

Advanced distillation technologies

Towards energy efficient separations



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Partners: to be determined
Budget: 2.4 MEuro
Duration: 2012-2015

Objective

Development of energy efficient distillation systems applicable to binary and multi-component separations, azeotropic, extractive and reactive distillation.

Motivation

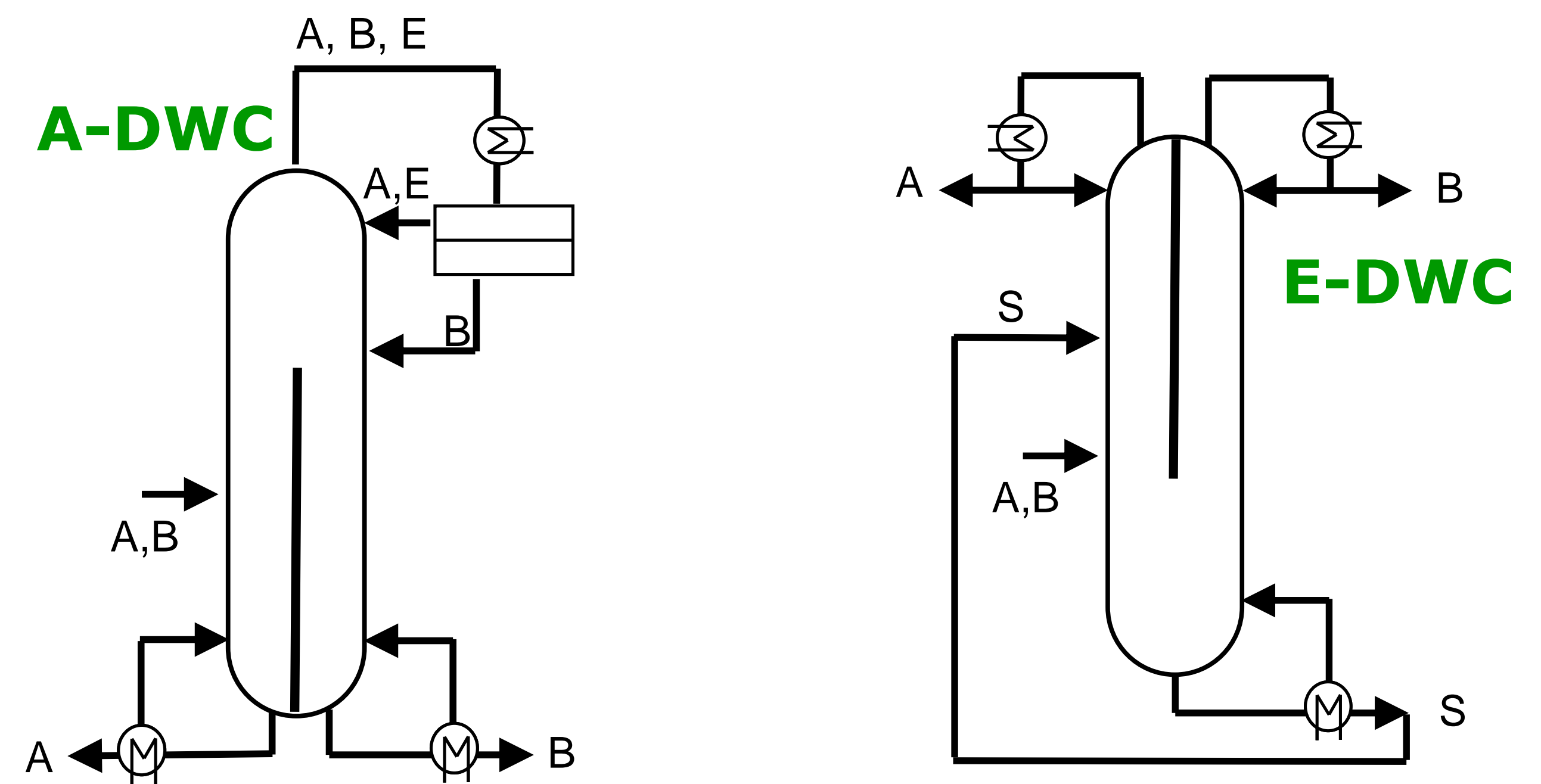
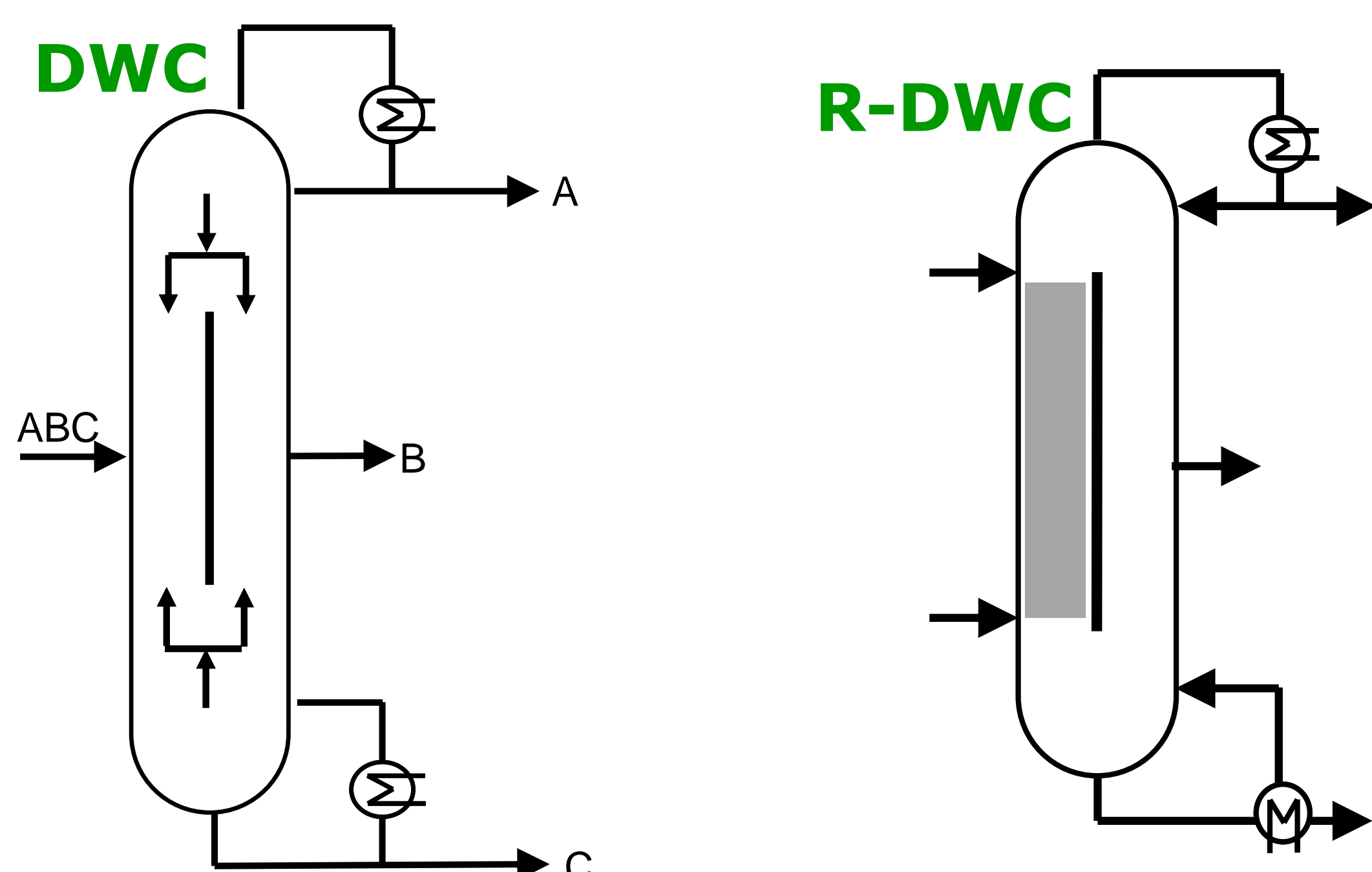
- Conventional distillation accounts for over 40% of the energy used in the chemical process industry (CPI).
- Cyclic distillation and dividing-wall columns (DWC) can significantly reduce the energy use by 25-50%, and the CapEx and plant footprint by 20-45%.

