SARAL ENGINEERS LLP

(Group of K G Corporation)

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MR. RUSJHIT KANSARA

MR. BHADRESH NAGORI

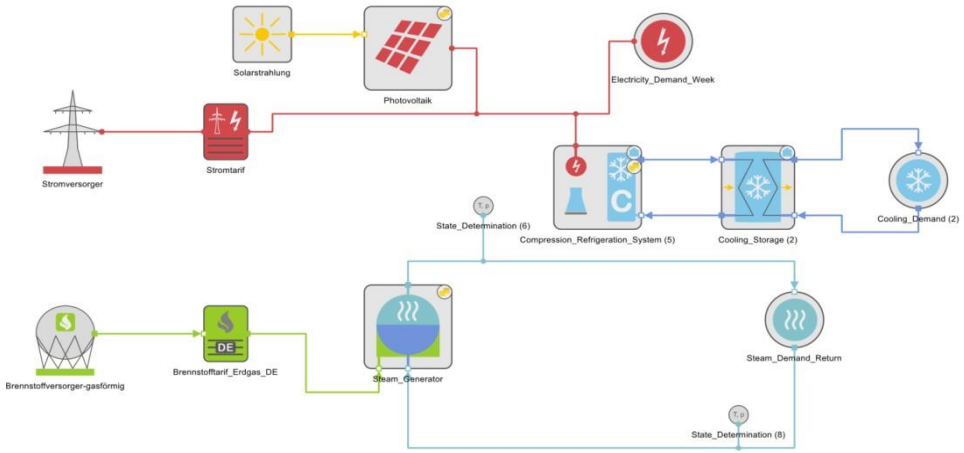
Novel Green Energy Management through Process Decarbonisation.

306, Sarita, Jain-Temple- St. Xavier's College Road, off. C.G. Road, Navrangpura, Ahmedabad – 380009. (INDIA)
Cell No: +91 9824250640, +91 9714050640 * E-mail: saralengineersll@gmail.com, bhadreshnagori@gmail.com
Web: www.kgcorporationindia.com, www.kgcorporation.co.in,

Food Industry

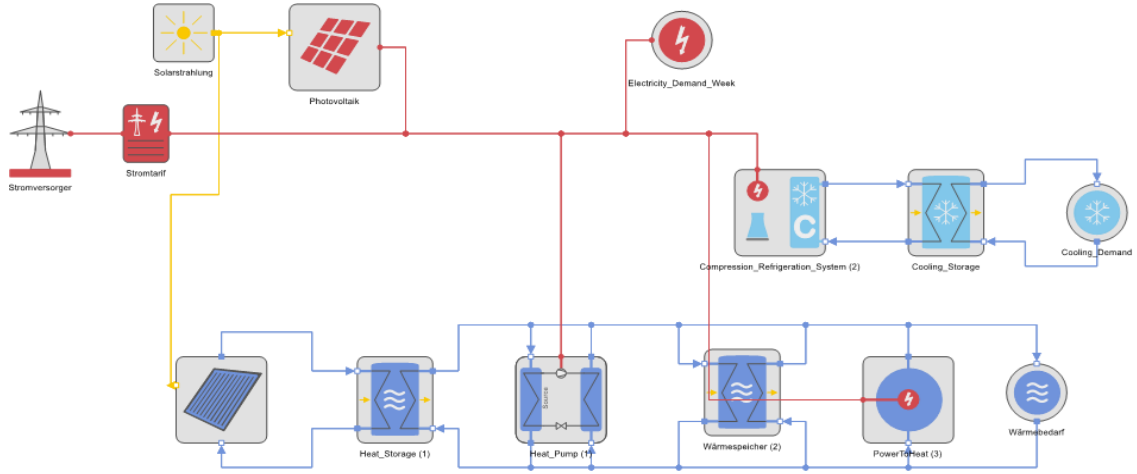
Existing state:

- Heat is covered by steam generation
- Small renewable electricity available



Decarbonized state:

- Heat is covered by hot water generation using
- Solar Collector, Heat Pump and Thermal Storages
- CO_2 reduced Upto 40%.
- With larger renewables the operating cost and – emissions can be further reduced.



