# Verwässerte Effizienz ?

Wie wassergeführte Systeme die Gesamteffizienz beeinflussen können

*DKV Tagung 2022, Magdeburg*

ENGINEERING TOMORROW

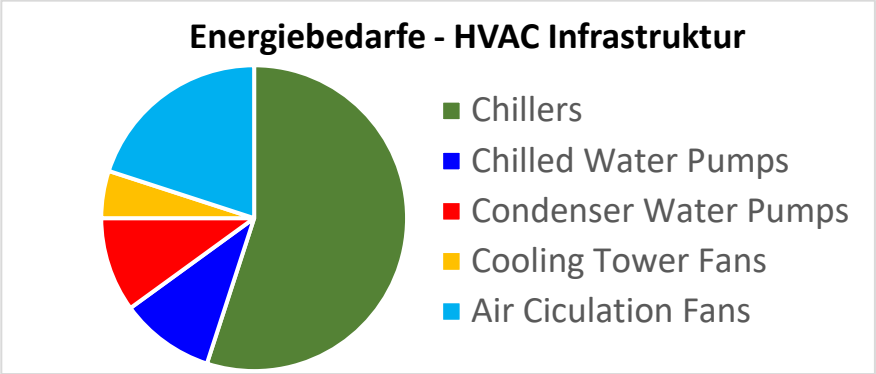
Danfoss

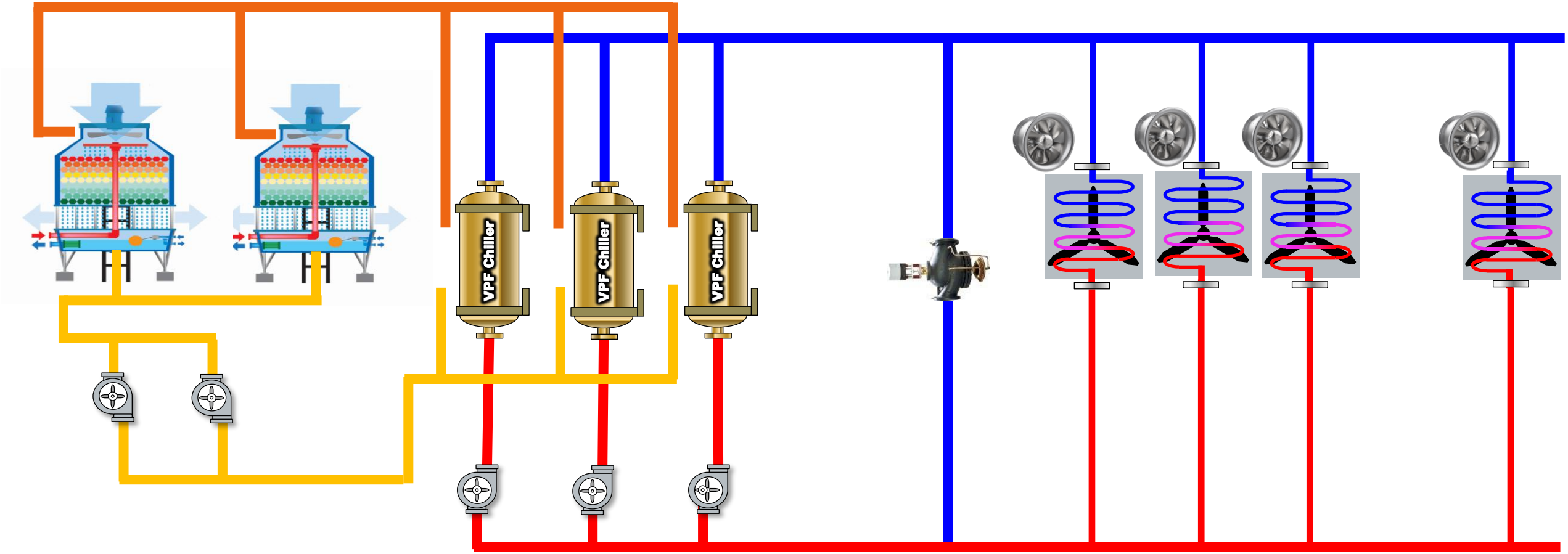
DKV
Deutscher Kälte- und Klimatechnischer Verein

# Kaltwassersätze zur Gebäudeklimatisierung

Classified as Business

# Beispiel Klimatisierung größerer Gebäude



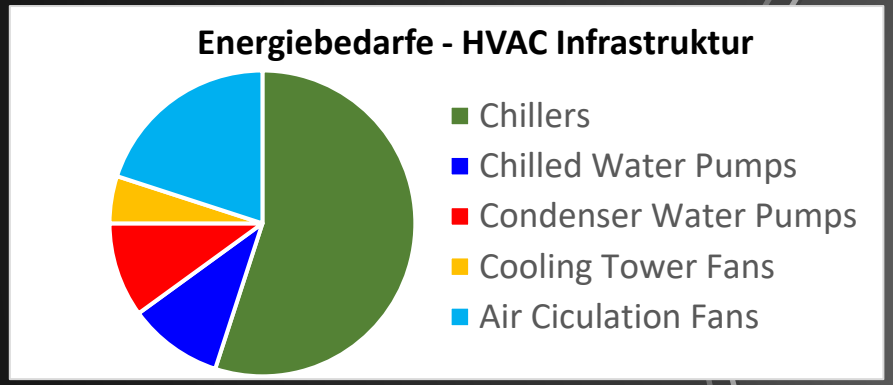






Classified as Business

# Gebäudeeffizienz / Klimaeffizienz

Effizienz nicht ok




…„muss der Chiller sein“.

Ist das so ?

„Klimatisierung ok“

Oft unklar :

Betrieb gemäß Planung ?

Effizienz ok ?

Mehr Komfort möglich ?

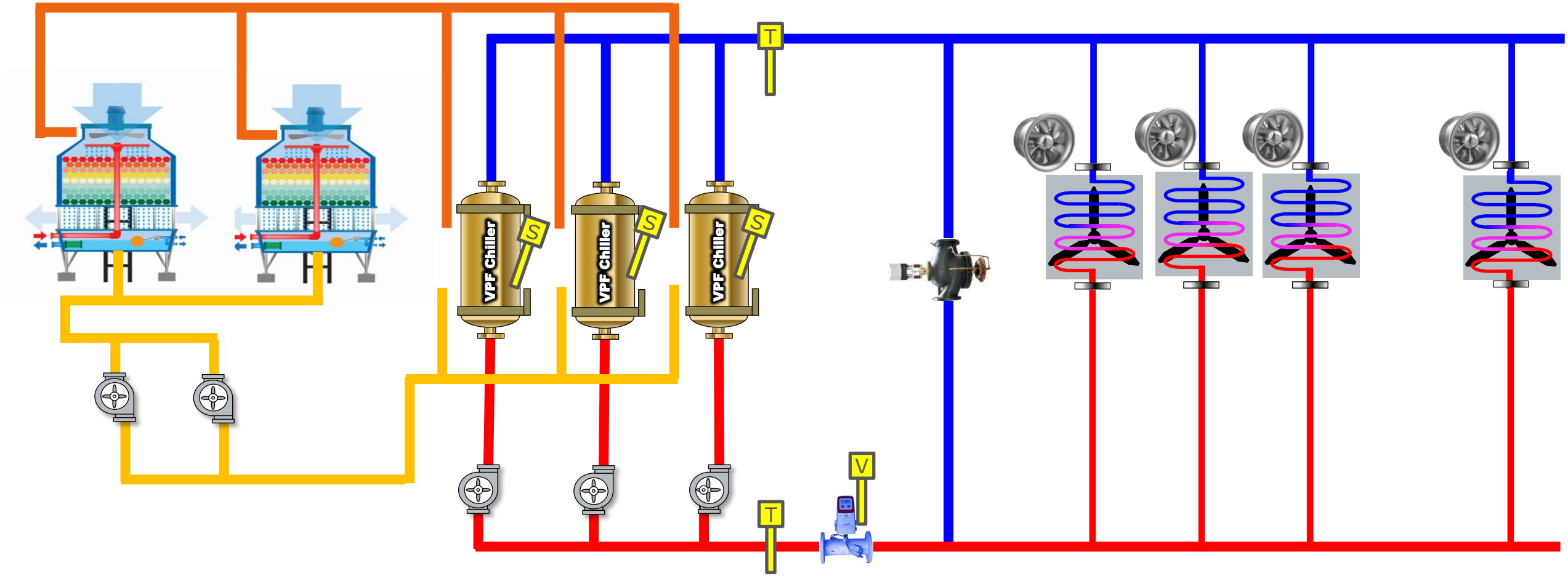
Einsparungen möglich ?



