LowGlyColl = Intelligently reduce costs + increase yield

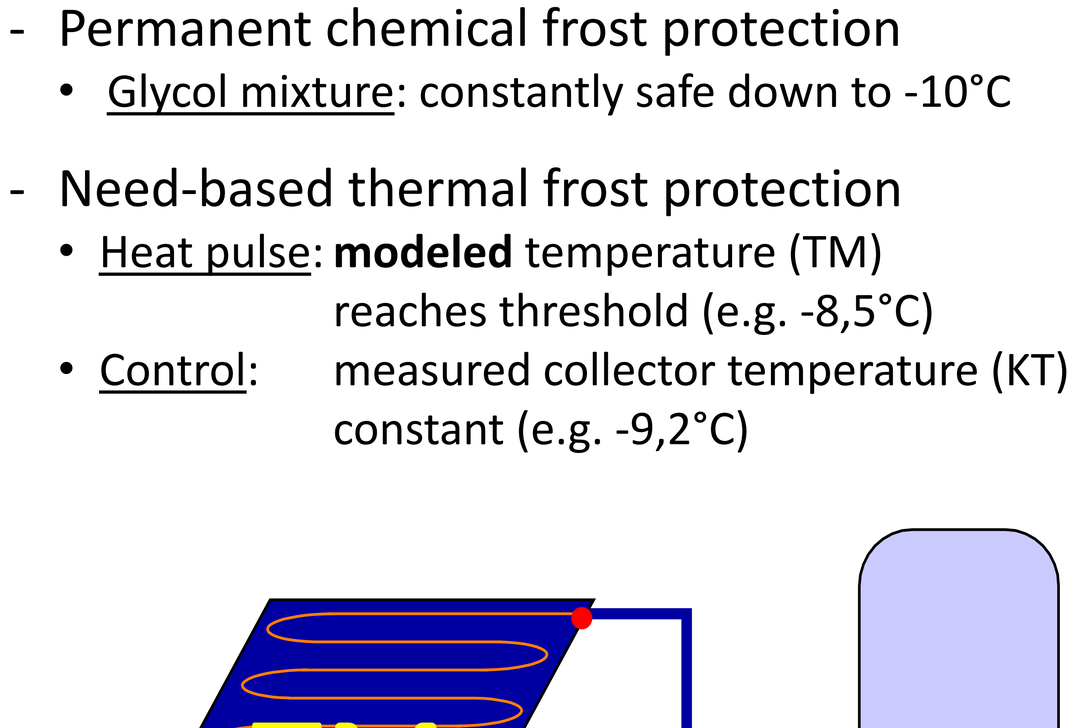
Motivation

- Flat plate collectors need compared to tube collectors significantly more antifreeze or energy
- Parameters of the carrier medium (frost protection up to -26°C)
  - Costs: approx. 2,5€/l (increasing)
  - Viscosity: approx. 4x higher than water