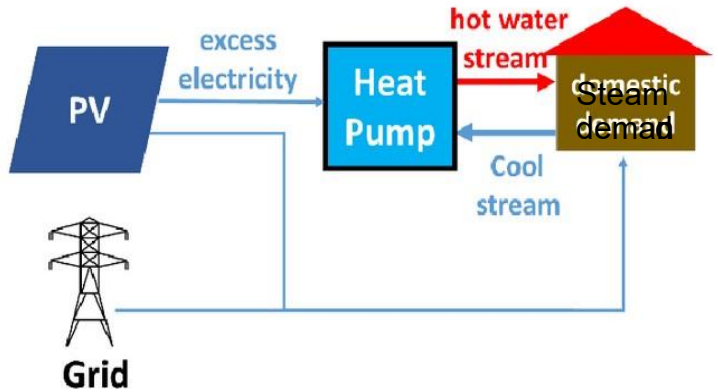
Paper Industry

❖ **Existing state:**

❖ Heat demand is majorly fulfilled through pressurized steam
❖ Steam generation is the biggest consumer of fossil-fuels
❖ Major waste heat is generated in drying process

❖ **Decarbonization solution:**

❖ Steam generating heat pump to replace fossil-based steam generator
❖ Waste heat benefits to achieve higher COP of heat pump
❖ Electrification of the process – renewable electricity can be integrated with Photovoltaics



Chemical Industry

Existing state:

- 90% of chemical reaction and separation processes are unsustainable, using heat and electricity from burning fossil fuels contributing heavily to climate change.
- Replacing the unsustainable use of fossil fuels by integrating renewable energy will significantly reduce the overall CO_2 emissions of the industry sector.
- Therefore, electrification of the industrial processes must be done wherever possible.

Decarbonization solutions:

- Power-to-X (PtX) refers to converting and storing excess renewable electricity into chemical/thermal energy sources and plays a key role in decarbonizing the industries with renewable energy.

Distillation Example

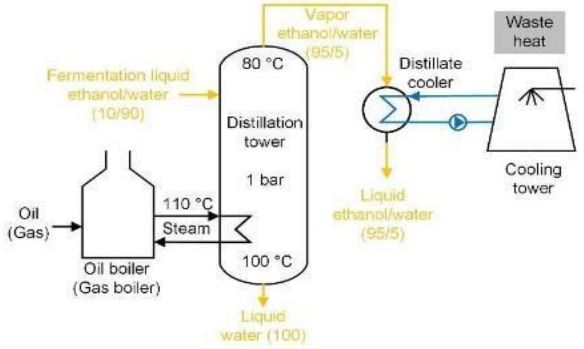


Figure 2-7: Typical distillation process with a steam boiler and a cooling tower [22]

