Energy for Sustainable Development 23 (2014) 85–91

Contents lists available at ScienceDirect

Energy for Sustainable Development

Energy and English wine production: A review of energy use and benchmarking

Mervyn Smyth [a,*], Alistair Nesbitt [b]

[a] Centre for Sustainable Technologies (www.cst.ulster.ac.UK), School of the Built Environment, University of Ulster, Newtownabbey BT37 0QB, United Kingdom
[b] Plumpton College, Wine Department, Ditchling Road, Plumpton, East Sussex BN7 3AE, United Kingdom

ARTICLE INFO

Article history:
Received 23 December 2013
Revised 5 August 2014
Accepted 7 August 2014
Available online xxxx

Keywords:
English wine production
Sustainability
Winemaking
Energy
Benchmark

ABSTRACT

The English (and Welsh) wine production industry, with more than 120 wineries, has many challenges linked to its northerly cool climate conditions and youthful status as a quality wine-producing country. The subject of sustainability remains important for producers, particularly as a means of improving the economic viability of wine production.

This paper presents energy usage within English winemaking facilities based upon energy audits conducted at an individual winery level. The survey did not include vineyard operations or energy usage. The wineries surveyed were representative of the geographic distribution of producers in England and included a range of production scales from a few thousand bottles per year to over 300,000 bottles per year. The combined (average yearly) bottle production for the wineries surveyed was 1,032,194 bottles, representing almost 26% of the total wine production capacity in England and Wales, expending 512,350 kWh of energy. Almost 44% of the energy expended in English wine production is related to heating, cooling and ventilation (HVAC) requirements, with 22% related to lighting. Extrapolating the study findings to the entire English winemaking industry (winery only) indicates that 2008 MWh of energy was expended in 2011. The average energy benchmark for English wine production is 0.557 kWh/l, ranging from 0.040 kWh/l to 2.065 kWh/l, which compares favourably with other wine producing regions.

The English wine industry

The English (including Welsh) wine production industry expanded rapidly from under 800 ha of established vineyards in 2005 to over 1300 ha in 2012 with more than 120 wineries, and it continues to grow. The wines produced are aimed at the premium market, with Sparkling Wines at the price-points occupied by good Champagne. Global warming, modern viticulture and oenology technology (growing grapes and making wine), and an improved skills base have all contributed to the growth of the industry in England. To maintain a sustainable industry, England must therefore address the grape and wine production challenges linked to its small size, northerly cool climate conditions and youthful status as a quality wine-producing country.

The challenges and thus experiences in producing quality wine in England have relevance to other emerging wine nations, even those in the developing world. India, for example, has been cultivating grapes for table use for centuries, but more recently, around 0.5% of the country's viticultural output has been turned over to wine production. Covering an area of approximately 3500 ha, primarily centred around one geographical region (Maharashtra), the majority of wine production is produced from small holdings of just 1 to 2.5 ha in size (Hinge, 2009). Given the relatively new status of Indian wine production, its organisation and infrastructure along with the challenges related to marginal climatic conditions there are many similarities with the UK wine industry. For many emerging nations/producers trying to establish themselves in the competitive global wine market, efficient production and improved economic viability are necessary. Energy sustainability is therefore seen as a key factor in reducing operating costs and achieving an overall sustainable business/industry model (Laurence Gould Partnership, 2012).

Energy use in English winemaking

There are many different systems, spaces and processes required in the modern winemaking facility. Fig. 1 schematically indicates some of the more common headings used to describe the activities associated with the production of wine. Each of these activities has a role within the modern winemaking facility and have a corresponding energy requirement, which collectively relates to an energy input necessary to produce the finished product. English wine is predominantly sparkling wine (currently ~50% of production) or light aromatic still wine wines. The shift over the last few years has been from growing older Germanic

* Corresponding author. Tel.: +44 2890 368119.
E-mail address: m.smyth1@ulster.ac.uk (M. Smyth).