Project scope

- Development and experimental test of energy saving distillation systems, by using new concepts (DWC and cyclic distillation) with existing equipment.

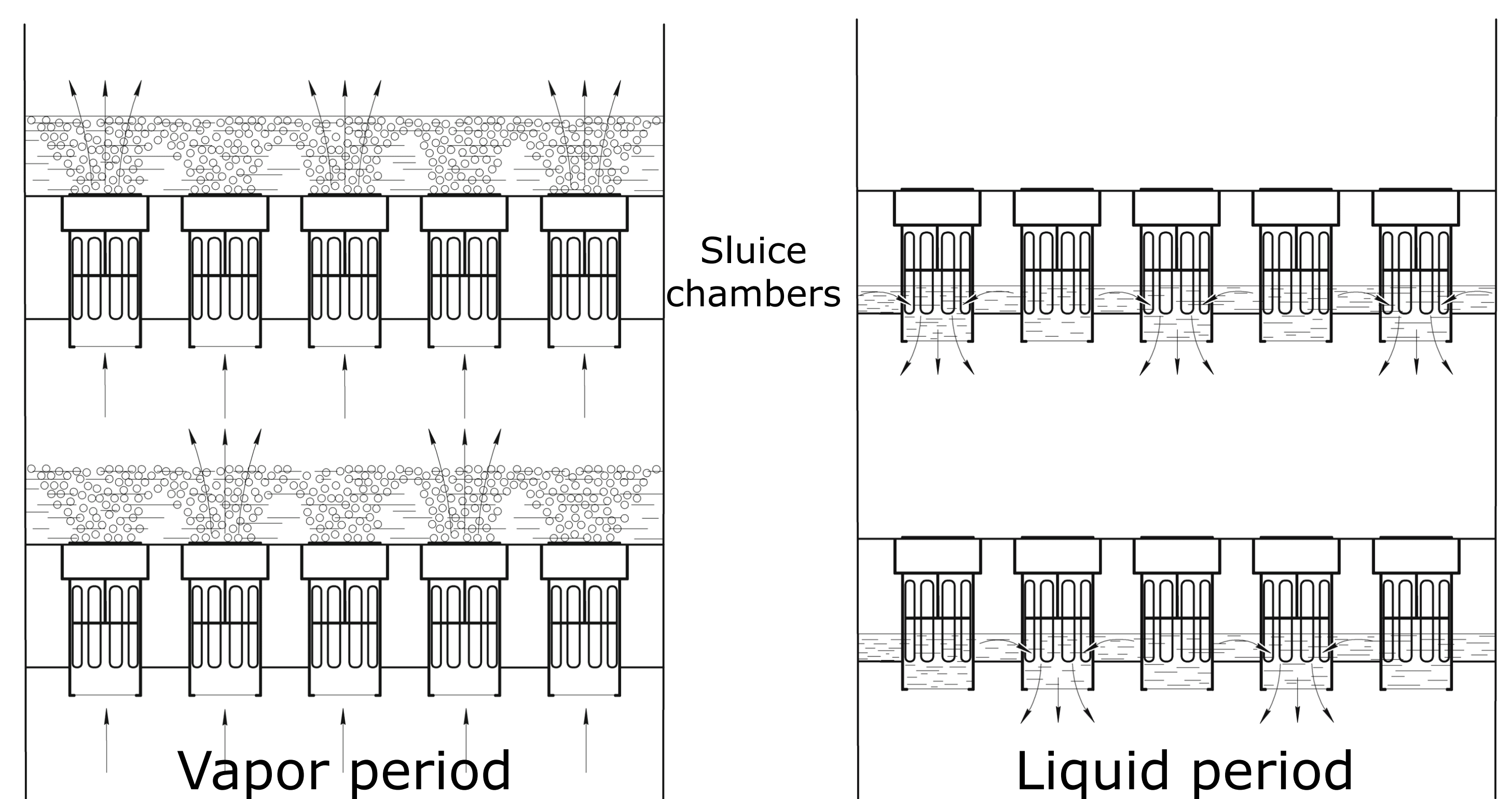
Dividing-wall column

- Combines two distillation units in one.
- DWC is the only industrial example of process intensification where the footprint, and both CapEx and OpEx are reduced.
- High thermodynamic efficiency due to no remixing effect (about 25-40% savings).
- Applicable to ternary separations, but also to azeotropic (A-DWC), extractive (E-DWC) and reactive distillation (R-DWC).



Cyclic distillation

- Allows high separation efficiency 140-300%
- Higher throughput and productivity
- Based on separate phase movement (SPM)
- Vapor period alternating with liquid period



Status

- DWC is available at industrial scale but with limited use, only in ternary separations.
- Cyclic distillation was proved to work in the food industry, but only for the binary distillation of an ethanol-water mixture.
- Technology is quite mature – equipment is available at pilot or industrial scale.

Applicability

- Cross sector applicability to bulk and specialty chemicals, as well as food industry.