Interest in Sustainability

63% of respondents indicated that the development of a sustainable wine program was 'Important' (25) or 'Very Important' (8) to Michigan's wine industry. Respondents ranked the development of a sustainable vineyard and winery certification slightly less than the development of a program. Only 31% of respondent ranked the development of a certification as Important (14) or Very Important (3).

After reviewing information about wine sustainability programs in Oregon and California, 80% of roundtable attendees either 'Strongly Agree' (10) or 'Somewhat Agree' (6) that developing a sustainability program for Michigan's wine industry is feasible and worthwhile. 52% (11) respondents 'Strongly Agree' that the industry should support the development of a Michigan winery certification (assuming vineyards are still environmentally verified by MAEAP).

Current Level of Sustainability

Respondents ranked the implementation of sustainable winegrowing practices in Michigan as ‘Moderate’ to ‘Good’ for both wineries and vineyards with vineyards slightly ahead. On a 5-point Likert scale (Poor, Fair, Moderate, Good, Excellent), the weighted average for wineries was 2.68 and 2.84 for vineyards.

Respondents were most familiar with national certification programs USDA Organic and Demeter Biodynamic. Overall, the respondents were highly aware of MAEAP program, but were not as familiar with other wine industry sustainability programs. The most recognized wine industry programs outside of Michigan, based on a weighted average out of five, were Certified California Sustainable Wine (1.64), Low Input Viticulture and Enology (1.58), and VineBalance (1.58). The relatively low familiarity with existing wine industry sustainability programs suggests that Michigan’s wine industry would benefit from further education about established wine sustainability standards before moving forward with designing a sustainability program for Michigan.

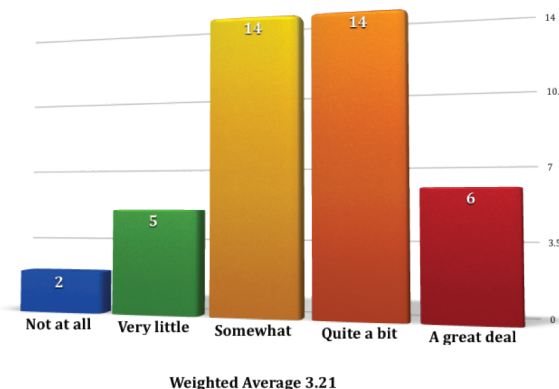
Since Michigan’s vineyards have been actively involved in environmental sustainability through MAEAP, respondents were asked to rate their experience with the MAEAP program. Respondents were split into two categories, ‘Verified’ and Non-‘Verified’. Respondents ranked how closely they felt MAEAP Verification reflects sustainable viticulture practices, and their responses placed MAEAP between ‘Somewhat’ and ‘Quite a Bit’ (a combined weighted average of 3.41 out of 5). MAEAP Verified respondents ranked the standard slightly higher (3.59) than Non-Verified (3.21) respondents. Both Verified and Non-Verified respondents ranked ‘Environmental Stewardship’ and ‘It’s The Right Thing to Do’, as the most influential factors behind their decision to be verified, or a future decision to become verified.

Program Components

Both the online survey and roundtable meetings included questions regarding different features of MAEAP or existing wine sustainability programs and certifications to determine what type of potential organizational structure would fit the needs of Michigan wineries and vineyards.

- *Self-Assessment* - 48% (24) of respondents were interested in self-assessing their vineyard or winery operations. 38% (19) were not familiar with self-assessment methods. 93% (19) of roundtable attendees indicated they ‘Strongly Agree’ or ‘Agree’ that Michigan’s wine industry should build a self-assessment tool or workbook. Attendees further specified that they would be most interested in format that is online, with a hardcopy, and that incorporates site-visits by MAEAP, or MAEAP-like, technicians.
- *Performance Metrics* - 56% (28) of respondents were interested in using performance metrics tools and 32% (16) were not familiar with performance metrics. 68.42% (13) of roundtable attendees felt that performance metrics are an important part of a sustainability program.
- *Certification* - Respondents indicated that ‘Sales’ (weighted average 3.90 out of 5) and ‘It’s The Right Thing to Do’ (weighted average 3.90 out of 5) would be the most influential factors behind their potential decision to certify a vineyard or winery. While respondents prioritized the development of a program over the development of a

How closely to you feel MAEAP verification reflects sustainable viticultural practices?



“Verification plays a key role in establishing transparency and trust between growers, wineries, consumers, and others across the supply chain.”

— Jeff Lemon, Lemon Creek Winery

certification, 90% (19) of roundtable attendees 'Strongly Agree' or 'Somewhat Agree' that Michigan should develop a winery specific certification, and 70% (14) implied that a MAEAP verification specific to vineyards would be valuable to their business.

- *Funding* - 54.5% (18) of respondents selected Membership dues as the most effective method to fund a wine sustainability program. Respondents offered suggestions of combined scenarios that include membership dues and an assessment based on production numbers.

During the Michigan Grape and Wine Conference in March 2015, panel participants discussed the potential of a check-off assessment for wine grapes to raise the amount of funding the wine industry can dedicate to state-wide projects (research, marketing and promotion, and potentially sustainability). The Michigan Wine Collaborative plans to poll industry members about their support for a winegrape check-off assessment in 2015-2016.

- *Management* - While 28.3% (13) of respondents selected MAEAP as the group that should be responsible for managing a wine sustainability program, MAEAP, though willing to work with the industry on build a viticultural specific verification, will not verify a facility like a winery. The next highest categories were a new industry association (9) and a collaboration of industry groups (8). Roundtable attendees favored (80%) a management scenario where the wine industry was responsible for developing and managing a sustainability program, and a 3rd party like MAEAP would verify or certify. Respondents ranked 'Educational Workshops' (weighted average 3.98 out of 5) and 'Grant Writing' (weighted avg. 3.78 out of 5) as the most important priorities for the staff of a sustainability program.

Online Survey

The survey was posted online using surveymonkey.com from December 15th 2014 to March 16th 2015. The links to the survey were distributed through:

- Embedded hyperlinks on 5lakesenergy.com and Michiganwines.com
- Direct emails from 5 Lakes
- Direct emails from Michigan Agriculture Environmental Assurance Program Staff
- Direct emails from regional wine trail associations
- Michigan Grape and Wine Industry Council newsletters

Additionally, paper copies were made available during the industry events, and meetings like the Orchard and Vineyard Show (Traverse City, MI), the Southwest Horticulture Show (Benton Harbor, MI), and the Michigan Grape and Wine Conference (East Lansing, MI).