Classified as Business

# Messungen realer Gebäude

Temperaturen Wasser
Volumenstrom Wasser
Stromaufnahmen

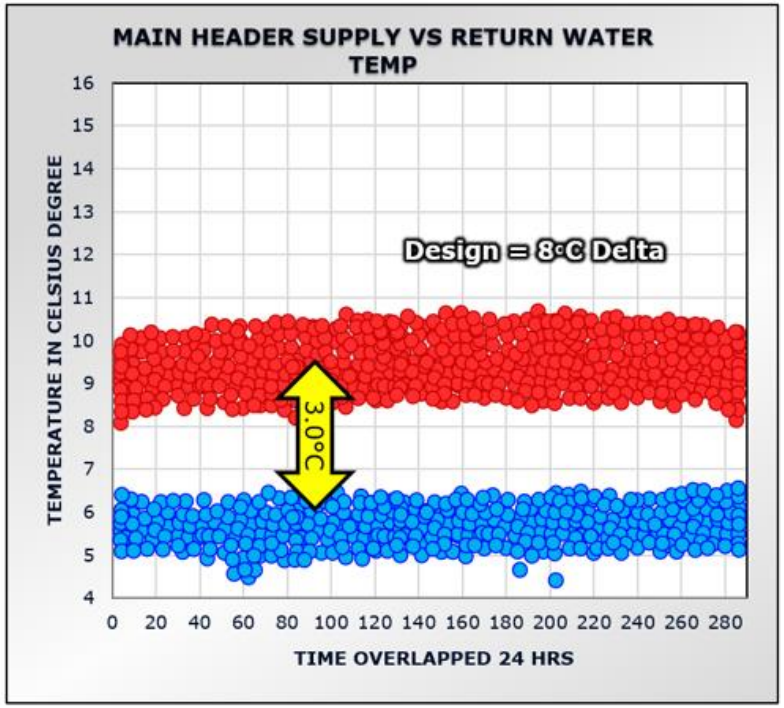




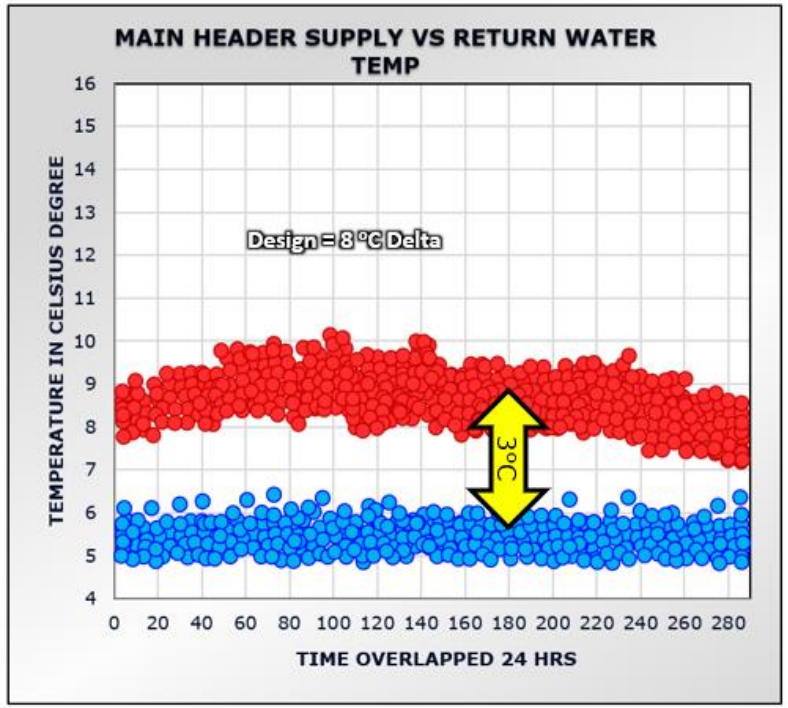

Classified as Business

# Messergebnisse

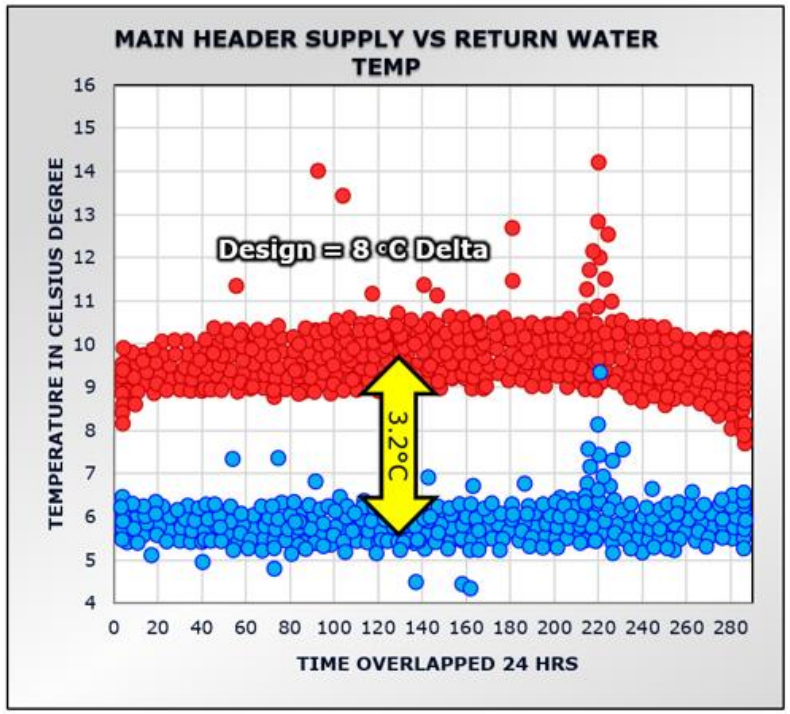
Wassertemperaturen
Vorlauf & Rücklauf




Gebäude 1




Gebäude 2