Heat Pump

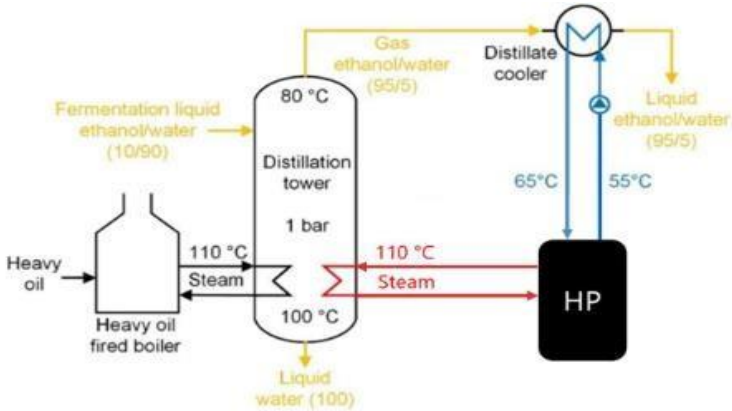
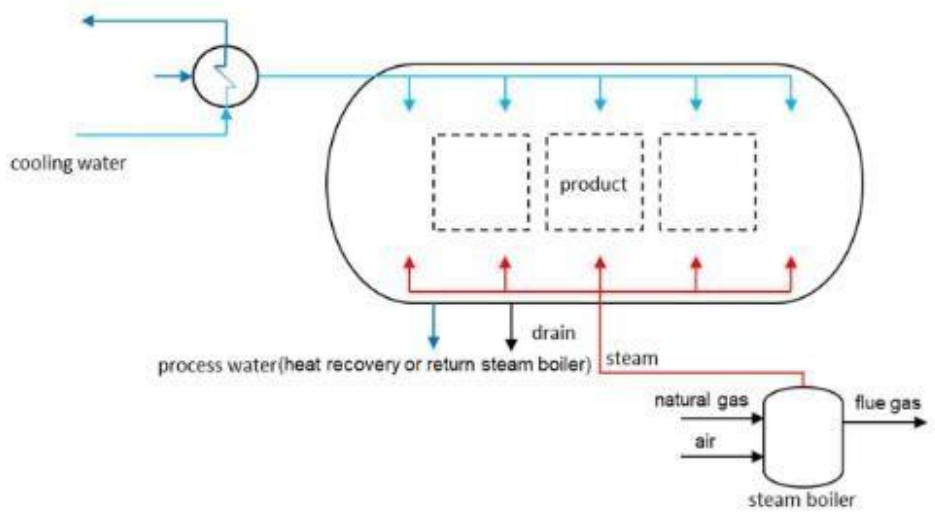


Figure 2-8: Flow diagram of integration concept A (distillation process)

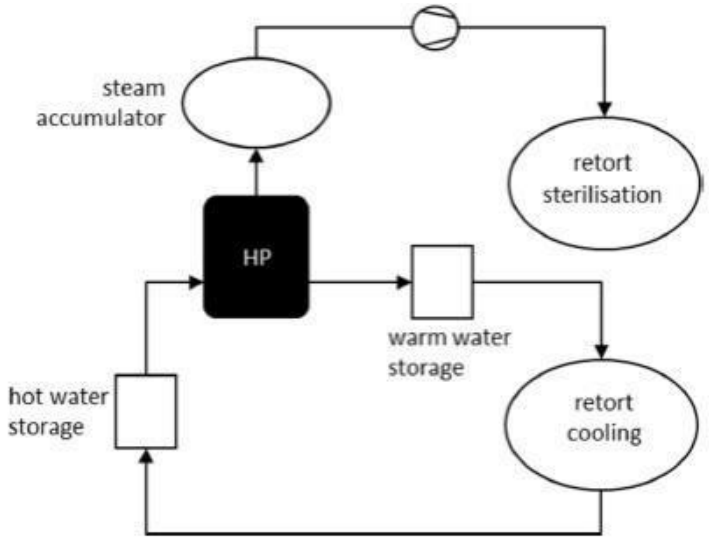
Source: IEA – ANNEX 58

Milk industry

- Milk pasteurization and sterilization are carried out with high temperature steam Upto 130°C. Usually it is provided with steam boiler.
- To decarbonize these processes PtX technologies can be integrated with renewable energy integration.



Existing state



Possible PtX solution

Template / Questionnaire

Sub.: Novel Green Energy Transition Concepts for fossil-based production to reduce CO_2 emission at minimum cost.

- Heat demand and electricity demand profiles.
- Flow diagram of the site with detailed consideration of the process flows (not just heat requirements).
- Which heating networks are available?
- Is there a chiller/cooling requirement?
- What is the basic data situation? How up-to-date is the flow diagram?
- Current status of renewables integrated in the plant?
- Where do you see the greatest potential for optimization?
- Operating mode or operating process.
- For batch operation: Temperature gradients during heating and cooling.
- Information of the waste heat sources.
- Data for energy consumption in past 3 years (natural gas, coal, external electricity, own electricity generation)
- Costs for energy consumption: natural gas, coal, external power grid.

Our MD, Mr Bhadresh Nagori, has addressed Climate Change on LinkedIn.

PFA herewith link for the same.

https://www.youtube.com/watch?v=VozkWhWgQu0