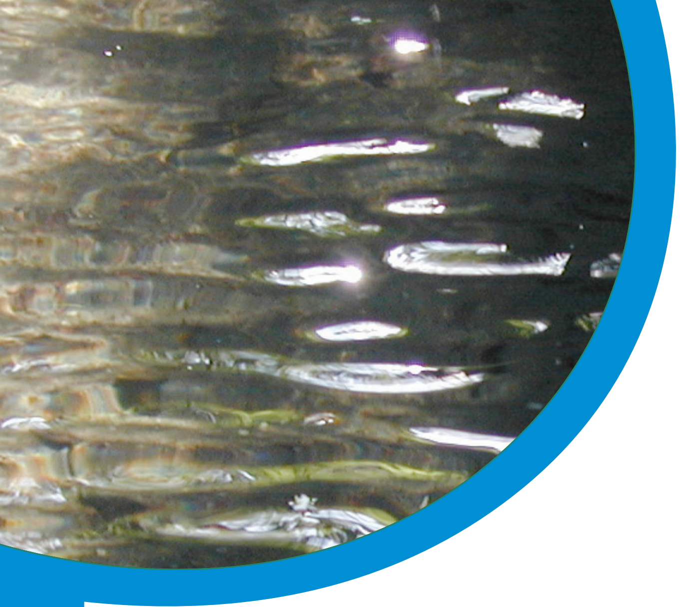

The Smart Alternative to Disposal

Process water recycling secures tomorrows earnings

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Do you have waste water in your production which cannot be disposed of into the public sewer system? How do you manage this waste water? Often this waste water is disposed of with specialised waste management companies. This is a straightforward procedure not disturbing the day to day business in the production. However; here big saving possibilities are hidden. When processing this water in-house 70 % of the occurring cost can be saved. When processing 2.000 m³ industrial waste water in-house instead of disposing of the water with waste management companies one can save in ten years more than € 1,000,000.00. These savings justify investment in water processing equipment in almost every case.

But which process for the treatment of the waste water is the right one? On the market several different technologies are available, all of them offering pros and cons. The variety of possibilities makes the proper selection of the right process difficult.

Which processes are available?

The most common processes fort he treatment of industrial waste water are chemical physical treatment plants, membrane plants and vacuum distillation systems.

Chemical Physical Treatment	Membrane Filtration	Vacuum Distillation
In chemical physical treatment pants several chemical substances are added to the process water in suitable order, resulting in precipitation of contaminants. The solids are filtered and disposed of with waste management companies. As an alternative or as additional treatment ion-exchanger columns are used to separate the contaminants. The treated water can be disposed of into the public sewer system in the most cases.	In membrane plants the waste water is filtered through water permeable membranes. The contaminants are retained and disposed of in liquid form with waste management companies. The permeate can be disposed of into the public sewer system in the most cases.	In vacuum distillation systems the contaminated process water is evaporated under vacuum. The caloric energy of the emerging steam is used to heat up and evaporate the feed water, thus the systems are very energy efficient. The distillate can be recycled back into the process, creating a zero liquid discharge production. The evaporation residue is disposed of with waste management companies

Which is the right process?

In some cases there is only one processing possibility. It can be determined by amount of waste water and degree of pollution. If mostly inorganic pollution membrane filtration plants can be exclude since processing would be too costly. If the water contains latex, paint or proteins vacuum distillation is not applicable. Fig. 1 shows that there is a extensive area where all three processes are an option. In this area the different processes have to be compared carefully.

Which are the important criteria to select the process?

First of all the general requirements have to be fixed. The most important criterion is the quality requirement to the treated water. This criterion is the basis for analysis of all following criteria.

Certainly the most important criteria are costs. Not only investment, but also operation costs have to be considered. What sense does a low investment make, if high operation costs are eating up this advantage within shortly?