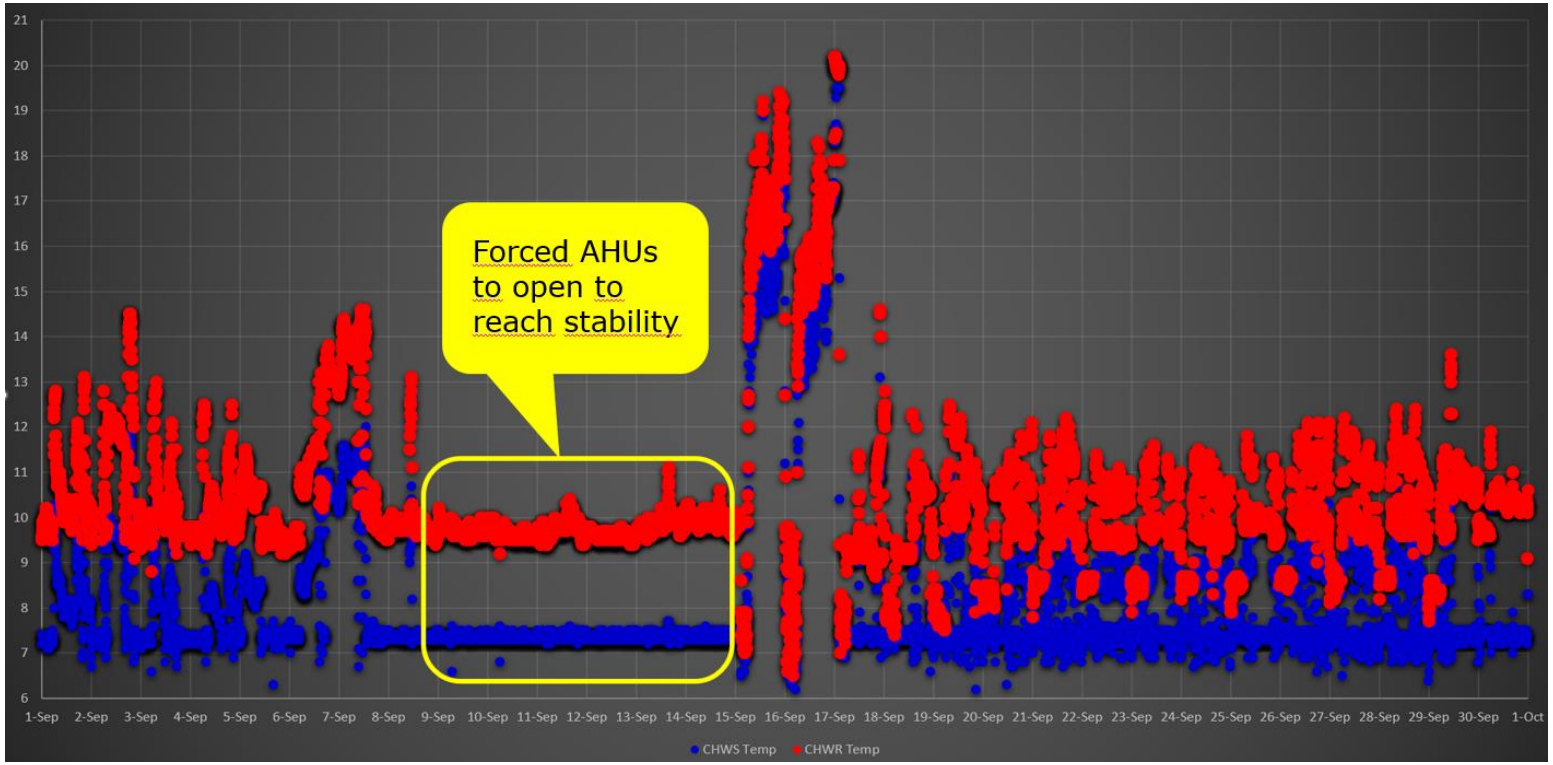


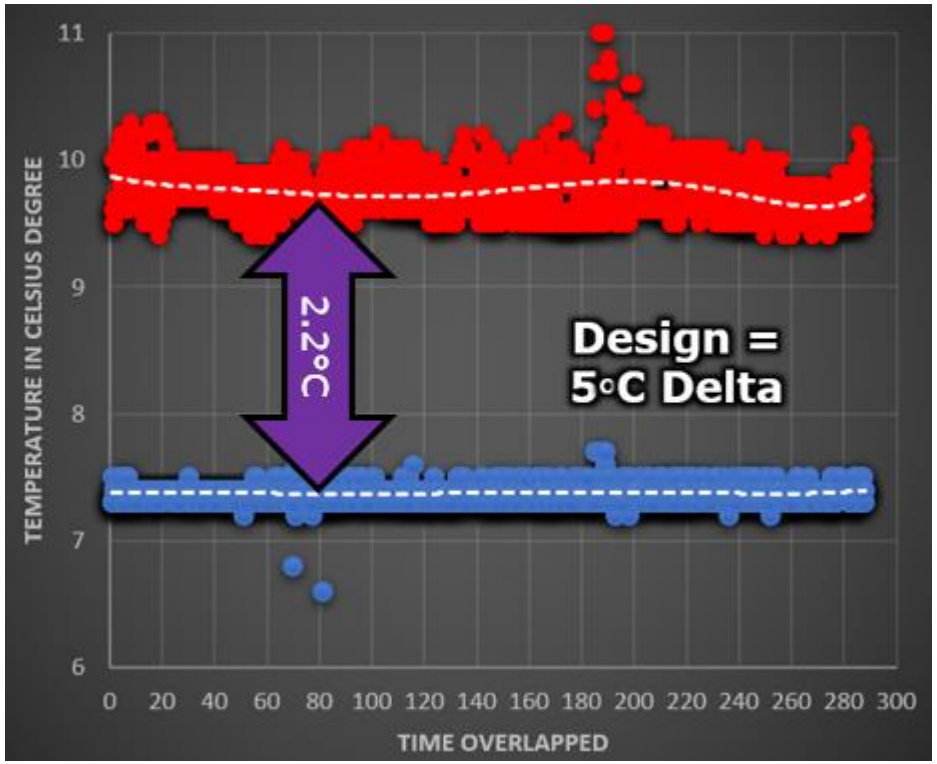

Gebäude 3


Classified as Business

# Messergebnisse

Wassertemperaturen
Vorlauf & Rücklauf

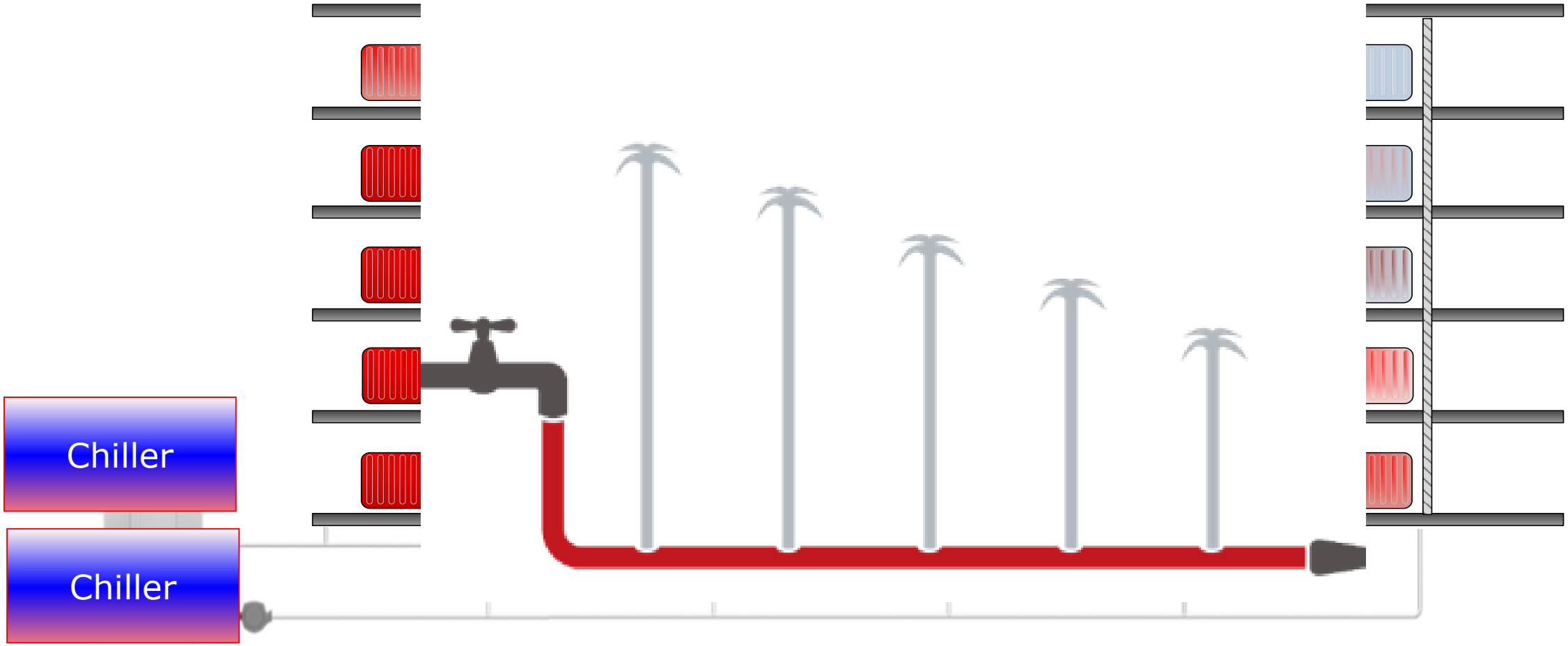



Gebäude 4 Instabil


Classified as Business
ENGINEERING TOMORROW

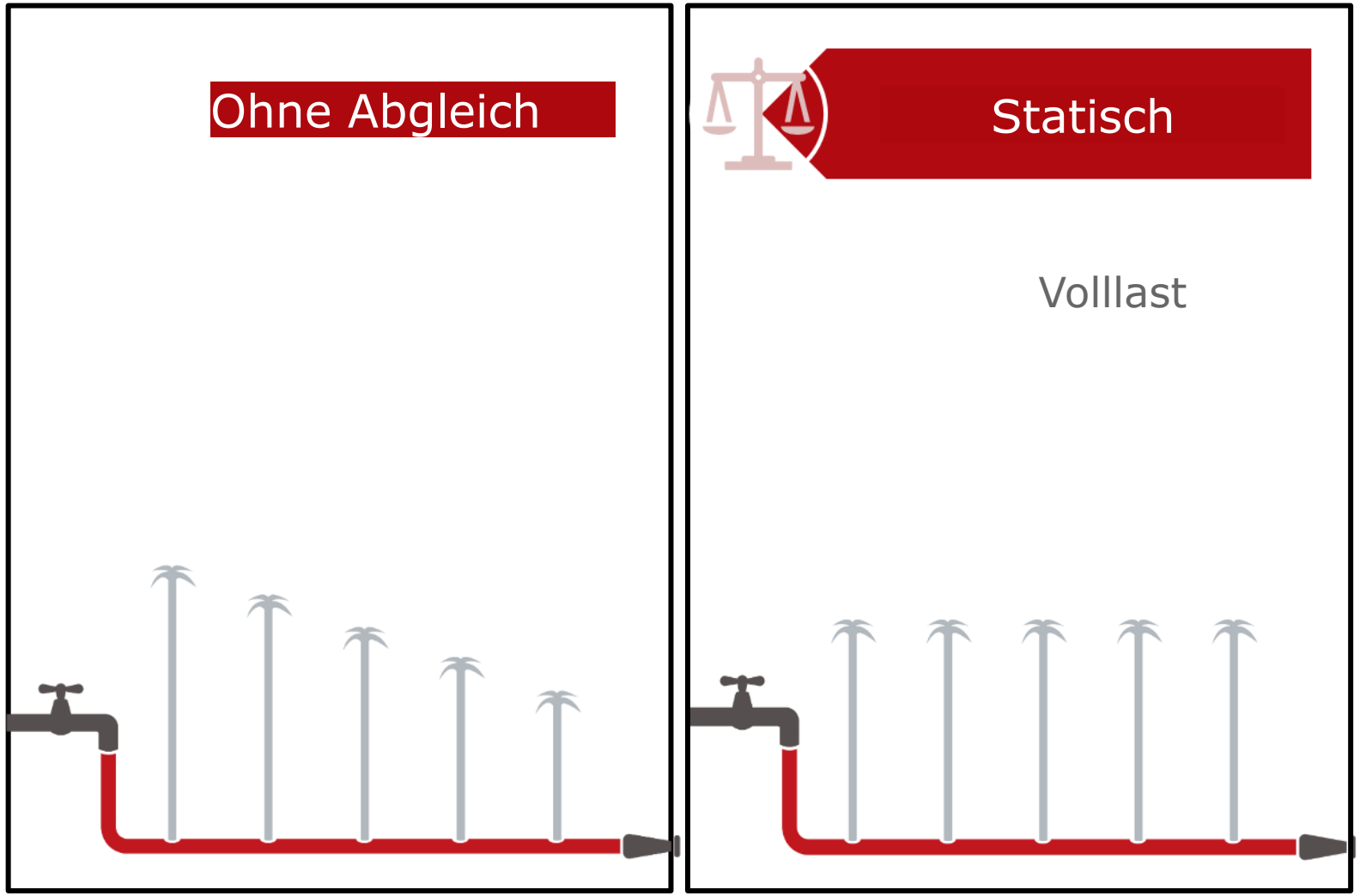
# Wasserseitig = Hydraulik






Classified as Business

