Institute of Brewing and Distilling - Asia Pacific Section

Why wasting Energy & CO_2 when you can save/recover it?

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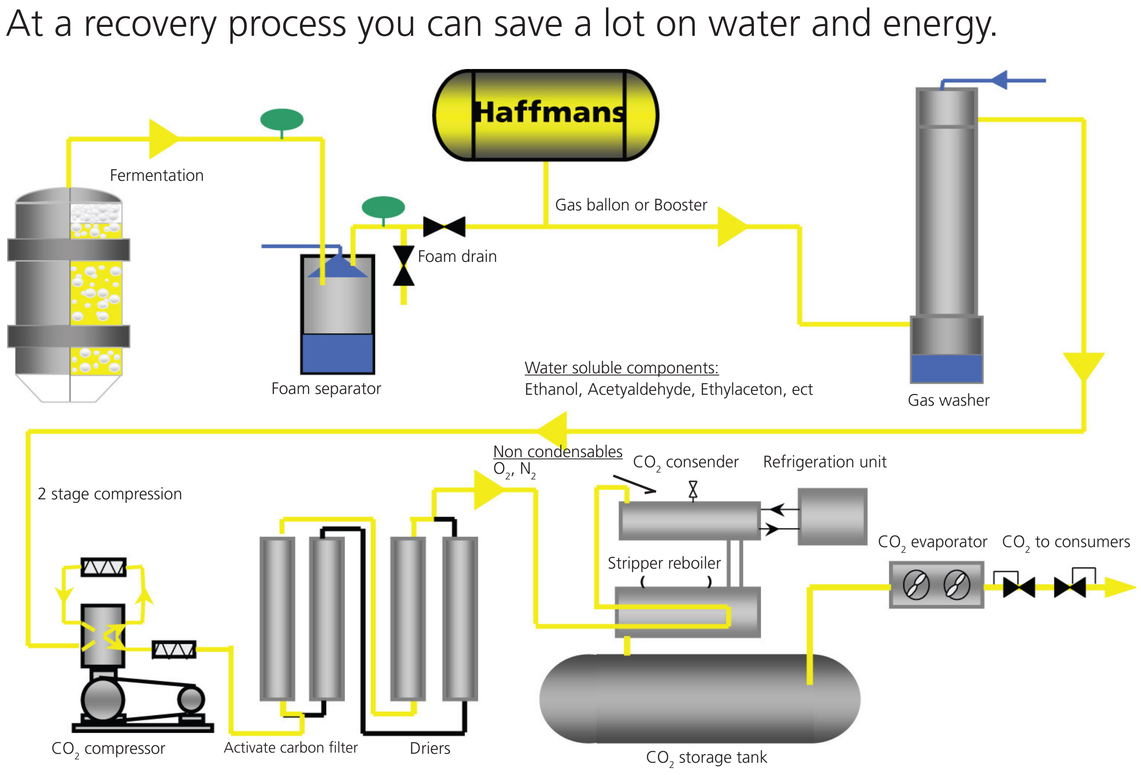
Introduction

With increased environmental awareness and desire to further reduce costs, breweries, wineries and beverage manufacturers are focussing on more compact possibilities to reduce energy consumption and waste.

The plant needs to be designed in such a way that the energy consumption and waste will be at a minimum level. As a lot of the energy in a production plant will be consumed in the utility area this is the area to look for.

At a recovery process you can save a lot on water and energy.



Save on water

Foam Seperator (or knock out drum)

Before the CO_2 gas, coming from the fermenter can be add to the recovery system the foam needs to be separated from the CO_2 gas. Therefore water is needed to "knock down" the foam. In many cases foam separators are continuously spraying water as they don't use foam sensors resulting in a large waste of water. By using "foam sensors", to detect the availability of foam, you only spray water if required. This rather small investment can already save money on a very short time.

Gas washer

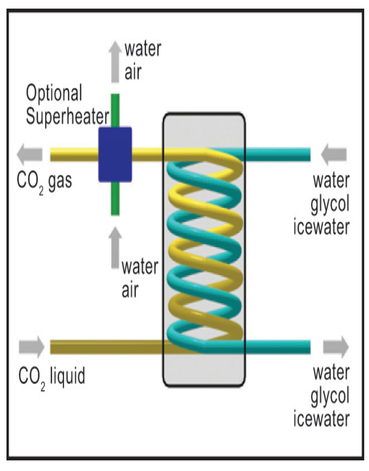
Another step where water can be saved in the cleaning process of a CO_2 recovery system is by using the right gas washer. A gaswasher is used to remove water soluble impurities. This process needs a lot of potable water. How to save water in this process. First it's important to install the gas washer behind the balloon. Then you only need water when the system is running. If the CO_2 system has more than one compressor you also should turn down the water flow in case the CO_2 system is running on ½ capacity.

Save on Energy

Traditional methods of carbon dioxide (CO_2) evaporation use steam, ambient air or electricity. Ambient airoperated CO_2 evaporators are only applicable when the ambient air temperature is high enough. The use of steam or electricity results in high energy costs, which accounts for the major part of production costs. Because of this, any potential savings on energy consumption are vital.