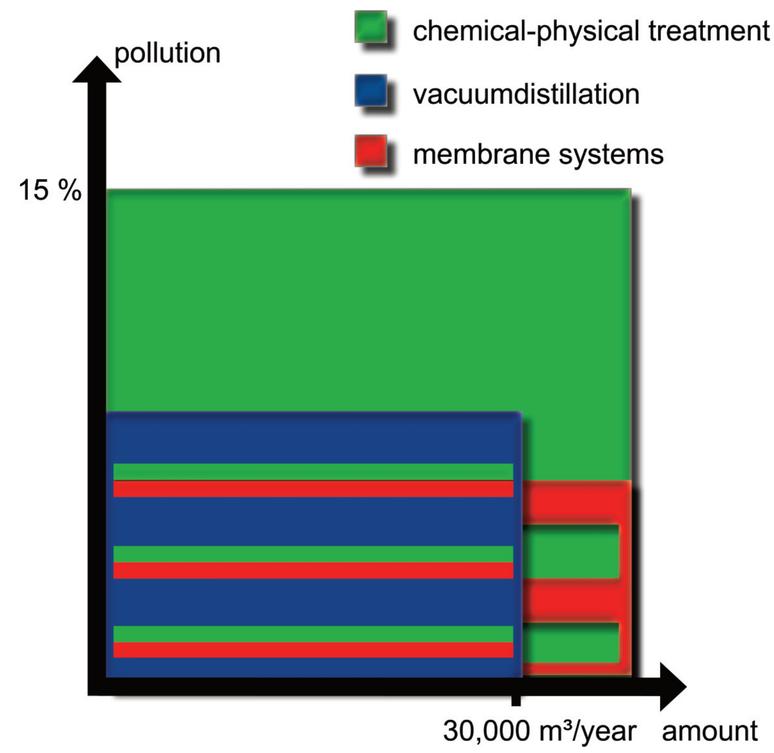

Figure 1: Range of waste water treatment processes depending on volume and grade of pollution

Process flexibility is a very important factor as well. How does the processing plant react if waste water quality varies or even changes composition totally within shortly? What happens if alternative process chemicals are applied in the production process?

Finally reliability has to be looked at. How complicated is the operation of the system? In how far can the operators themselves react in case of malfunction?

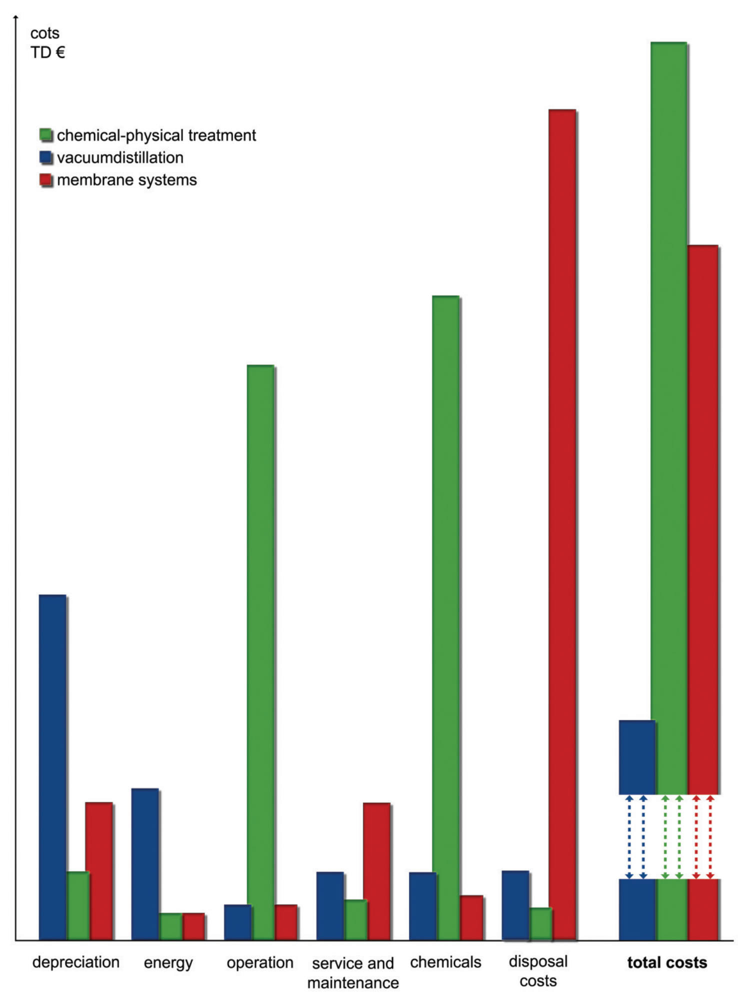

Figure 2: Comparison of operation costs for process water treatment systems

Zero liquid discharge – is it feasible?

Nowadays many companies focus on sustainability to save valuable resources. Self imposed environmental standards are often higher then required by the respective authorities. This certainly includes responsible dealing with valuable fresh water resources. If the aim is zero liquid discharge production facilities and/or if very pure rinsing waters are required, vacuum distillation is the best choice. Distillate quality is high enough to allow recycling without or with simple post treatment only. Distillate is normally almost free of oil and heavy metals. Only if quality requirements to rinsing water are very high post treatment with ion exchangers is necessary.

When using other processes like chemical physical treatment or membrane filtration the quality of the treated water is below fresh water quality. Thus it is more feasible to dispose of the treated water into the public sewer system and process fresh water to the required quality for the production process.