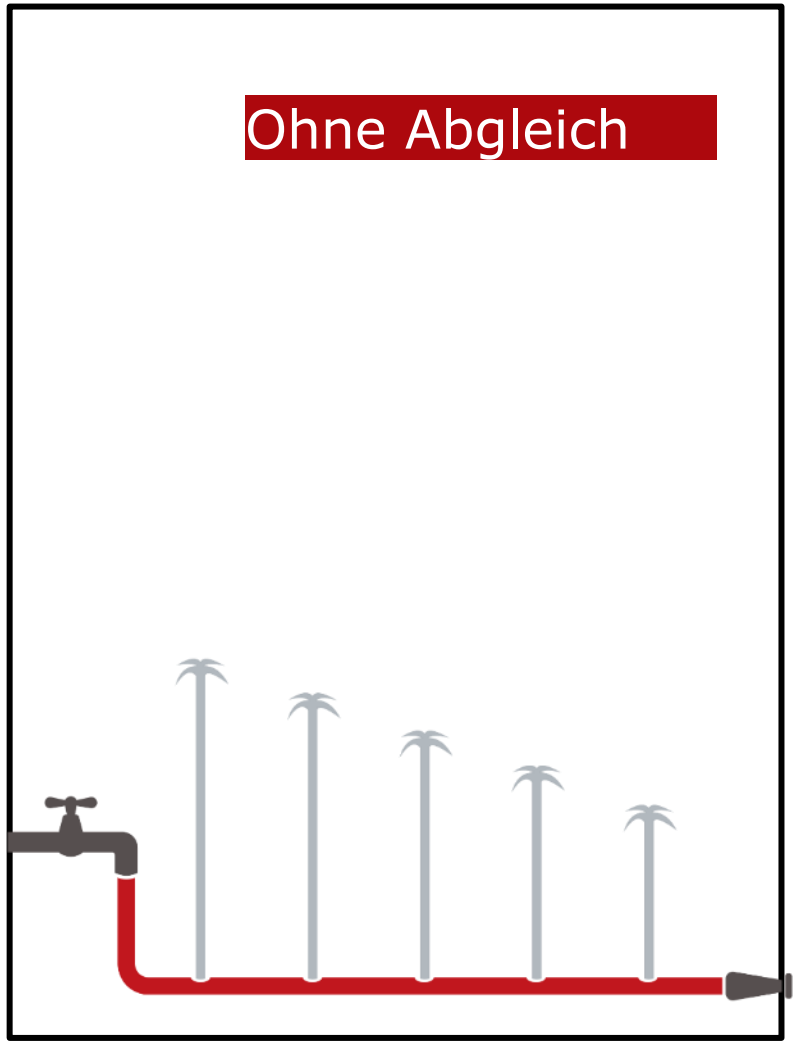
# Lösung : Hydraulischer Abgleich

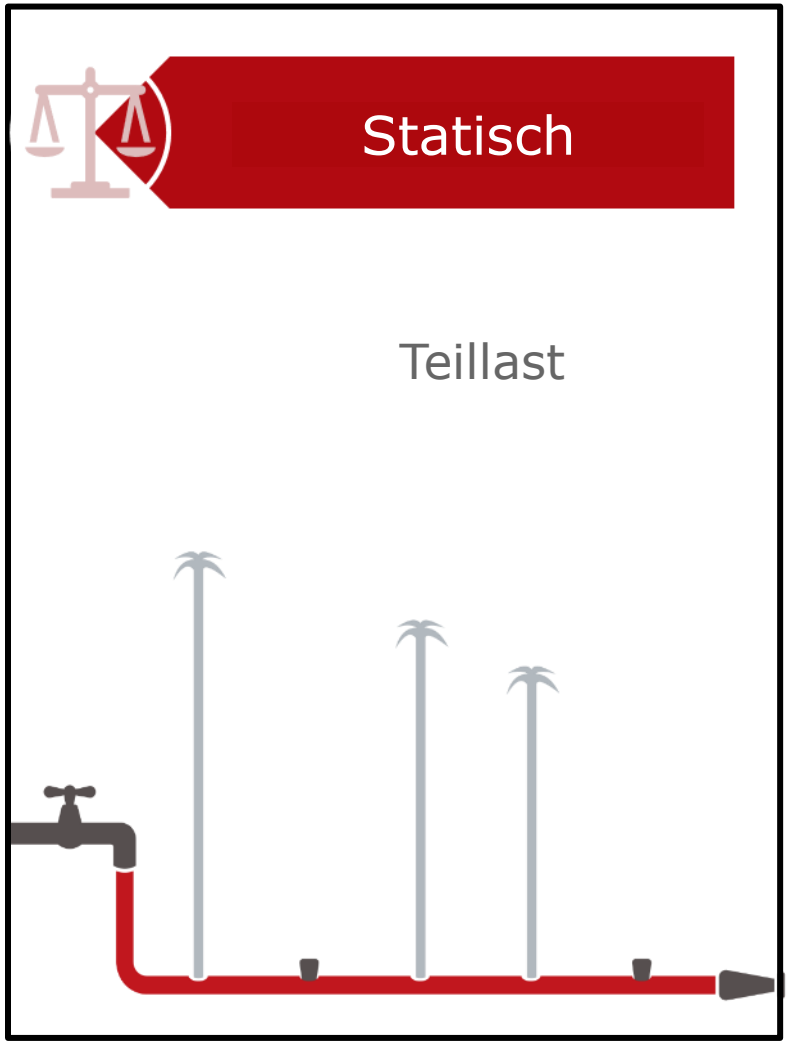





Classified as Business

# Lösung : Hydraulischer Abgleich

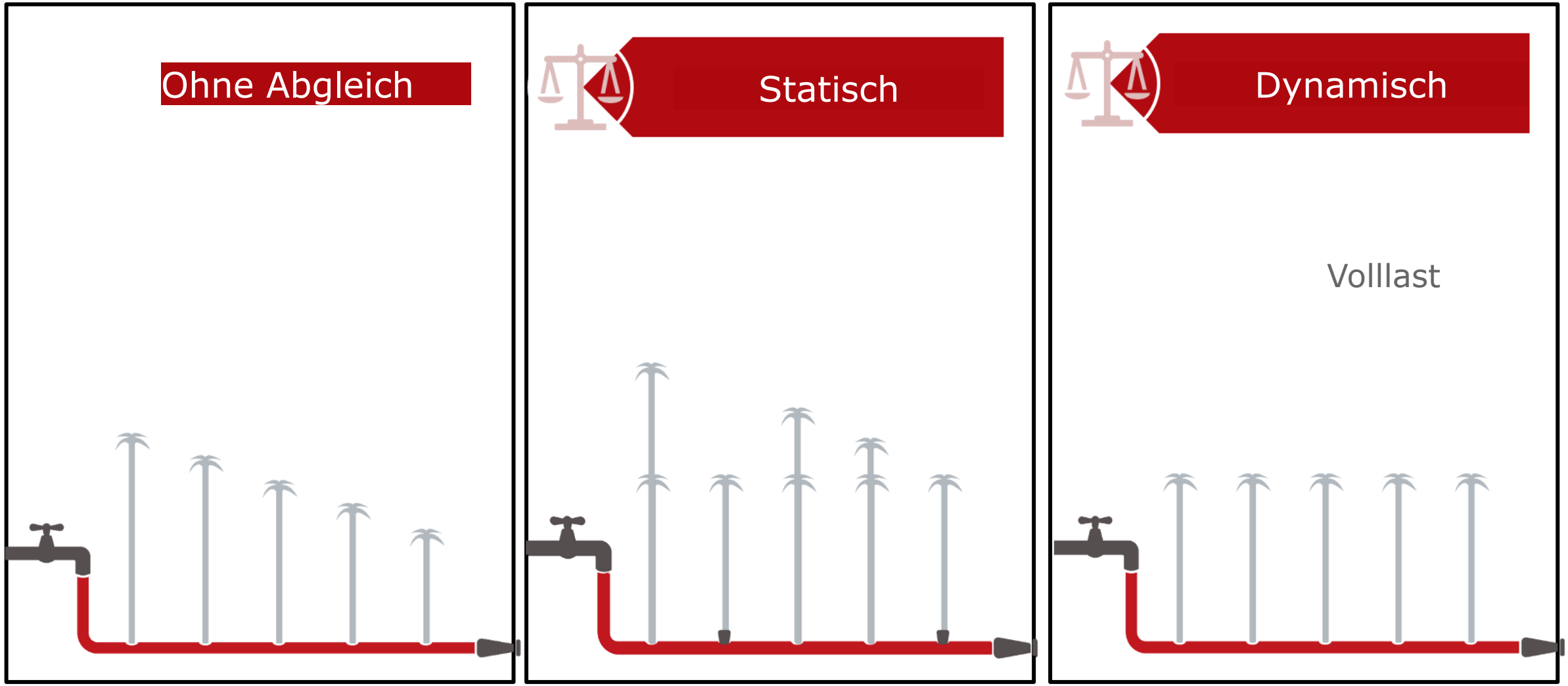





Classified as Business

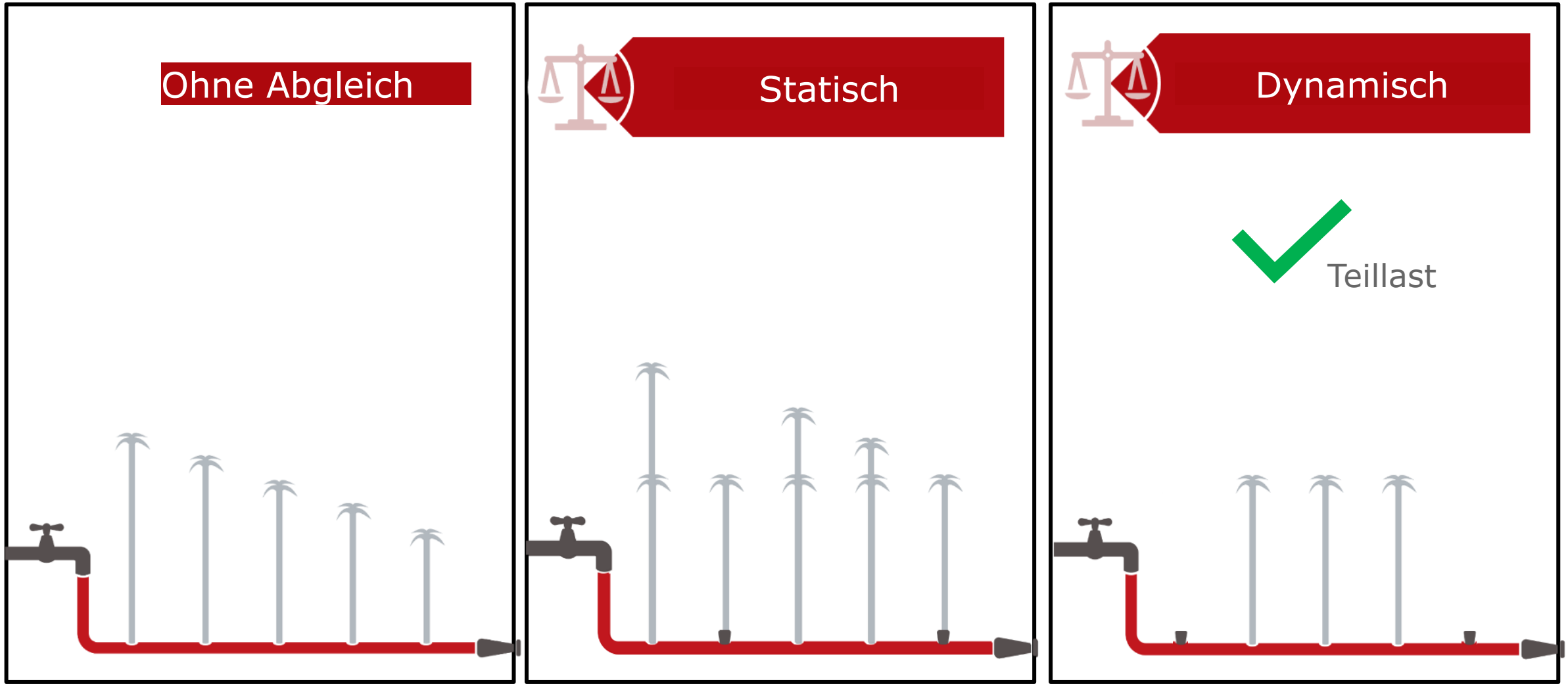
# Lösung : Hydraulischer Abgleich






Classified as Business

