

Sustainability at DESY MKK

Group MKK



Responsibilities

> The group is responsible

- General electrical energy supply
- Water cooling
- Air conditioning, heating, tunnel ventilation
- Alarm handling and archiving, regulation of water plants
- Development of power supplies
- Operation group of power supplies
- RF sender supply
- Responsible for dual students



Heat recovery from Helium cryo Pumps and heat exchangers

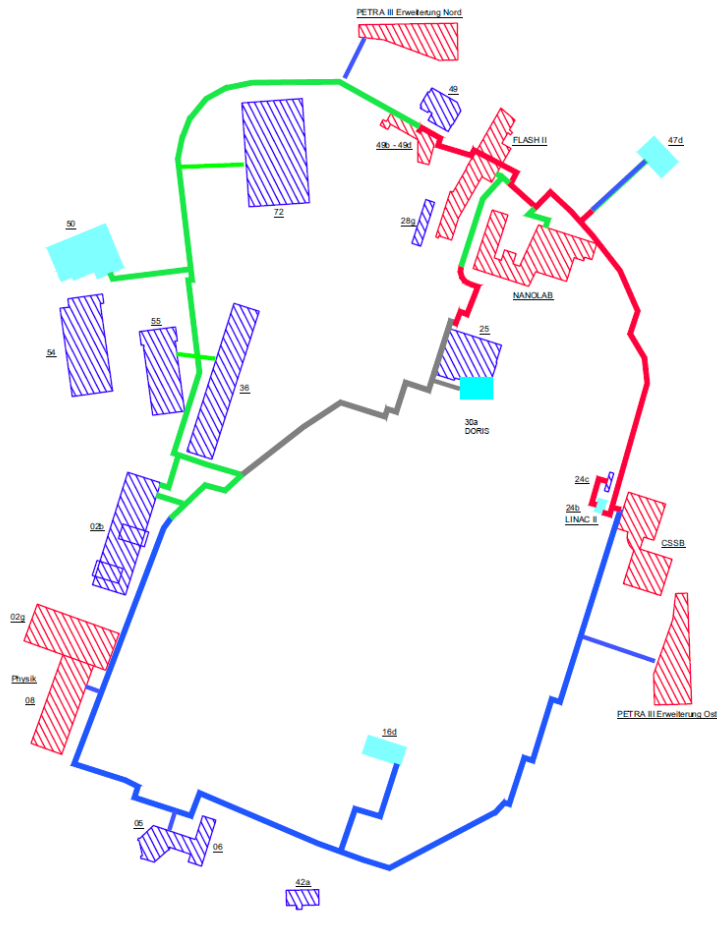


Heat recovery from the Helium cooling plant

- > Project start: 2015
- > Start of construction: 2016
- > Commissioning: End March 2017
- > Design for saving of heat recovery: 6.800 MWh
- > First Measurements (31.05.-15.06.2017) : 268 MWh
 - Calculated value for the first year: app. 6.520 MWh (app. 1/3 of the heating energy required for DESY and adjacent university buildings)
 - Still potential for improvement: Adaptation of the return water temperature of the distribution grid
- > Savings: app. 200.000 €/a



Remote cooling ring at DESY



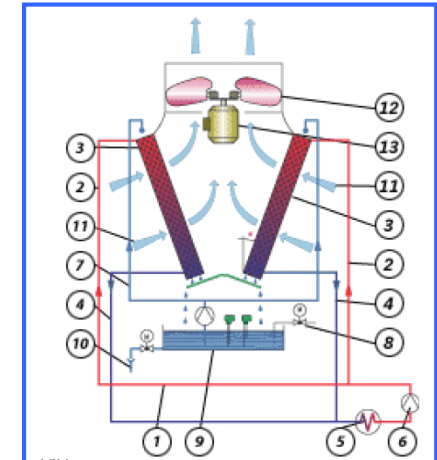
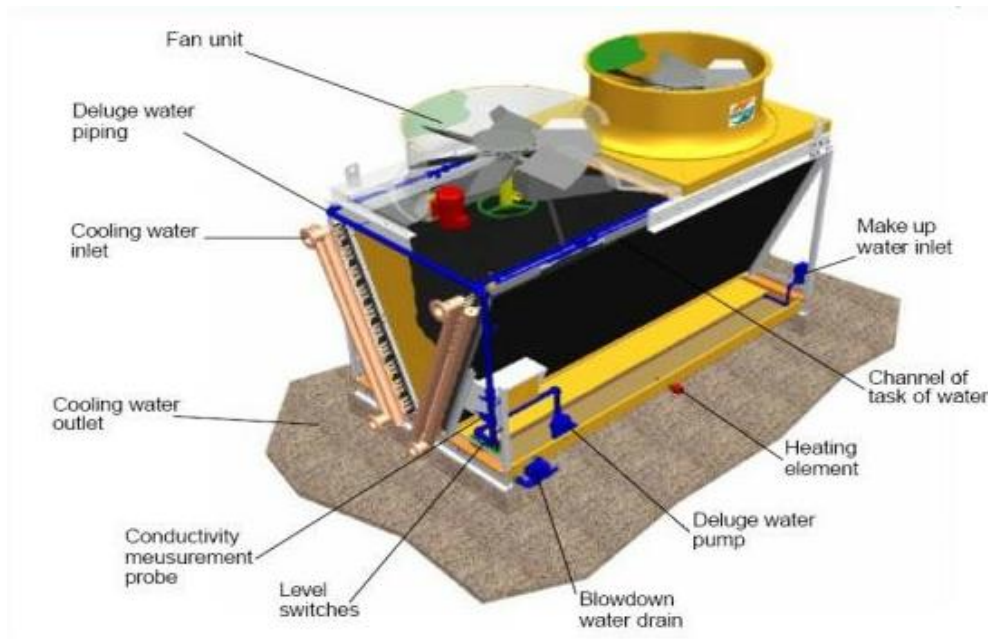
- New plants have a higher efficiency
 - Reduction of CO₂
- Possibility to use free cooling or absorption cooling (not yet in use)
- Reduction of operational and manpower cost
- Temperature of 6 – 8°C