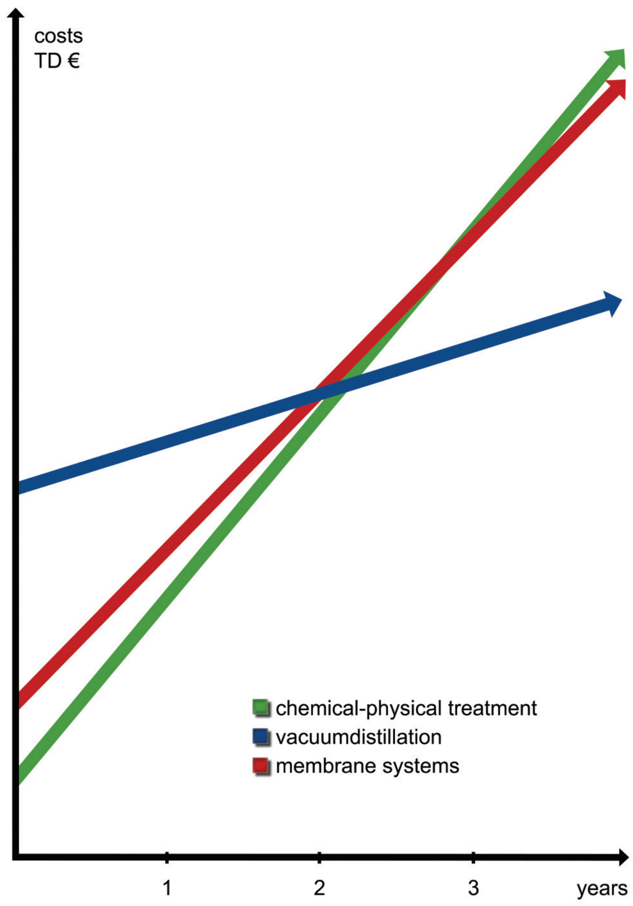

Figure 3: Comparison of life cycle costs of process water treatment systems

When investigating investment and operating costs of vacuum distillation systems in the area of 100 to 30,000 m³ waste water per year with a pollution degree lower 8 % one can see the feasibility advantages of vacuum distillation technology. Investment costs are higher compared to other processes; however operation costs are unbeatable. Chemical physical treatment has very high chemical consumption figures and operation is time consuming and demanding, especially if the waste water composition is complex. Consumption figures of membrane filtration plants are moderate; however retentate amount is rather high leading to high disposal cost. Fig. 3 shows that higher investment costs of vacuum distillation systems are compensated quickly by lower operation cost.

In terms of flexibility and reliability vacuum distillation systems are setting benchmarks. Modern systems adapt to varying process water compositions automatically. If for instance designed for the processing of spent coolant emulsions small and simple modifications allow processing of galvanic rinsing water instead. Smart maintenance concepts and intelligent process visualisations improve system availability and ease operation. In so far modern vacuum distillation systems as reliable as the specialised waste management company picking up the waste water frequently.

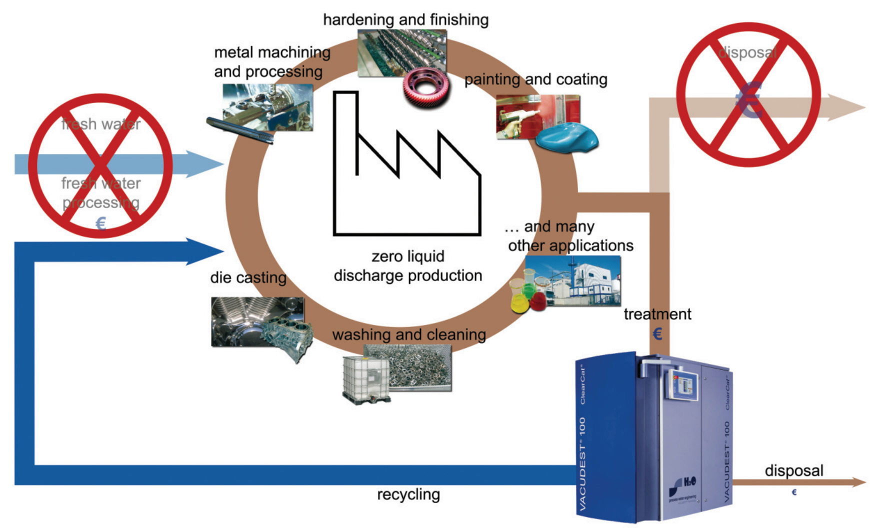

Figure 4: Vacuum distillation systems save money

Summary:

Fig. 1 explains process selection depending on waste water volume and degree of pollution. In the area where several processes are possible vacuum distillation proves to be the most feasible and environment friendly process. In other areas it is recommendable to think about combination of several processes (for example membrane filtration plus vacuum distillation for the processing of retentate.