POLITECNICO DI TORINO
SECOND SCHOOL OF ARCHITECTURE
Master of Science in Architecture for the Built environment
Honors theses

THE WINERIES SUSTAINABILITY:
Energy and environmental assessment tools; case-studies; future developments

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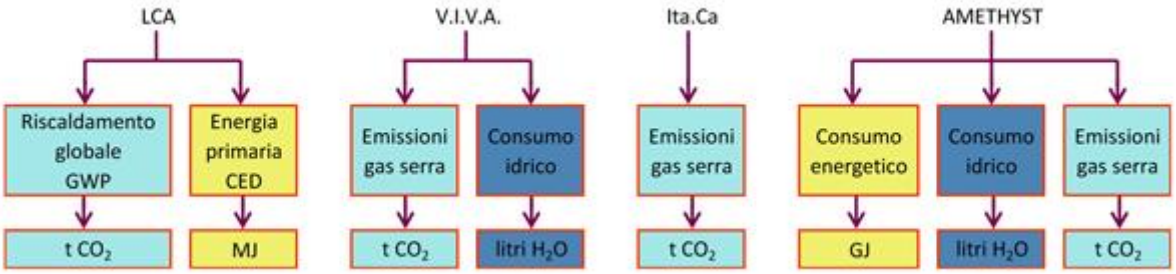
In the last few years, the wine industry is facing with the issues of sustainability and energy and environmental efficiency, both for the production cycle and for the characteristics of the winery.
This trend is recent and the assessment tools are still rare and incomplete.
Main available assessment tools were analyzed to propose a methodology for the assessment of energy and environmental aspects of the entire life cycle of a winery, both about production cycle and building aspects.

Wine production is a complex process that includes farming activities in the vineyard and other ones carried out in the winery, subdivided into four phases: delivery of grapes, vinification, storage and packaging of the finished product. Each activity is characterized by different operations that require spaces with specific environmental conditions.

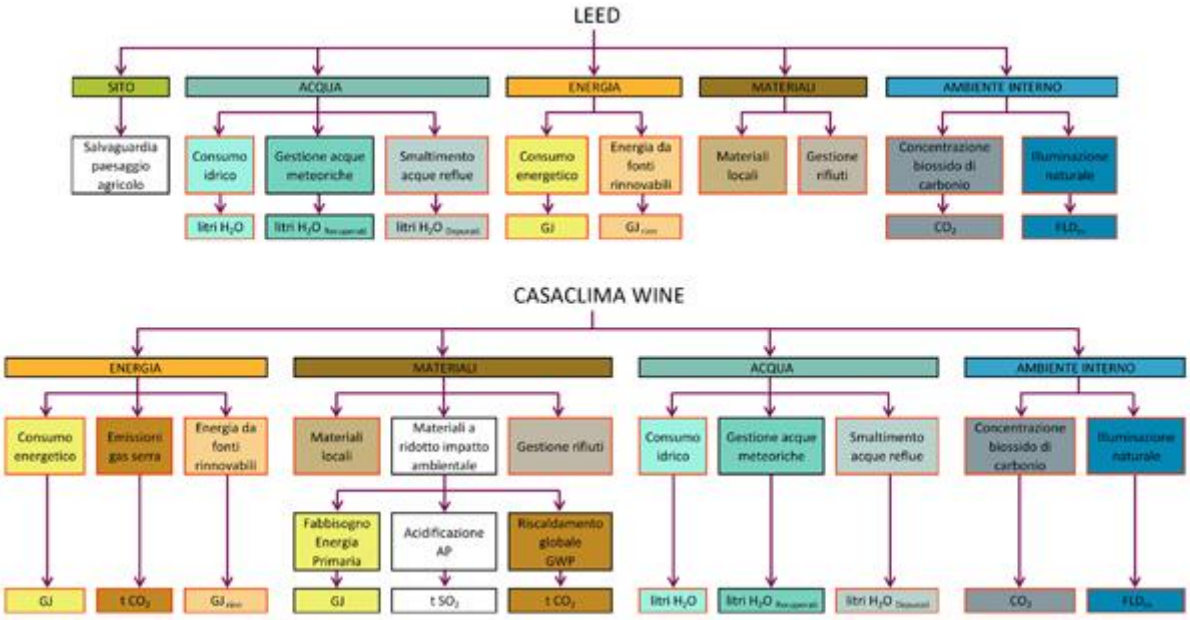
About energy and environmental assessment tools of the production process there are four methods:

- V.I.V.A. (Environmental Impact Assessment of Viticulture), with the objective to defining an evaluation through four indicators: Vineyards, Land, Water and Air.
- Ita.Ca, a greenhouse gas emission calculator for the Italian wine industry.
- Amethyst, a self assessment tool for winery, developed in Europe, adapting the Californian method BEST Winery. Software Amethyst is free available on internet and so this method has been applied to a case study (Destefanis Vinery from Canale - CN, harvest 2012).
- Life Cycle Assessment, an objective assessment of the entire life cycle of a product, concerning every stage of its production. In this thesis has been carried out a research on the LCA studies made on the wine sector nationally and internationally until now.