http://dx.doi.org/10.1016/j.esd.2014.08.002
0973-0826/

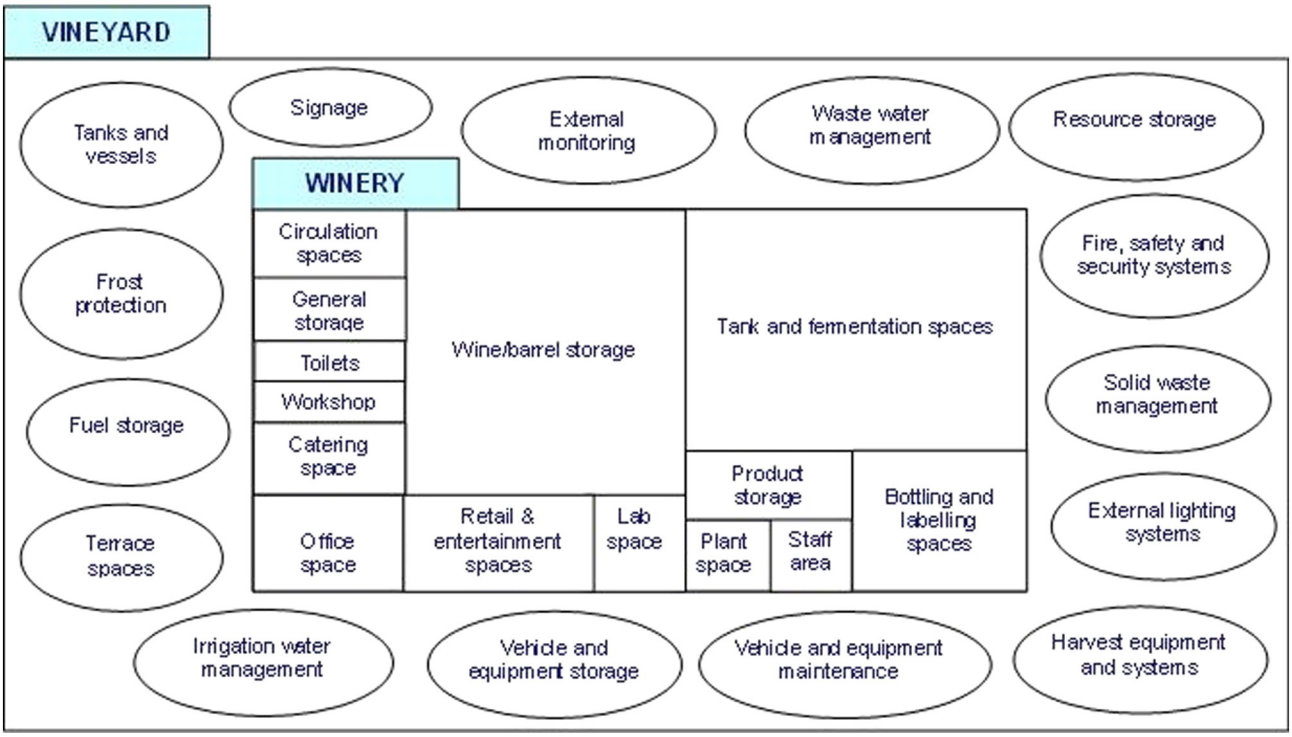

Fig. 1. Schematic representation of winemaking requirements (Smyth et al., 2011).

varietals to planting classic Champagne varieties: Pinot Noir, Pinot Meunier and Chardonnay to produce traditional method sparkling wine.

To accurately assess the absolute energy requirement of a commercial winemaking enterprise is quite a difficult task, due to the range and inter-relationship between variables, which includes highly variable parameters such as transportation to market or embodied energy. It is therefore more simplistic (and realistic) to determine the measurable indicators specific to each facility, namely the energy inputs that can be accounted for within the boundaries of the wine producing facility. This study did not quantify the total energy used from vine to bottle,

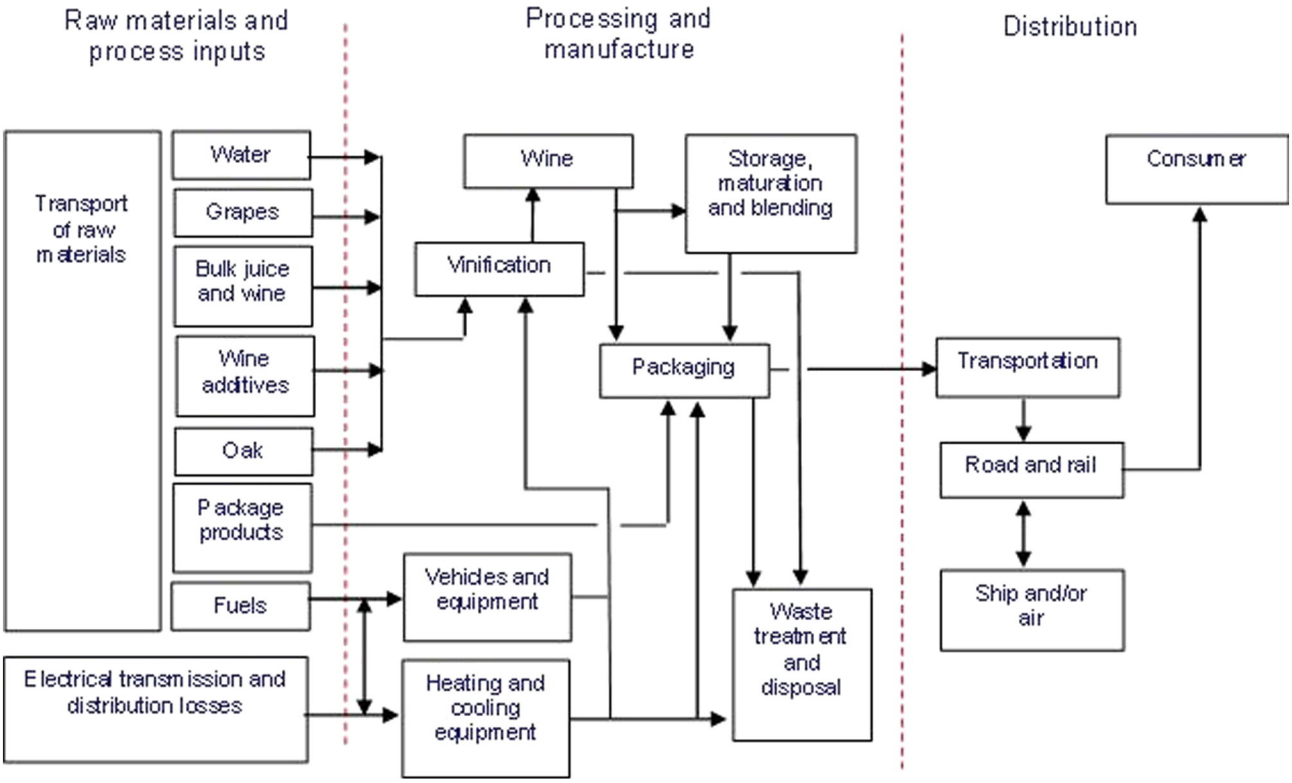

Fig. 2. Winery supply chain showing fuel and energy inputs (adapted from Forsyth et al., 2008).