Roundtable Discussions

5 Lakes led two roundtable discussions with industry members at Michigan State University Extension offices in northwest Michigan (Leelanau County) and southwest Michigan (Benton Harbor). 5 Lakes presented initial results from the online survey, asked follow up questions, and provided further details about existing industry programs to help answer questions that arose in the online survey.

The roundtables were open to all industry members with invitations sent to survey respondents, and information about the roundtable sent to industry members through the same distribution network listed above.

Fifteen industry members attended the northwest roundtable and five industry members attended the southwest roundtable. The attendees responded to fifteen prompts during the presentation. The prompts asked greater detail on initial trends spotted in the online survey.

Survey Bias

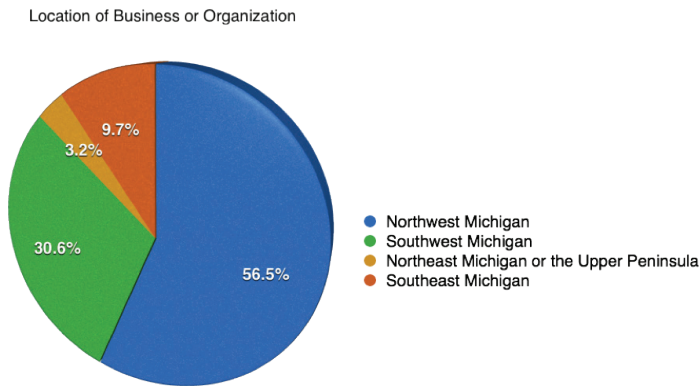
Since the survey respondents were voluntary and not randomized, the results do suffer from voluntary response bias, and could over represent individuals within the industry who have strong opinions. However, this bias is true for both supporters and opponents of sustainability initiatives; those who indicated strong opposition did so consistently and the same follows for those who strongly support sustainability initiatives.

Additionally, to increase the response rate, and to account for different perspectives from within the business (winemaker versus vineyard manager), multiple entries from one business were allowed. Five wineries with vineyards had multiple responses, which artificially increased the representations of wineries with vineyards.

While the results are affected by volunteer bias, the following demographics show that the respondents do represent a substantial portion of Michigan’s wine grape acreage and wine production.

Respondent Demographics

The online survey had 62 completed surveys. Respondents were categorized by business type Vineyard (15), Winery (8), Winery with vineyards (26)², Research and Education (7), and Vineyard Management (1) and location Northwest Michigan (35), Southwest Michigan (19), Northeast Michigan or the Upper Peninsula (2), and Southeast Michigan (6).



The businesses the respondents represent have been operating for an average of roughly 15 years with facilities (Winery and Winery with vineyards) of a similar age. In total, these businesses support 270 full time jobs, produce 281,795 cases of wine (roughly 48% of total MI production³), and manage 1,167.2 acres of wine grapes (44% of MI winegrape acreage).⁴

Of the total 62 completed survey’s, 35% (22) of the respondents represented vineyards that have been Environmentally Verified by the Michigan Agriculture Environmental Assurance Program (MAEAP).

Limitations

Growers from Southwest Michigan are an under-represented population in the survey. Additional efforts to engage winegrape growers in the southwest region should be a priority during any further sustainability efforts.

This survey did not include distributors, retail, or restaurant staff. An additional survey on the demand for sustainable wine in those sectors should be considered a high priority. The Market Research Literature Review does not include research on demand for sustainable wine from Michigan based or regional consumers and retail; a survey of those consumers would complement this project.

Survey Conclusions

The online survey and roundtable discussions suggest that Michigan’s winegrape industry is interested in developing a sustainability program. However, the survey results indicate that Michigan’s winegrape should first focus effort on developing a secure funding mechanism and clear plan for a Michigan winegrape association to manage a program. Additionally, program development should focus on developing self-assessment tools, performance metrics, and expand educational workshops.

² ‘Winery with vineyards’ had 31 total responses but five businesses at multiple entries so only 26 wineries who owned vineyards are represented

³ Assumes 2.378 gal./case of wine

⁴ <http://www.michiganwines.com/fast-facts#sthash.5tzeGmg.dpbs>

Market Research Literature Review

In winegrowing regions around the world, the wine industry has taken action to ensure that their winemaking and vineyard practices are sustainable. Wineries and vineyards have demonstrated that sustainability initiatives can be beneficial for several reasons. This section reviews existing market research to explore the potential benefits in sales, marketing, and consumer relationships of a sustainability certification for wineries and vineyards. The following summarizes published research on the market demand for sustainable wine, and this document should be used as a reference for wineries and vineyards that are interested in learning about the demand from consumers and retail or restaurants for sustainably certified wine. It will also seek to show why vintners in the state of Michigan should seek to utilize this research while addressing their consumer markets, due to the growing desire for sustainable wine products in the U.S. It should be noted that this review is not exhaustive, and should be updated as new research is published.

Sustainable agriculture, the basis of sustainable winemaking, can be defined as a “systems perspective of stewardship of the natural and human resources; it comprises three goals: environmental health, economic profitability, and social and economic equity” (Zucca, Smith & Mitry, 2009). The broad definition of sustainable wine production encompasses different types certifications based on regional growing demands, preferences, and approaches that fit the needs of individual wineries or vineyards; ‘sustainable wine’ can include certified organic, biodynamic, or sustainable. Unless otherwise noted, any references to ‘sustainable wine’ are inclusive of all forms of sustainable agriculture production methods.

“Bowers Harbor Vineyard’s focus on sustainability shows the customer that we have invested in ourselves and take pride in our quality products from grapes to glass. Education is a significant component of our business model, resulting in customer education as well as enhancing revenue. The perceived value of our standard tasting is increased as customers interact with our knowledgeable and friendly staff to learn about how and why BHV is verified by the Michigan Agriculture Environmental Assurance Program (MAEAP). A Michigan Sustainable Winegrowing Program and Certification would expand and strengthen the progress we have already made through MAEAP.”