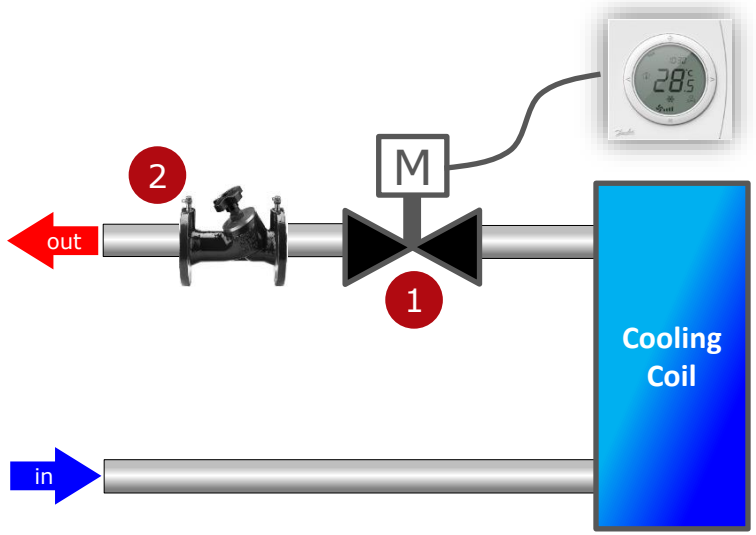
# Lösung : Hydraulischer Abgleich



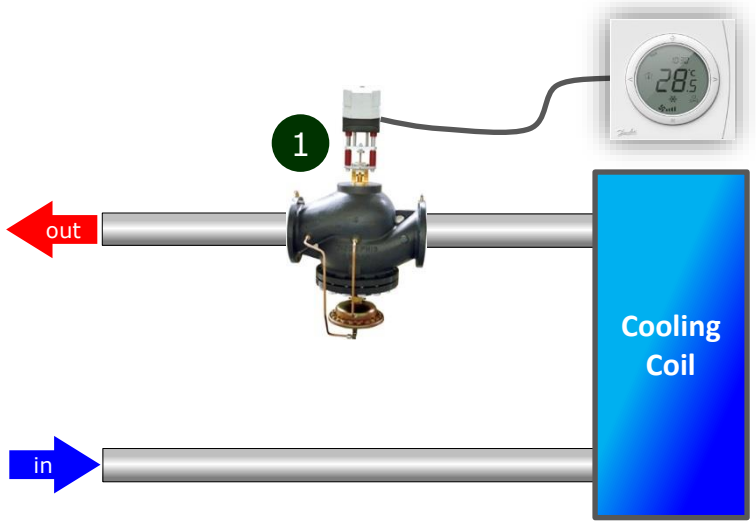



Classified as Business

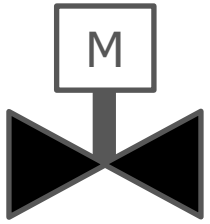
## Manuelles Ventil + 2-Wege-Ventil




## Druckunabhängiges Ventil




1




**2-Wege-Ventil**

Regulierung : Temperatur-Sollwert