Production Process - Diagram of requirements identified by the different assessment tools

About energy and environmental assessment tools of the winery there are two methods and they correspond to two certification systems: LEED and KlimaHouse. LEED is a U.S. certification system, recognized at international level, in which there isn't a specific protocol for wine industry, but North America wine producers have certified its winery on the basis of one of the existing systems.
KlimaHouse Agency of Bolzano has recently introduced a specific protocol for winery, called KlimaHouse Wine, which considers building energy efficiency, consumption of the production cycle and interior comfort.



Building - Diagram of requirements for LEED and KlimaHouse Wine certification. There are some common requirements (colored boxes) and most important requirements are in boxes with red borders

The ultimate goal of this thesis was to define guidelines for a unified and complete assessment tool, concerning winery in its entirety and considering the contribution of all the methods described.
In the proposed methodology energy and environmental assessment tool of a winery is divided in the evaluation of the production process and the evaluation of the building.
For the production process can be considered two components: energy and environmental impacts of vineyard activities (CO_2 emissions, water consumption, eutrophication potential) and impacts of winemaking cycle (CO_2 emissions, water consumption, energy consumption, use of local materials, waste management).
About building assessment is necessary to analyze four areas:

- Water (water consumption, wastewater disposal);
- Energy (energy consumption, use of renewable energy, greenhouse gas emissions);
- Materials (use of local materials, waste management);
- Internal environment (concentration of carbon dioxide, natural lighting).

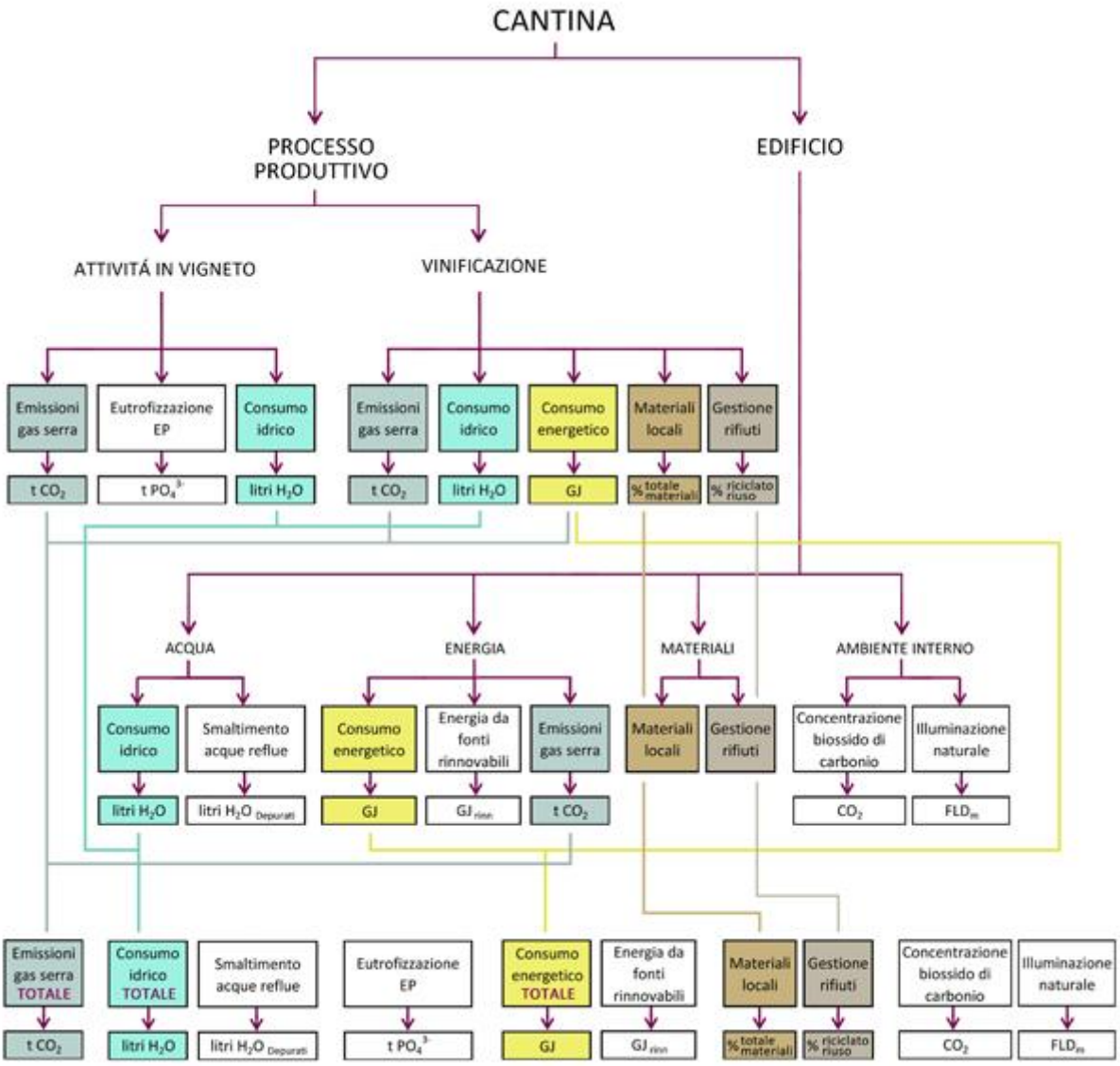


Diagramma of the proposed methodology for energy and environmental assessment tool of a winery

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