

**THE BEST AVAILABLE TECHNIQUES (BAT) FOR THE SUSTAINABILITY OF WINE
MAKING PROCESS: AN ENERGY AND WATER ANALYSIS AS A STRATEGY
FOR RESOURCES OPTIMIZATION**

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The European Community with the approval of Directive 96/61/EC (ICCP Directive - Integrated Pollution Prevention and Control) of 24 September 1996 initiated a gradual process aimed at limiting the environmental impact of industrial production, according to various protocols' environment adopted in recent decades.

For the purposes of its application have been prepared a series of technical reference documents (Best Available Techniques Reference Documents - BREF) that define the procedures and terms of the directive in a wide range of industries.

One of these, the "Best Available Techniques Reference Document or in the Food, Drink and Milk Industries (BREF FDM) in August 2006 specifically refers to the food industry by providing precise information on the levels of emissions and energy consumption of processes and on the "Best Available Techniques" (BAT), indicating that term "best available techniques in order to control energy use and water and environmental impact."

To this aim, techniques and options for emission reduction must be related to different processes in order to assess the environmental benefits, technical feasibility and economical aspects.

The Department of Agricultural Engineering of the Università degli Studi di Milano has set up several years research in this direction in order to validate the data in the documents of the European Community with direct analysis conducted in various wine industries. This has allowed us to identify the main consumers, both electric and water, suggesting strategies for saving and optimized management of resources.

Two lines of research were followed: first we tried to identify the energy consumption related to wine making process by identifying the steps to greater energy intensity, while the other measured water consumption were mapped within the context of production.

Analysis of power consumption was conducted by splitting the production process into three macro processes and two service areas: the process of pressing, wine maturing and bottling and the two areas related to transport and energy needed for refrigeration systems. The average values identified can be summarized as follows:

- Phase pressing: 1.5 kWh/t;
- Phase wine maturing: 0.1 kWh/t;
- Phase bottling: 1 kWh/t;

- Transport: 0.03 kWh/t;
- Refrigeration Energy: 500 kWh/t.

The investigations conducted in relation to water consumption have identified a specific value of power consumption of approximately 10 L water / L Wine in accordance with data provided by the EU documents. Interestingly, in the cases under study, 20% of water is committed for washing crates and 50% for that of the tanks. Water consumption are also markedly higher in the six months from March to October (+80%) when both the successive stages of winemaking is starting late harvest.

Analysis undertaken have revealed how the wine industry has some fields for intervention and for an interesting discussion of ethical behavior towards environmental issues, both for a margin of savings certainly not negligible.

In particular there are two main areas of intervention: on one hand the adoption of behavioral practices "virtuous" can lead, in line with the considerations advanced in the EU document, with a saving of 15% for both resources and on the other the adoption of advanced technologies both for what concerns the rationalization of water (water recycling systems, wastewater, etc..) and to save energy (use of inverters for the refrigeration systems and for the pumps, use of high efficiency motors on the machines, etc.).

These considerations lead us to conclude as for the entire wine industry is essential to these issues reach the center to govern the entire process in a fully sustainable way.

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