Durchfluss-Schwankungen aufgrund Druckunterschieden

2

**Manuelles Ventil**

Feste Einstellung.

Einstellung individuell für jede AHU.

1

**Druckunabhängiges Regelventil**
**Pressure Independent Balancing & Control Valve**
(z.B. Danfoss AB-QM)

Selbsttätige dynamische Anpassung

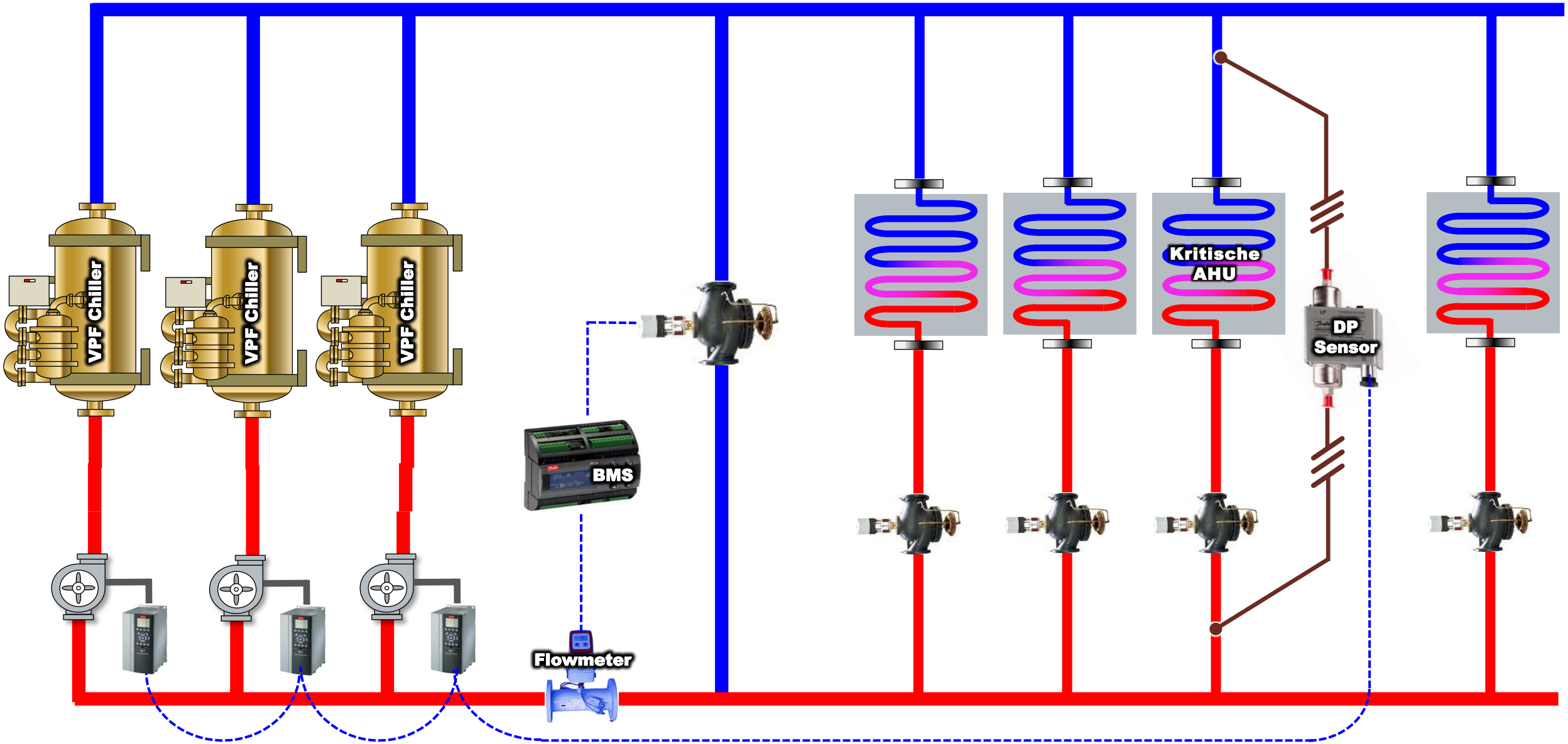
Stabile Regelung auch bei Druckschwnakungen