— Spencer Stegenga, Bowers Harbor Vineyards

Consumer Interest

Sustainability is rapidly gaining support from individual consumers. They have begun to seek out products that follow sustainable production methods. A study conducted by researcher Sharon Forbes has noted that knowledgeable wine consumers have developed their own benchmarks for which they judge sustainable, or ‘green’, wines (Forbes et. al, 2009) and these consumers are critical for wineries interested in marketing sustainably certified wine. Many consumers have developed a desire for industries to begin acting in an environmentally responsible manner (Berghoef & Dodds, 2011). Consumers envision a product that positively affects consumer health, local business growth, social and environmental responsibility, and a simpler form of living (Zucca, Smith & Mitry, 2009).

Researchers have found that a buyer with a predisposition to purchase 'green' products, or who show a level of curiosity in the comparability of these products to alternatives, will move the market in favor of sustainable products over non-sustainable options (Barber, Taylor & Strick, 2009).

A study in Italy addressed young buyers purchasing behaviors and interest in sustainable wine. Previous research suggested this focus on the younger market because of the aging market's declining wine consumption due to a loss of interest and lack of funds (Vecchio, 2013). Vecchio found that the majority of wine drinkers in this study were between 18-35 years of age. A group matching this demographic (around 23 years of age) was surveyed on their willingness to buy sustainably. The participants were shown wine options that carried a sustainable logo, along with a short description of its purpose and meaning. The study found the WTP (willingness to pay) to be significantly higher for those wines claiming an aspect of social responsibility through their sustainable certification.

Similarly, a study was conducted in Ontario to discover the potential for sustainability eco-labeling in the wine industry. The authors found that 65% of consumers surveyed were moderately interested in purchasing 'eco-labeled' wine while only 10% of surveyed consumers were completely uninterested in eco labels. (Berghoef & Dodds, 2011). More generally, The Natural Marketing Institute in partnership with the Wine Institute found in a national survey of over 4,000 adults that 34% of wine consumers indicated that environmental or sustainable attributes are often/sometimes a factor in wine selection (Wine Institute, 2013).

Niche Market

While some research has shown general consumer interest in purchasing sustainably certified wine, a larger body of research suggests that wineries that sell certified wine should focus on the wine buyers who are both well-educated about wine and predisposed to purchasing sustainably certified products.

Purchasing organic and/or sustainable goods is a habit that paves the way for success of the sustainable wine market. Many buyers are driven to buy sustainably based on their previously ingrained desire to purchase organically sourced or produced goods. Consumers have started to integrate environmental considerations consistently into their purchases, which has led to a higher demand for sustainable goods by the 'green' consumer, due to a desire to consume healthier, safer, and better quality food products (Kyrstallis and Chryssohoidis, 2005).

During a Communicating Sustainability Workshop in San Francisco, a presentation on research by the Natural Marketing Institute showed that wine consumers classified as 'eco-conscious' (LOHAS-Lifestyle of Health and Sustainability) showed a large and growing interest in information on sustainable practices in wineries and vineyards. 52% of LOHAS respondents indicated that environmental or sustainable attributes are often/sometimes a factor in their wine selections. Additionally, LOHAS were also the largest wine purchasing demographic surveyed with 43% of LOHAS respondents purchased wine for the household in the last three months (Natural Marketing Institute 2013, 2013).

Another U.S.-based study concentrated on consumer tendency to buy sustainable goods across the nation. It explored customers' purchasing habits regarding sustainable products and the environment, as well as their level of knowledge and attitude toward environmental issues, and how it affected their willingness to purchase the product (Barber, Taylor & Strick, 2009). This study found that half of the respondents did not possess the information to increase their participation in 'green,' or sustainable behaviors, while 49% stated "they would do more for the environment, if they only knew how" (Barber, Taylor & Strick, 2009).

Another study makes mention of the fact that the ‘sustainable connoisseurs’ market segment, or those who have some pre-existing knowledge of wine and sustainability efforts, is most affected by the production of sustainable wines when it comes to market targeting. Wineries who are considering adopting sustainable methods in hopes of increasing market demand for their wines should concentrate on this market, rather than what the authors refer to as ‘unconcerned non-experts’ buyers (Klohr, Fleuchaus & Theusen, 2013).

Marketing Implications

Sustainable wine certifications do not necessarily translate well across all consumer demographics. Research conducted in Ontario supported the hypothesis that the older market (65-years-old and older) is far less interested in purchasing eco-labeled wines. Authors concluded that this could be due to a lack of interest or knowledge in sustainability or eco-labels, having no desire to introduce a new factor into their wine purchasing habits, or the presence of a fixed income that inhibits them from paying premiums on wines (Berghoef & Dodds, 2011). This promotes the idea that unwillingness to pay a premium resides in the older market, and the younger market should be the target audience for sustainable wine sales.

There is also an issue in the fact that some of the wine market is still not familiar with sustainability and what it means in wine production. In 2011, Berghoef and Dodds found that “only 36% [of those surveyed] indicated that they were familiar with the term [sustainability] and only 9% were either greatly or considerably familiar.” The same study found that 60% of respondents had no experience tasting or purchasing eco-labeled wines and were therefore unable to put precedence on them over other wine options.

Willingness to Pay Price Premium

In cases where implementing sustainable practices increases operational costs, wineries could adjust their prices accordingly, assuming that consumers are willing to pay extra for sustainably certified wines. Even if operational costs do not increase, wineries should still pay attention to consumers willingness to pay (WTP) a premium for sustainably certified wine. A number of studies have found that consumers are willing to pay more per bottle for sustainably certified wine. Berhof and Dodds (2011) found that (78%) of consumers would be willing to pay at least some premium for eco-labeled wine. Barber, Taylor & Strick (2009) also discovered that 40% of Americans would consider paying more for a product that proved to be environmentally friendly.

Approximately 82% of respondents surveyed by Forbes et al. (2009) expected the price of wine to increase due to a sustainable certification, and around 74% of those surveyed were willing to pay 5-10% more for a sustainably produced wine. In a similar study, respondents showed a willingness to pay a premium on sustainable wines anywhere between 23% and 57% more than the average price of other wine options. Females and older respondents (those aged 30-35) were willing to pay more for the sustainable wine options (Vecchio, 2013).