  ⇒ **High costs, high losses, high raw material consumption, uncertain yield**

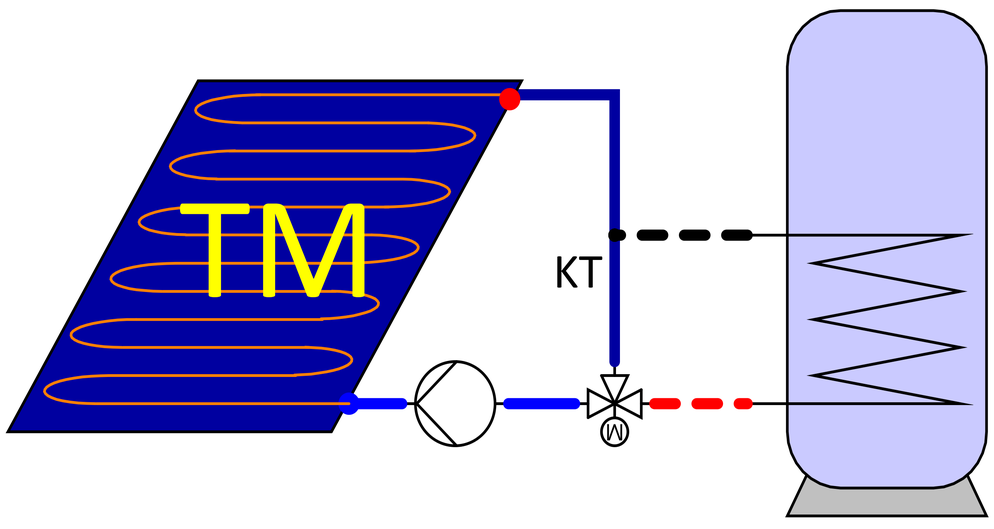
Approach

- Determining the optimum of negative and positive effects of decreasing glycol content:
  - Acquisition & maintenance costs ↓
  - Solar yield↑
  - Heat demand for frost protection ↑



Concept (based on “Stahrsolar“)

- Permanent chemical frost protection
  - Glycol mixture: constantly safe down to -10°C
- Need-based thermal frost protection
  - Heat pulse: **modeled** temperature (TM) reaches threshold (e.g. -8,5°C)
  - Control: measured collector temperature (KT) constant (e.g. -9,2°C)



Target

1. Reduction of installation, operation and maintenance costs
2. Increase of the solar yield
3. Maintaining system reliability

⇒ **More yield with less effort**

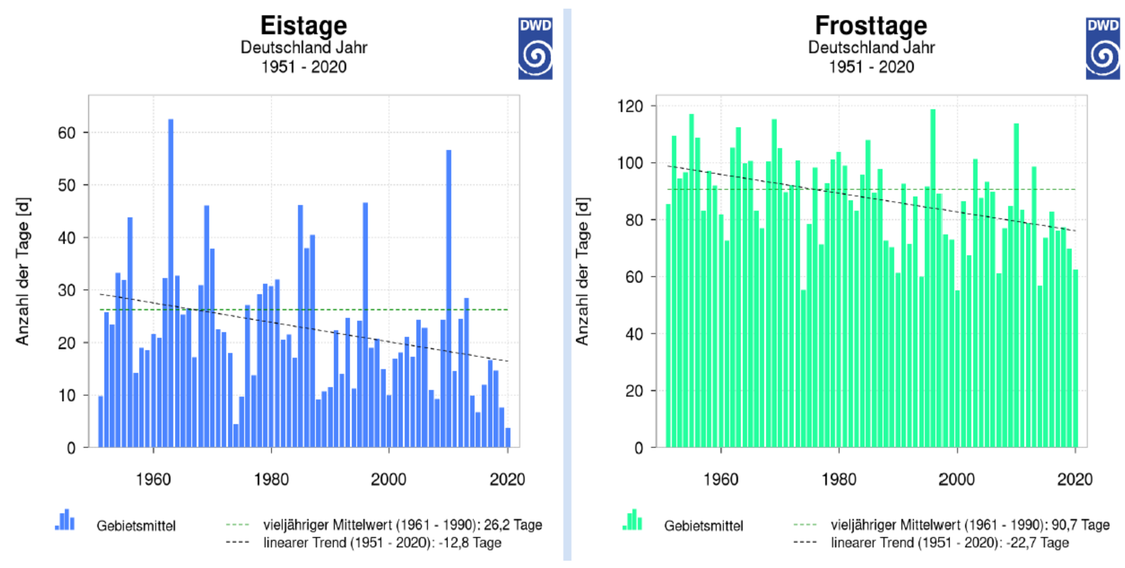
Boundary conditions

- Number of annual frost days < 100

(see climate status report DWD 2020)

- Number of annual frost & ice days continues to fall

(see climate status report DWD 2020)



⇒ Need for antifreeze or antifreeze energy continues to reduce

- Efficient technology for optimum thermal frost protection is available and proven (see Stahrsolar)
- Digital monitoring of the plant status

Conclusion

➢ Glycol content of flat-plate collectors can be safely lowered with little additional technical effort

➢ Raising the permanent antifreeze temperature from -26°C to -10°C leads to:

Halving of glycol costs

and

Yield increase by approx. 10%

➢ Adaptive temperature model enables further valuable potential

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