Einfache Einstellung



Classified as Business

# Hydraulischer Abgleich mit druckunabhängigen Regelventilen

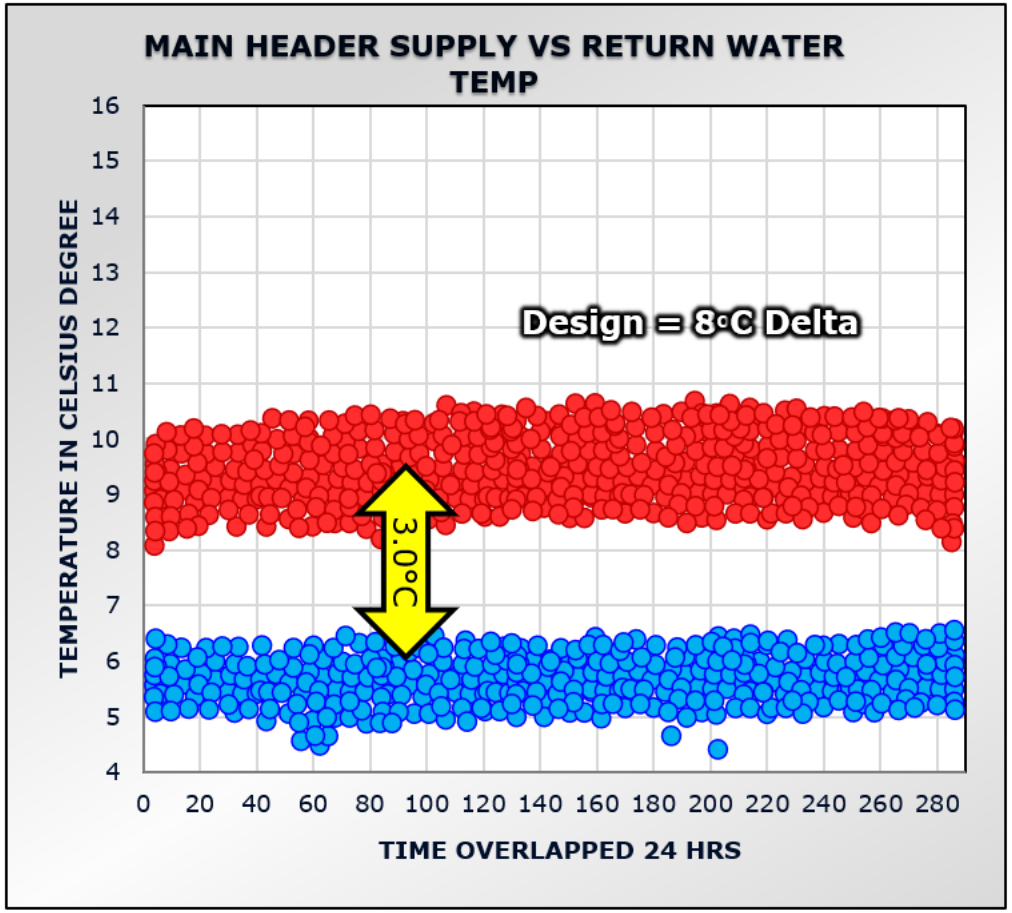




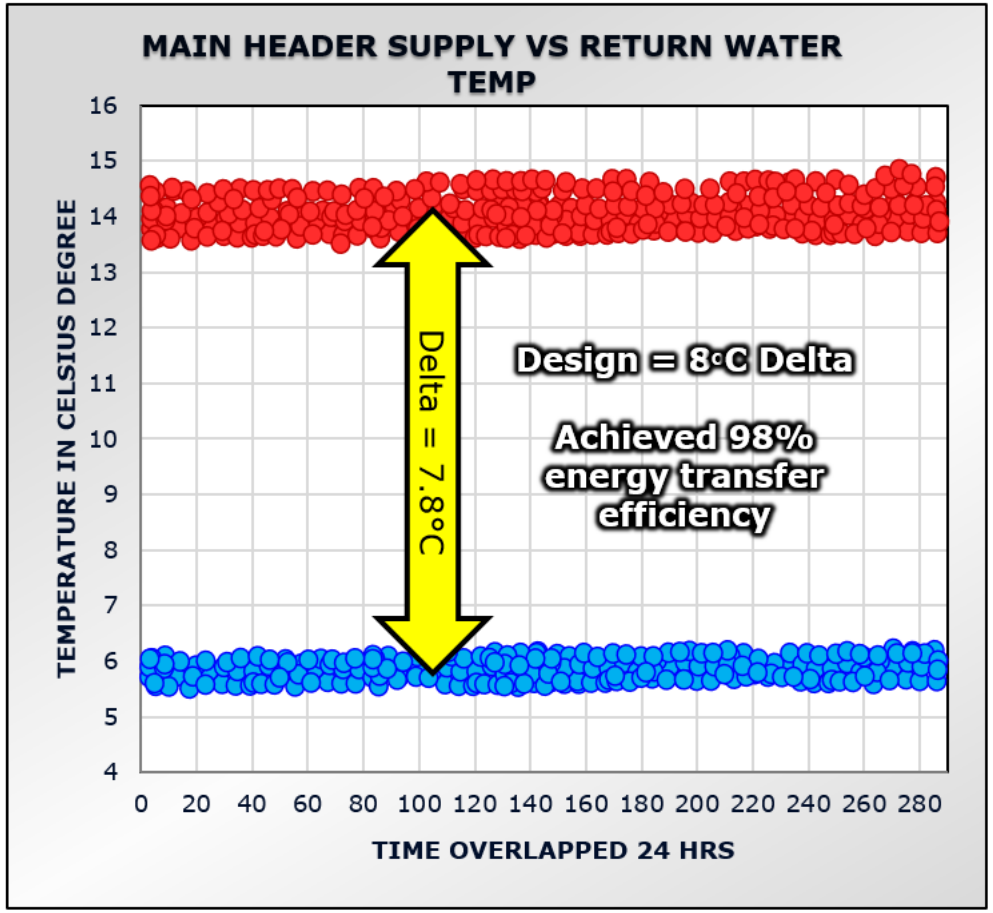

Classified as Business

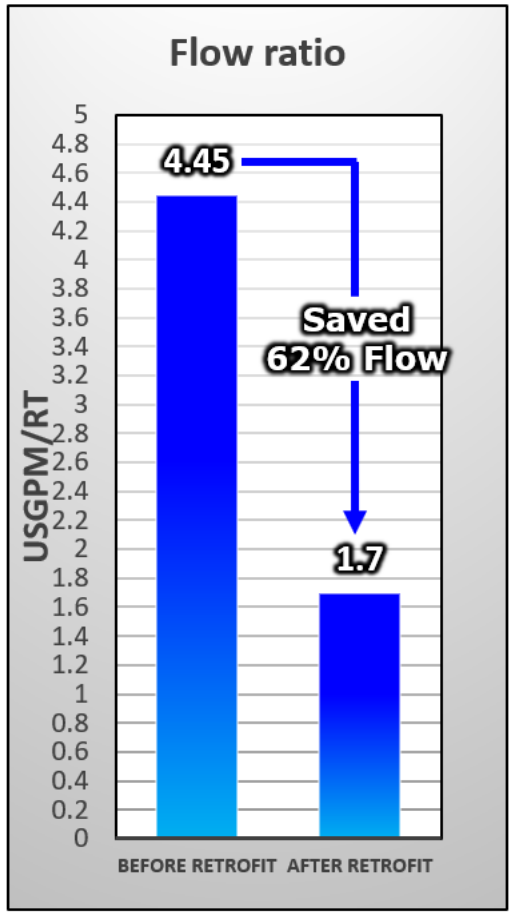
# Gebäuse 1

## Vor Umrüstung




## Nach Umrüstung