An Australian study conducted on the WTP concerning organic wine found that 13.3% of respondents would pay a \$1.00 premium for wine that offered an environmental benefit when the base value was \$10.00. Even greater, 21.6% showed a WTP a premium of \$2.00. These amounts surpassed the 12.3% of respondents who would pay a \$3.00 premium and the 8.4% who would pay \$4.00 (Ogbeide et al, 2014).

Another study showed consumers willing to pay a premium ranging from “17 cents on a \$10 bottle of wine to \$7 on a \$23 bottle of wine.” Those who were unwilling to pay a premium on sustainable wines were shown to have a direct correlation with being uninterested in purchasing the wines to begin with. This study found the target market to be females and those with higher incomes (Berghoef & Dodds, 2011). Consumers who are not as knowledgeable about wine and/or sustainability primarily are also less willing to pay a premium. The willingness-to-pay (WTP) differs with product type, region, and consumer knowledge (Berghoef & Dodds, 2011).

Organic purchasers were also willing to pay a premium on organically certified wines, or 'green wines.' (Thach and Olsen, 2010). However, researchers have also found that consumers will not trade wine quality for the promise of ethical environmental and social processes, and that some consumers believe sustainable wines should be sold at the same price as non-sustainable options (Vecchio, 2013).

Influence on Purchasing

Wine consumers' desire to purchase sustainable wine appears to be significant based on the research surveyed, research also suggests that sustainable certifications or attributes influence consumers purchasing decisions.

A survey in California of 300 wine-buying customers, members of wine industry associations, vintners and growers, found that "90% of respondents thought that sustainable practices were an important feature of wine production and would buy the product from such vineyards" (Zucca, Smith & Mitry, 2009). Approximately 50% of those interviewed claimed they were familiar with sustainability (Zucca, Smith & Mitry, 2009). Again, this research suggests that the level of educational about wine in general influences the purchasing behavior of sustainable wine.

In addition to surveying consumer purchasing behavior Wine Institute and PE International surveyed 59 industry stakeholders, including major retail, restaurants and hotel chains, and distributors. 37% of retail and trade respondents indicated that sustainable attributes to frequently or very frequently be a factor in the wines they choose to purchase, while 86% indicated that they were at least occasionally a factor in wine selection (The Wine Institute, 2013).

A similar study done in Colorado found that strong attitudes towards the environment showed a positive correlation with the willingness to participate in sustainable purchasing practices of wine. Consumers with firm environmental stances were willing to pay (WTP) a \$4-\$7 premium on a \$23 bottle of sustainably produced wine (Berghoef & Dodds, 2011).

Consumer Perceptions

Researchers found that as products inhibit extrinsic and intrinsic cues, the consumers' perception of quality will be directly dependent on their related product knowledge (Veale, 2008). Focusing on wine, over half of consumers surveyed believed that being certified as sustainable would not change a wine's quality at all, while 36.7% believed it would increase quality (Forbes et al., 2009). During this study, 13,400 wines were analyzed, and it was found that a winery's environmental certification increased the price of the wine by 13%. It should be noted that when an environmental logo was utilized, the price reduced by 20% (Forbes et. all, 2009).

An Australian study found that only a quarter of participants perceived products labeled as 'green' to be of lower quality than alternatives (Forbes et al., 2009), compared to a previous study which stated "a third of American consumers perceived green products to be technically inferior" (Peattie, 2001). An additional study reported that the majority of participants surveyed did not see an impact on quality (D'souza, Taghian, & Lamb, 2006). Another Australian study showed that 60% of survey respondents held the perception that environmentally safe products would be more expensive than non-sustainable products, but, of this group, almost 70% were willing to pay the difference (Forbes et al., 2009).

In a German study, respondents most related to the following statements: 'I don't buy products from companies that act socially irresponsible', 'when buying products, I pay attention that neither humans nor animals were harmed in the production', 'I don't buy products from companies that disregard environmental protection', and 'I have switched brands because of social reasons.' This supports the notion that businesses that engage in socially and environmentally conscious practices will gain acknowledgement from their consumers, and in most cases, be able to charge a premium for their products (Klohr, Fleuchaus & Theusen, 2013).

Klohr et al. also found that the majority of respondents showed at least some interest in environmental concerns when purchasing products. Many were concerned with sustainable consumption habits in general. It also revealed that these wine consumers were willing to broaden their market for wine consumption based on sustainable initiatives, or proof of ethical processes in production (Klohr, Fleuchaus & Theuysen, 2013).

A second study carried out in Germany in 2011 assessed base knowledge and perceptions of participants using a South Australian wine as the tasting product. 74.3% of the participants believed organic food to be healthier than conventional products, and thought that organic growing procedures was better for the environment due to the decrease in usage of pesticide and chemical presence in food. The study then concluded that the survey participants found the organic wine to be rated significantly higher in terms of taste than the non-organic option (Wiedmann et al, 2012).

Perceptions of Organic Products

Researchers found that those who purchased organic believed organically made wines to be better for their health, though all those surveyed categorized wine as a healthy product regardless. A study did find that non-organic purchasers were less likely to see advice or try new brands, “nor did they show as much concern about reputation and consistent quality” (Thach and Olsen, 2010).

Another study that involved a sample of 321 wine consumers across the United States concentrated on purchasing behavior of organic and non-organic buyers. When polled, both groups were found to have a concern for protecting the environment. The difference between the groups is that only the organic buyers believed purchasing organic products made a positive difference in the environment (Thach and Olsen, 2010).

Another study utilized 16 focus groups from four countries, one of which was from Germany, the others being France, Switzerland, and Italy, analyzed consumer’s attitudes and expectations towards organic wines. The study found that some organic wines had difficulty competing in sensory perception, but benefited from a positive image with regard to grape production, wine processing, and healthiness (Lockshin & Corsi, 2012).

Benefits of Sustainable Operation Systems

A number of countries have adopted sustainable winegrowing initiatives due to a growing concern from consumers about ethical, environmental, and health issues associated with commercial growing techniques (Forbes et al., 2009). It has also been found that sustainability is becoming a competitive advantage in the international wine market (Vecchio, 2013). As programs grow internally, or in response to market pressure, it is essential for the winegrape industry to better understand the benefits of certification on operations rather than simply focuses on market and regulatory demand.

A study performed in California analyzed and compared the perceptions of competitive advantages of wineries that have utilized EMS (environmental management systems), and those who have not (Atkin et. al, 2011). This study sought to identify any positive effects a strong EMS system would have on a winery, both internally via cost cutting, and externally through an improved market perception. The study found that one fifth of the respondents indicated a clear case for EMS.