Optimisation of water plants

- All pumps will be driven with variable speed with frequency converter.
 - For new plants: The pressure farthest away from the pumps will be measured and used as reference for the regulation. Only the required energy for obtaining this pressure will be used which increases the efficiency.
- At an early stage the communication with the user is started. The Δp and ΔT shall be defined and an optimum has to be found.
 - In HERA one single magnet type defined the pressure. This one needed 7 bar. All other magnets got a pinhole aperture to reduce the pressure. This reduced the efficiency very much.
 - *Δp small, ΔT large; water volume small*



Hybrid Drycoolers



1. Primary cooling circuit
2. Cooling water inlet
3. Cooling elements
4. Cooling water outlet
5. Heat source
6. Cooling circuit pump
7. Wetting water circuit
8. Make-up water
9. Wetting water tank
10. Waste water
11. Ambient air
12. Fan
13. Fan motor

Hybrid dry cooler

- reduction in water consumption
- low noise emittance, no fog
- good regulation
- higher invest

Efficiency improvement by optimization investment and operation cost

> Dimensioning of cable

- The cross-section of cables is defined by standards. Anyhow these are ment to guarantee that cables are not overheated or the voltage drop will be to high
- In the accelerators the current in the cables is often known precisely, e.g. the optic currents for magnets are well known.
- Therefor the optimization between invest and operation cost can easily be done. This helps to convince decision makers to increase the invest and save later on.