Heat Recovery - Direct

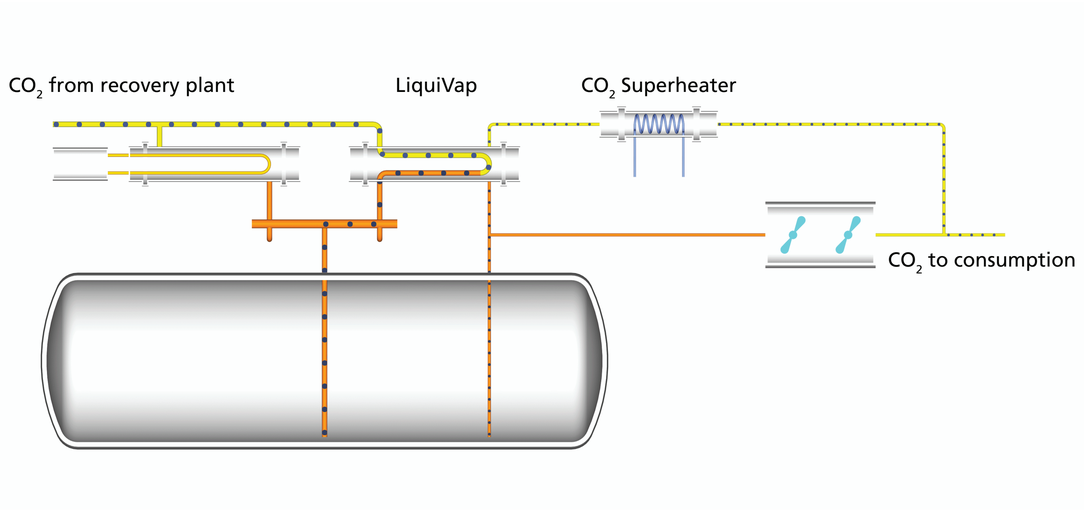
There are several media available for cooling down the product and machinery. Examples are ammonia (NH_3), glycol, ice water and cooling water. The return flow of these media can be used for CO_2 evaporation. This type of operation has dual energy advantages because the CO_2 is evaporated by means of a medium that takes advantage of available energy. In addition, the NH_3-plant, glycol plant or cooling towers are less loaded, due to the fact that the medium is pre-cooled. By installing such a system, you are able to recover, and save, a lot of energy.



Heat Recovery - LiquiVap

CO_2 recovery requires energy to condense the recovered CO_2 from fermentation. CO_2 evaporation, prior to CO_2 consumption, requires energy to vaporize the CO_2. The LiquiVap system optimally applies the two "neglected" energy streams.

Heat released when liquefying CO_2 gas and cold released when evaporating liquid CO_2. By combining the energy intensive processes, 90 percent of the required cooling energy can be recovered, which saves up to 60 percent on electrical energy costs required by a traditional CO_2 plant. LiquiVap can be provided for new CO_2 recovery plants and easily retrofitted to existing CO_2 plants.



Direct

Recovers energy from vaporized CO_2 DIRECTLY back into your utility processes – saving you money.

- Short payback time (ROI)

Annual production	800,000 Hl	ROI = 19 months
Glycol costs	€ 0.027/kW	
Steam costs	€ 0.017/kg	

Example of ROI-calculation

- No CO_2 vaporization operating costs
- Reduced house refrigeration system operating costs
- Applicable for glycol, cooling water and process water

LiquiVap

Cuts CO_2 Plant operating costs by up to 60%!

- Short payback time (ROI)

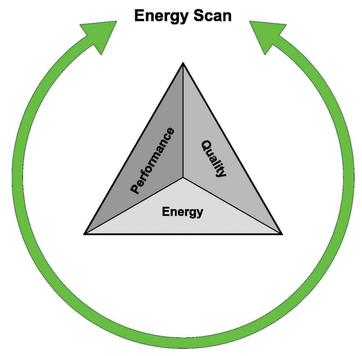
Annual production	2,000,000 Hl	ROI = 11 months
Electricity costs	€ 0.083 kW/h	
Steam costs	€ 0.019/kg	

Example of ROI-calculation

- Environmental friendly – CO_2 as a refrigerant
- Easily retrofitted into existing systems – ideal for capacity upgrades
- Additional CO_2 Recovery without additional energy costs

Energy Scan

Interested in how to improve performance and processes, while meeting environmental, health and safety challenges? As a specialist in CO_2 management Norit Haffmans offers an energy scan to enable you to reach these targets.



An energy scan of your **CO_2 recovery system** will provide detailed information on:

- Energy Consumption
- Performance
- Quality

and will be translated into a custom-made maintenance plan as well as an advise for any needed improvements. This ensures you maximum plant efficiency and best quality performance against the lowest energy consumption.

Conclusion

To be more competitive in the future a focus on energy and water consumption is ineviable. Minimizing utilities costs are essential in meeting energy and water saving targets. When looking for the right system there are opportunities to save energy and water at a CO_2 recovery system. In particular water savings at the foam separator and gas washer and electric power savings at the liquefaction and CO_2 evaporator. With a new plant these design options should be taken in account and with a modification or system upgrade these energy saving options should be taken in account.