“Out of these 3,400 bonded wineries that responded, 230 have participated in the self-assessment of their sustainable practices. 38 (16.5%) of that group instituted formal programs and achieved certification from the Wine Institute” (Atkin et. al, 2011). Research showed that those who had their wineries assessed to certification standards saw supply chain optimization, lower legal and regulatory risks, and greater overall efficiency. They also “gained more potential sources of revenue, lower costs on capital, greater access to capital, financing and insurance, and an increase in employee recruitment, moral, and retention” (Atkin et. all, 2011). The study also found that a significant

number of respondents who reported to have a clear EMS found they had an enhanced ability to enter new markets due to their adopted sustainability initiatives, versus those who had no clear EMS. They also had a stronger brand, greater pricing power, and an ability to justify charging a premium for their products (Atkin et. all, 2011).

A survey conducted by the CSWA (California Sustainable Winegrowing Alliance) asked 101 winegrowers about their sustainable practices and the benefits received from them. Over half the participants had adopted at least 11 out of the 16 practices listed in the survey, and over 75% had adopted at least 8 practices (CSWA, 2009). When asked about the perceived impacts, respondents stated “a variety of environmental and/or economic benefits or particular benefits to production” had been noted. Practices were found to have positive effects, such as reducing tillage, energy conservation, cost reduction, and environmental preservation and improvement (CSWA 2009). It should also be noted that some respondents stated that utilizing reduced risk pesticides and solar energy increased costs, though many lead to higher returns at harvest (CSWA 2009).

Conclusion

Internationally, wineries are responding to the market pressure for sustainably produced wine. Implementing, certifying, and marketing sustainable practices fulfills interests of educated consumers, and can help wineries expand their market competitiveness within the concerned and educated wine buyer demographic. Consumers have adopted an expectation for the use of sustainability initiatives due to the want for a healthier product that supports local business growth and environmental responsibility (Zucca, Smith & Mitry, 2009), and wineries should pay close attention to consumer purchasing behavior within the subset of the market.

The research surveyed in this paper suggests a few major trends that should be carefully considered by wineries that are interested in marketing sustainably certified wine or wine made from sustainably certified winegrapes.

- Consumers are increasingly concerned about the environmental attributes about the products they purchase, including wine.
- Wine consumers are willing to pay a price premium for wine that has been certified through various programs (sustainable, organic or biodynamic).
- Wineries should focus sales and marketing of sustainably certified wine on the educated, eco-conscious demographic within wine consumers. Further consideration should be given to younger consumers.
- Consumers, generally, do not associate sustainable certification with a decrease in quality, and value the potential health benefits.

It is recommended that further research be done on various markets due to the trends found in this research. A heavy emphasis on the importance of marketing to millennials (buyers 21-35 years of age) is important, due to their desire to live and purchase sustainably, and more research on retail purchasing decisions would be beneficial. Michigan’s wine industry should consider including sustainability in regional market decision making to gain a better understand of how implementing sustainable practices could impact sales to local restaurants, retail and consumers.

Winery Energy Management Recommendations

5 Lakes Energy retained Keen Technical Solutions of Traverse City Michigan to conduct 10 ASHRAE Level 1 Energy Assessments at wineries across Michigan.

The objectives of the energy assessments were to:

- Save money through reduced energy use
- Encourage investment in energy efficient equipment updates
- Foster energy and water conservation policies and practices
- Generate an attitude of striving for continuous improvement in energy and water management

This program is the beginning of a roadmap for Michigan wineries to become more sustainable both financially and environmentally. Today with rising energy costs and a more competitive market, financial and environmental decisions are inextricably tied and have a direct relationship.

With Keen's experience in working with thousands of commercial facilities they have found that across almost all sectors the foundation of every strong energy management program is the collection of meaningful data. In the past, this was limited to tracking monthly energy bills which was effective and regularly led to 10% reductions in facility energy use. Today, with the ability to incorporate remote monitoring into every process including temperature and humidity, flow rates, occupancy, etc, it is possible to effectively control systems and processes to optimize their performance. This is the number one most important implementation measure that could be made at every winery in the state.

Energy efficiency in wineries is an important component of winery sustainability programs because self-assessment and action in these two areas can result in measureable and significant cost savings. US Department of Energy (DOE) estimates that the average building wastes 30% of its energy use due to inefficiency. Energy efficiency, energy production, and conservation have proven to be great financial investments and energy efficiency is the least expensive source of energy. The California Sustainable Winegrowing Alliance (CSWA) has published numerous winery case studies on self-assessment, energy efficiency, water efficiency, and renewable energy that demonstrate the value of taking action. Also, CSWA partnered with PG&E (Pacific Gas & Electric) on educational videos highlighting energy and water saving practices, new energy efficiency technology, and available rebates and incentives specifically designed for wineries. This first set of energy assessments provides Michigan's winegrape industry with valuable information to evaluate how a partnership with Michigan utilities could assist the winegrape businesses.

Wineries were invited to participate in an initial webinar to learn more about the energy management review process and how to set up and use an ENERGY STAR Portfolio account as preparation for an energy assessment. Interested wineries applied through the online survey by filling out a brief application regarding their interest in an energy management review, the size, type, and production level of the facility. Fifteen wineries submitted applications. Three wineries did not complete the application, and two wineries had already received energy reviews in the last 5 years, so the remaining ten wineries were chosen for site visits.

Keen conducted site visits throughout the spring of 2015 at five wineries in Southwest Michigan, three Wineries in Northwest Michigan, and two wineries outside Northwest Michigan. The wineries ranged from small production facilities to medium size, and included new and well establish businesses.

- On average the visited wineries were 11,172 square feet in size. The 29 wineries that completed the online survey averaged 7,429.4 square feet.
- On average produced 15,670 cases a year. The 29 wineries that completed the online survey averaged 9,717.1 cases a year.

The assessments represent an important benchmark to realize winery operations energy, and water sustainability opportunities. Energy efficiency, energy production, and processing equipment can be cost effective, provide comfort to occupants, and be profitable to wineries bottom line. Increasing energy costs improve the economics of energy efficiency measures.