Efficiency improvement by optimization investment and operation cost

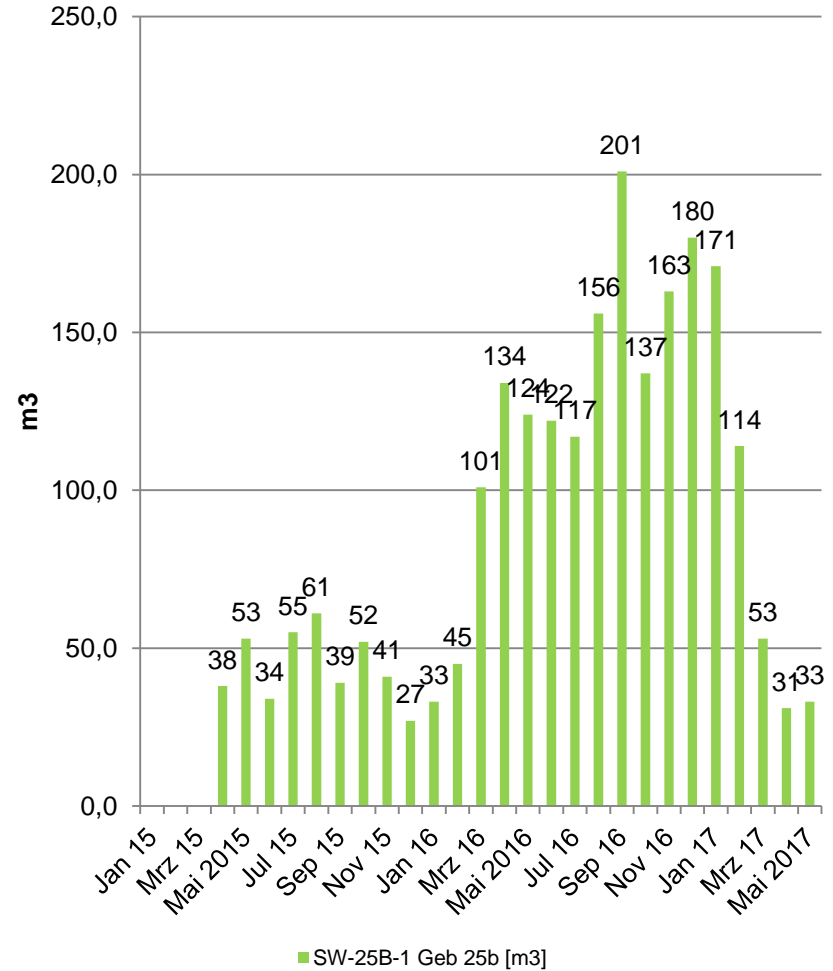
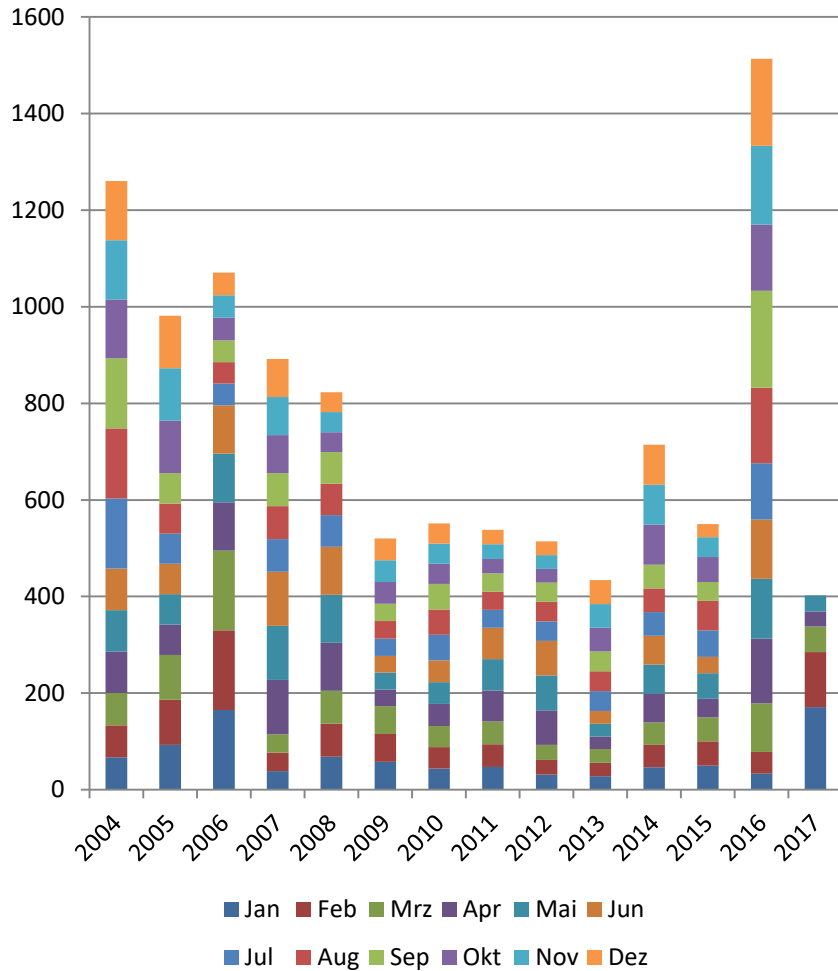
> Dimensioning of transformers

Im Juni 2014 ist die Verordnung Nr. 548/2014 der EU-Kommission [1] in Kraft getreten. Darin werden die Öko-design-Anforderungen an Leistungstransformatoren beschrieben, die nach dem 1. Juli 2015 in der EU in Verkehr gebracht und in Betrieb genommen worden sind und werden. Sie gilt für Transformatoren mit einer Mindestnennleistung von 1 kVA. In der Verordnung wird zudem bereits die zweite Stufe der Wirkungsgradverbesserungen, bzw. der Verlustreduktionen, für das Inverkehrbringen von Transformatoren ab dem 1. Juli 2021 angegeben.

- In this directive a minimal efficiency is defined. The standards VDE 0532-76-20 and IEC 60076-20 are following this directive
- At DESY these values are specified even below. Here the loss calculation with evaluation of the short-circuit losses of 5 € / W and the no-load losses with 21 € / W are already specified during the tender phase for transformers.
- The award accordingly decides on the most economical offer of the production price of the transformer plus the sum of the losses

Consumption of city water Geb 25b

User took water from the tap instead of coling water



Questions?