Site Visit

All visits started with a brief discussion on the energy needs followed by a tour of the facility. Utility bills were collected on the day of the visit. Three page surveys were completed to capture the opportunity details for each facility.

An Introductory Energy Evaluation (IEE) template report was created with the top ten Energy Conservation Opportunities (ECOs) expected to be identified at Michigan wineries. Most of the opportunities were applicable to each facility and all were discussed.

The top five opportunities identified during the walk through were:

- Air-sealing and insulation
- Lighting and lighting controls
- DHW and processing system pipe insulation
- HVAC upgrades and controls
- Fan motors for walk and coolers

Already Michigan wineries have made significant commitments to sustainability with investment in agriculture, energy efficiency, and renewable energy. The scale of winery energy projects will drive investment in energy efficiency and renewable energy throughout Michigan. Energy savings opportunities were discussed for electricity, propane and natural gas. Additionally, some energy conservation measures were quantified and water saving opportunities discussed, although exact energy reduction results are based on multiple variables.

Energy Use

In total, the ten wineries annually pay an estimated \$248,588 for energy fuel. On average the ten wineries evaluated pay \$0.133/kWh (kilowatt-hour), \$1.81 for liquid propane and \$.91/CCF (centum cubic feet) for natural gas. Total usage of energy fuel was 545,180 kWh, 64,618 gallons of propane, and 34,131 CCF of natural gas.

The total BTUs (British Thermal Units) for participating wineries were calculated and estimated at 11.2 B BTUs per year. The BTUs were calculated from annual winery kWh, CCF, and Propane usage totals. Each kWh has 3,413 BTUs, one CCF has 100,000 BTUs and propane, has 91,500 BTUs per gallon.

Just as automobiles use MPG (miles per gallon) to compare vehicles, with commercial buildings there is a metric used to compare building energy performance. That metric is energy utilization index or EUI. Facilities managers and business owners are growing more aware of this metric and using it to evaluate facilities, performance, and opportunities. It is calculated based with total energy use per square foot. It is best used to compare like facilities and, by using weather

Case Study

In one facility, there was an older, 80% efficient boiler with a cracked heat exchanger. There were several options on the table to replace the boiler with a similar or more efficient unit. At the temperature they were operating the boiler, a high efficiency boiler wouldn't be at its best and provide the potential savings. Additional inquiries were made and it was clear the chiller was at capacity and there was a need to add another chiller. Chillers produce cooling and their waste is exhausted as hot air. This hot air can be reclaimed and through a heat exchanger that provides hot water. This is an example of integrative system design that can offer a tremendous benefit to MI wineries.

In order to be done most cost efficiently, it is important to know how much hot water is in use. It is possible to extrapolate, but this can be grossly inaccurate and lead to the wrong decision. By first implementing monitoring and controls for a few years, the data will then be available to allow better system design. In an example like this with appropriate data, it is possible to take advantage of the synergy of combining these two processes rather than just designing a water heating system and a water cooling system independently.

normalization calculations, can allow for comparing facilities in different areas of the world. In production facilities it is also helpful to consider the energy use per product encapsulated in the energy wine index or EWI. Using Energy Star Portfolio manager allows these numbers to be easily calculated on an annual basis. This type of use with enough wineries participating could result in a category that would allow wineries to receive Energy Star certification for facilities.

- EUI of 95,133 BTU/ft²/yr
- ECI \$2.10 ft²/yr
- EWI \$2.83/case of wine

Assuming average case production of 15,670 cases, the participating wineries paid an average of \$2.83 in energy costs per each case of wine produced per year. The Energy Wine Index (EWI) is the energy cost per case per year for individual wineries. The EWI provides wineries a clear benchmark on the cost of producing wine in Michigan. Wineries can use their EWI to set clear goals to reduce the cost per case of wine through investment in energy efficiency, and renewable energy, and by implementing a thorough energy conservation plan or best practices.

Additionally, the EUI and ECI calculations can be used by wineries to make comparisons against other wineries in Michigan or with additional research, make comparison with published data in other wine regions. These comparative reports are an important part of performance metrics tools that wine sustainability programs have developed to assist wineries with measuring, tracking, and recording energy and water consumption, chemical use, fuel use, and the associated Greenhouse Gas (GHG) of each activity. Recording and monitoring this type of data can help wineries identify any cost savings that result from implementation new practices, or installing more efficient equipment.

Energy Conservation Measures

Each winery has the potential for energy reduction through the implementation of the Energy Conservation Measures (ECM's) and Energy Conservation Opportunities (ECO's) identified during the assessment. ECM's provide an example cost analysis and ECO's identify energy reduction opportunities without doing the math. Keen suggests that wineries create a timeline that makes sense for implementation of all of the measures. A start with no cost, low cost, and moderate cost investments can create energy and cost savings, then earmarks can be made for the larger investments in the future.

When building an implementation timeline or evaluating ECM's and ECO's, wineries should consider the available resources that support agriculture in Michigan. Consumers Energy has specific programs designed in coordination with the USDA resource programs. Some projects installed with the Consumers Energy program (found at <https://www.consumersenergy.com>) can qualify for up to 20% rebates depending on the energy reduction opportunities. Additional grant opportunities through US Department of Agriculture like the Rural Energy for America Program (REAP), or The Michigan Energy Office (MEO) can be used to reduce cost of energy efficiency or renewable energy projects, and combining rebates and incentives can further reduce costs.

Of the facilities evaluated the most cost effective ECM's were:

- Air-sealing and insulation
- Lighting and lighting controls
- DHW and processing system pipe insulation
- HVAC upgrades and controls
- Fan motors for walk and coolers
- Replacing lighting
- Installing new fans
- Retrofit of insulation

On average the ECM's have an estimated initial cost \$4,243. Implementing the ECMs would result in an estimated average annual savings \$1,394 for the wineries, which results in a simple payback of 4.26 years per ECM and an average annual return on the investment (ROI) of 26%. It is important to consider that the estimated initial cost, annual savings, and ROI varies significant depending on the type of ECM implemented. Some ECM's will payback in just 2 years, and other can be quite longer, which is why it is so important for wineries to consider a full implementation timeline that fits the wineries' needs and budget over time.

Rebates and incentives can also impact the ROI of implementing an ECM. For instance, the estimated rebate for the lighting and walk in cooler fan motor project is \$1,028. If purchasing T8 fluorescent lamps, ballasts, and LED lamps, wineries should specify the Consortium for Energy Efficiency (CEE), EnergyStar, and Design Lighting Consortium (DLC). The 3rd party certifications are required for all utility rebate programs. This could mean as much as \$5-\$10 for each LED lamp purchased.

In addition to the ECM's, Keen recommends that wineries evaluate the following Energy Conversation Opportunities (ECO's):

- Lighting Controls
- Temperature Controls
- Electronically Commutating Motors for walk in coolers
- Pipe Insulation
- Ventilation Controls
- Heat Reclaim Chiller
- High Efficiency Water Heaters
- Energy Monitoring and Controls
- Variable Speed Drives (VSDs) for fans or pumps

Environmental Implications

Wineries that invest in energy efficiency, water efficiency, or renewable energy will see a benefit to their bottom line. At the same time, wineries have the opportunity to promote their stewardship and actions to stakeholders and consumers. For instance, a winery should initiate a public campaign to reduce their energy and water use, displaying their progress and goals for stakeholders and consumers for follow. Research has shown that consumers are influenced by a wine's perceived sustainability achievements - which is an extension of the winery itself - and consumers are willing to pay more for that wine. A Michigan winery that commits to reducing energy consumption could tap into this niche market resulting in expanded marketing opportunities.

For instance, wineries who invest in saving energy can ultimately reduce their greenhouse gas (GHG) footprint. Many online calculators are available to estimate greenhouse gas emissions by inputting electricity and gas usage totals. During 2014 and 2015 using the www.americanforest.org calculator it is estimated the energy usage at ten participating wineries produced 1,520,148lbs. of greenhouse gases (1,677 trees). If the 10 wineries could improve their energy efficiency by 15%, the wineries collectively annually save over \$37,978 in energy costs and emissions would be reduced by 228,022 lbs of carbon dioxide (251 trees).

Michigan could be the first wine region to create, plan and set a GHG reduction target. LIVE manages the Carbon Reduction Challenge to help wineries in their program target and reduce GHG emissions, and CSWA's performance metrics help wineries calculate GHG emission; however, neither the California or Oregon wine industry have set a GHG emissions reduction target for their state's wine industry.

For example, assuming that the surveyed wineries are a representative sample of the Michigan wine industry, the participating wineries' data can be extrapolated to provide estimate of the entire Michigan winegrape industry's energy consumption. At an average of 847,771,104.9 BTUs per winery, Michigan's 117 wineries consume 99,189,219,273.3 Btu's of energy a year. Using the same calculator above it is estimated the energy usage Michigan wineries produces 6,567,735 lbs. of greenhouse gases (7,210 trees). If the Michigan wineries could improve their energy efficiency by 15%: (14,878,382,891 BTUs), the annual savings would be over \$436,271 and emissions would be reduced by 985,160 lbs CO2 (1,081 trees).

Development Scenarios

Based on the industry's interest in a sustainability program, the immediate need for a statewide industry association with a secure source of funding, and the process by which other wine industry programs have grown, the steering committee recommends that the Michigan Wine Industry pursue development in four short-term steps:

1. Expand or create an industry association capable of handling administration and management of marketing, research, and a sustainability program
2. Fund the industry association
3. Establish a budget that allocates funding for research, marketing, and the development and management of a sustainability program
4. Use the established budget to follow one of the three potential development scenarios below to build a sustainability program

The industry has shown support for a sustainability program while simultaneously expressing concern about the cost and management of a program. Specifically, industry members have repeatedly pointed out the lack of industry generated funding and the need for greater statewide organizational capacity as the two biggest hurdles facing the industry. Michigan's wine industry should consider these two issues as pre-requisites to address in conjunction with the development sustainability program. The lack of a funding mechanism and organizational capacity limit the industry's ability to pursue more than a sustainability program; without a secure source of annual funding, and an industry association to manage and direct the use of those funds, the industry cannot remain competitive with other growing and establish wine regions that are committing significant funding to research, marketing and sustainability initiatives.

If the industry addresses these two shortcomings, Michigan's wineries and vineyards will have developed the basic infrastructure needed to support research and educational programs, to build and complement the work of the Michigan Grape and Wine Industry Council, and to develop a sustainability standard, program, and certification over the next few years as the industry continues to grow.

Funding

U.S. wine regions have utilized production assessments, membership dues, or collected portion of excise taxes to fund industry associations that support marketing, research, promotion, and sustainability initiatives. It is essential that Michigan's wine industry establish a funding mechanism to support a new or expanded industry association.

Michigan Check Off Assessment

Michigan law – the Agricultural Commodities Marketing Act or PA 232 of 1965 – allows for producers to assess themselves for the purpose of marketing, promotion, and research programs benefitting both the growers and the products they raise. Assessment could be made on inputs and/or outputs, meaning on wine grapes and/or bottles of wine. The industry would need to come together and petition the director of the MDARD to create a board. The board would then structure the actual voting process (overseen by MDARD staff). Using the PA 232 process would give the industry maximum flexibility to design the program that would best suit their desired outcomes.

The Lodi Winegrape Commission, Oregon Wine Board, Sonoma Winegrape Commission, and the Washington Wine Commission utilize assessments on winegrapes or finished wine to fund their organizations.

Excise Taxes

The Oregon Wine Board, Missouri Wine and Grape Board, and Virginia Wine Board are assigned to receive by legislation portions of excise taxes on wine sold in-state to fund their organizations.

Membership Dues

Sonoma County Vintners, Virginia Vineyards Association, The Wine Institute, and The California Association of Winegrape Growers are all membership based industry associations that receive funding directly from membership dues. The Wine Institute and The California Association of Winegrape Growers use a portion of their budget each to fund the California Sustainable Winegrowing Alliance, which manages Certified California Sustainable Winegrowing.

Industry Association

The Michigan Grape and Wine Industry Council (MGWIC) is the only significant statewide industry group currently in operation with an active regular program of support activities for the industry. It is funded through legislation passed in 1985 and receives non-retail liquor license fees to support its mission. The MGWIC should not be the only winegrape industry association that dedicated its budget, staff, and goals to serving the Michigan winegrape industry. Another Michigan winegrape industry association is needed to complement and expand the ongoing statewide work of the MGWIC.

The Michigan Wine Collaborative (MWC) is a recently formed statewide industry association that is a membership-based organization. The MWC could potentially be structured in such a way to manage a sustainability program. The MWC and the MGWIC are working with the Michigan Wine Producers Association, a lobbying group funded by membership dues that supports lobbying activities on behalf of the entire Michigan Wine Industry, to evaluate potential funding mechanisms that the Michigan winegrape industry could utilize.

A 501(c)3 non-profit funded by one of the methods listed above will increase the industry's capacity to handle new and broader marketing, research, and sustainability projects. The industry will have to clearly define the priorities of the association and allocate budget accordingly; for example, the budget could be split into thirds to fund marketing projects, research, and the development and administration of a sustainability program. While kept separate on a budget sheet, these funds and the projects they support should complement each other. The key component of the new industry association is the staff; ideally, Michigan's wine industry should hire an executive director and a project coordinator, since the organization will have to be capable of writing and managing grants, coordinating educational workshops, building partnerships, maintaining a website and online database, creating marketing materials, and developing and administering a sustainability program and certification.

Potential Development Scenarios:

The following scenarios represent potential paths forward for the industry to build a sustainability and certification program. Each scenario requires that the industry establish, or expand, a state-wide industry association with the staff to administer the program, determine budgets, procure funding, and pursue the development of specific resources and tools. These scenarios are intended as a guide for the industry to start the conversation about how best to proceed; they are not absolutes and should be considered at length by industry groups to determine which path best fits the immediate and long term needs, and available resources of Michigan wineries and vineyards.

MAEAP Expansion

The wine industry has engaged with environmental sustainability in vineyards through the Michigan Agriculture Environmental Assurance Program (MAEAP), which is administered through the Michigan Department of Agriculture and Rural Development (MDARD). MAEAP has expressed interest in working with the industry on expanding their existing standards to align more closely with sustainable viticulture practices.

- *Administration and Management* - new or expanded industry association staff would be responsible for managing the program, and winery certification, while MAEAP could help with grower outreach, and educational efforts
- *Funding* - derived from industry association budget for sustainability
- *Self-Assessment* – add viticultural specific best practices and educational resources through a gap analysis of existing standards by technical review committees
- *Certification/Verification* – completed by MAEAP

- *Limitations* – MAEAP does not have an online tool, performance metrics, or a database. MAEAP does not currently verify wineries so a winery self-assessment and certification will have to be developed independently
- *Strengths* – builds on recognized standard, relies on existing and trusted MAEAP infrastructure, shorter development timeframe, provides value to MAEAP, good opportunity to build partnerships with MAEAP

Low Input Viticulture and Enology (LIVE) Framework

LIVE “is a 501(c)3 non-profit organization that provides education and independent third-party certification of vineyards and wineries using international standards of sustainable viticulture and enology practices in wine-grape and wine production.”⁵ LIVE’s standards are endorsed by the International Organization for the Biological Control of Noxious Animals and Plants (IOBC), and LIVE standards adhere to Salmon Safe Farming certification as well. LIVE currently operates in Oregon, Washington, and Idaho, and could be used as a framework by Michigan’s wine industry to create a Michigan winery and vineyard sustainability program, and could potentially be licensed to make LIVE certification claims.

- *Administration and Management* – new or expanded industry association staff in coordination with LIVE staff
- *Funding* – derived from industry association budget for sustainability
- *Self-Assessment* – technical review committees evaluate LIVE and IOBC standards for fit with MI winegrape growing, approved MI standard to be reviewed by LIVE for endorsement
- *Certification* – LIVE could license their certification for use in Michigan, but would still need administrative support from a Michigan organization
- *Limitations* – LIVE would supplant the MAEAP standard, losing gains already made, certification claims would not be Michigan specific
- *Strengths* – Cost effective, relies on credible internationally recognized standard, existing resources would be benefit Michigan’s industry, funds dedicated to build online tool and database could be directed elsewhere

Combined Scenarios

The last development scenario for a Michigan sustainable wine program has been partially addressed in both the LIVE and MAEAP scenarios. It would require extensive coordination and time to lay out the specific details, but the industry could use both LIVE and MAEAP as independent winery and vineyard standards that are overseen by a larger Michigan Sustainable Wine Certification. For example, a vineyard verified by MAEAP could be labeled as a Michigan Certified Sustainable Vineyard, and a winery certified by LIVE could be labeled as a Michigan Certified Sustainable Winery.

- *Administration and Management* – Industry association, MAEAP, and LIVE
- *Funding* – derived from industry association budget for sustainability
- *Self-Assessment* – technical review committees would make recommendations for both MAEAP (vineyards) and LIVE (Wineries)
- *Certification* – MAEAP certifies vineyards, and LIVE certifies wineries, certification claims would have to be clearly defined
- *Limitations* – certification fatigue for consumers and industry, need to reconcile two self-assessment tools in one online website and database
- *Strengths* – builds on existing standards, could create umbrella style certification to incorporate organic or biodynamic producers or create a tiered certification structure to encourage participation, cost and time effective by relying on established organizations and resources

⁵ <http://liveinc.org/about>

Glossary of Terms

- **Sustainability Program** – the initiative managed by an industry association that oversees self-assessment, research, educational workshops, or outreach
- **Sustainability Certification** – a third party review of a winery or vineyard progress according to specific criteria in self-assessment
- **Performance Metrics** – a tool, either online or as spreadsheets, to track, record and report resource use (Water, Energy, Pesticide use, etc)
- **Self-Assessment** – typically a free and voluntary set of best practices for wineries and vineyards to evaluate their operations
- **Issue Areas** – specific chapters within a self-assessment tool like Vineyard Water Management, Human Resources, or Energy Use
- **Best Management Practices (BMPs)** – specific operations within a self-assessment chapter like Installing Flow Meters, Regular Soil Sampling, etc.
- **Organization Acronyms**
 - LIVE- Low Input Viticulture and Enology
 - CSWA- California Sustainable Winegrowing Alliance
 - CCSW- Certified California Sustainable Winegrowing
 - SAW- Sustainable Australia Winegrowing
 - MAEAP- Michigan Agriculture Environmental Assurance Program
 - MGWIC- The Michigan Grape and Wine Industry Council
- **Willingness to Pay (WTP)** – the range of prices consumers are comfortable expended on a given product

Appendix

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