## Dynamischer hydraulischer Abgleich



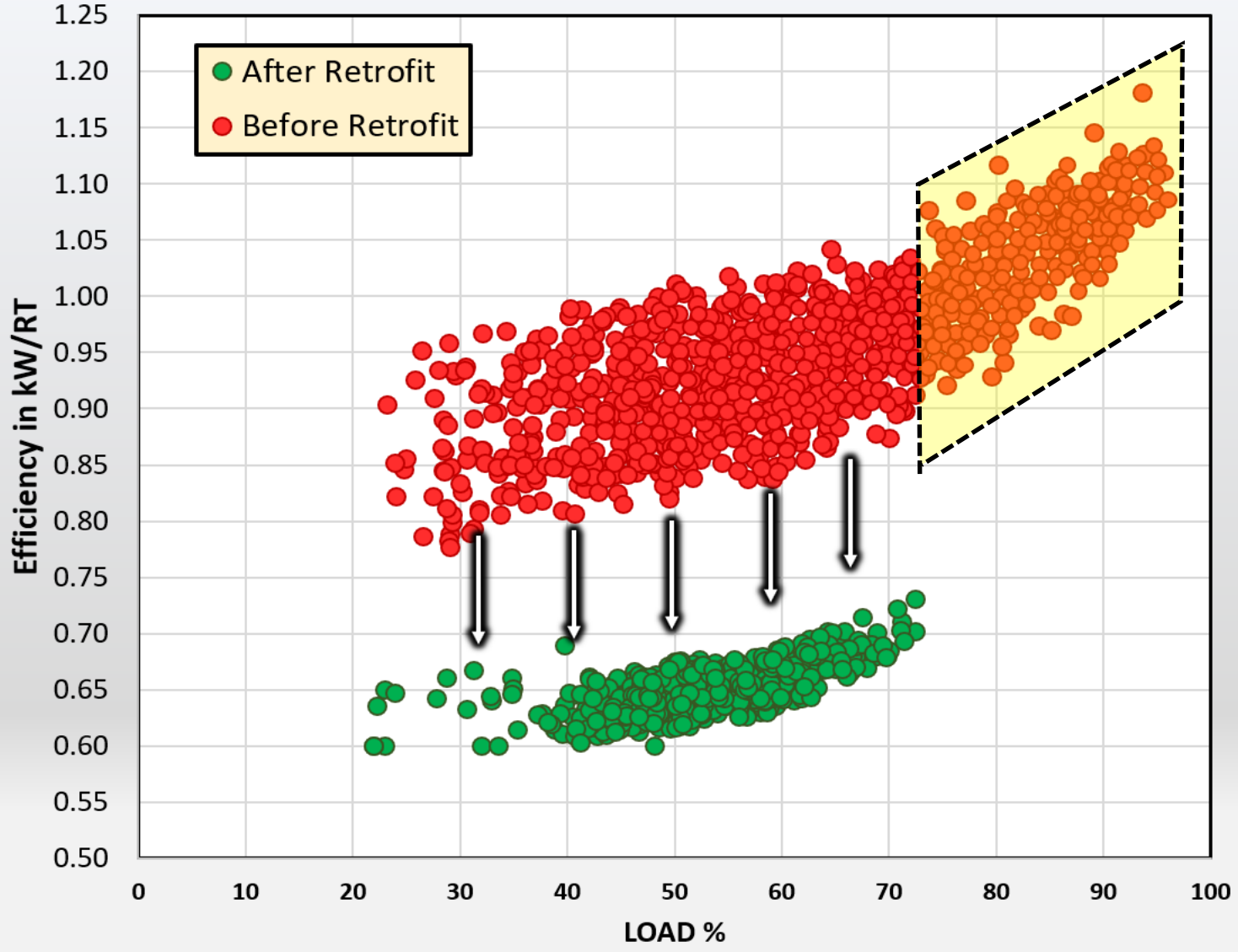





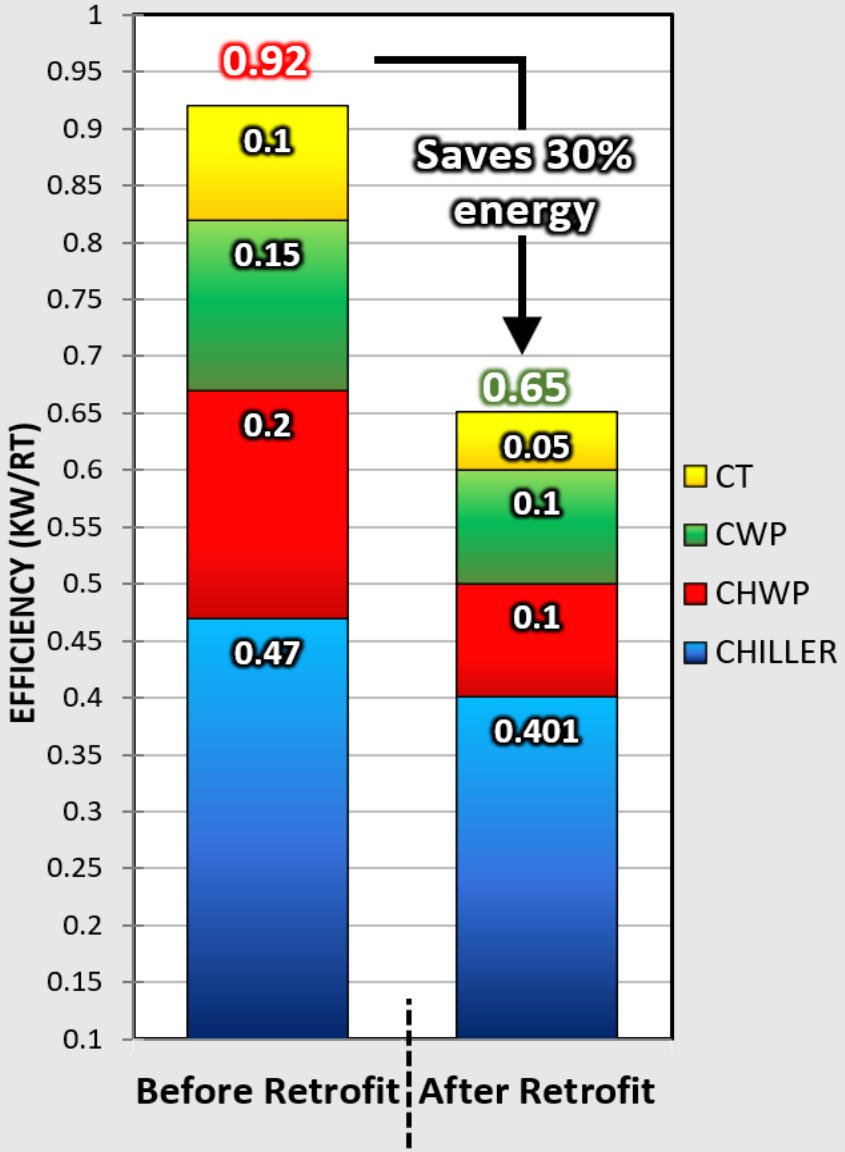

Classified as Business

Gebäude 1

## CHILLER PLANT PERFORMANCE




## PLANT EFFICIENCY

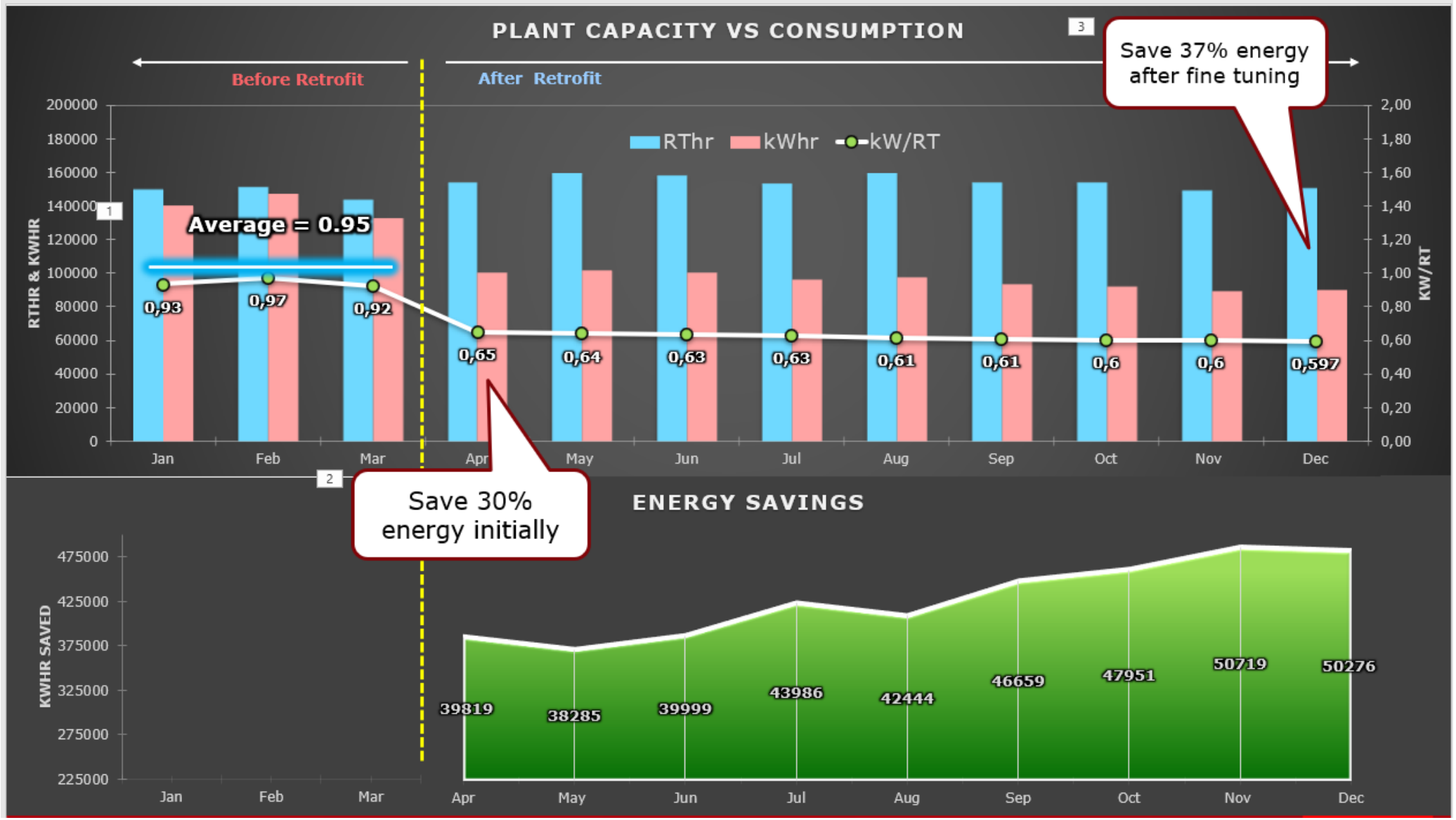



Classified as Business



Classified as Business

# Gebäude 1

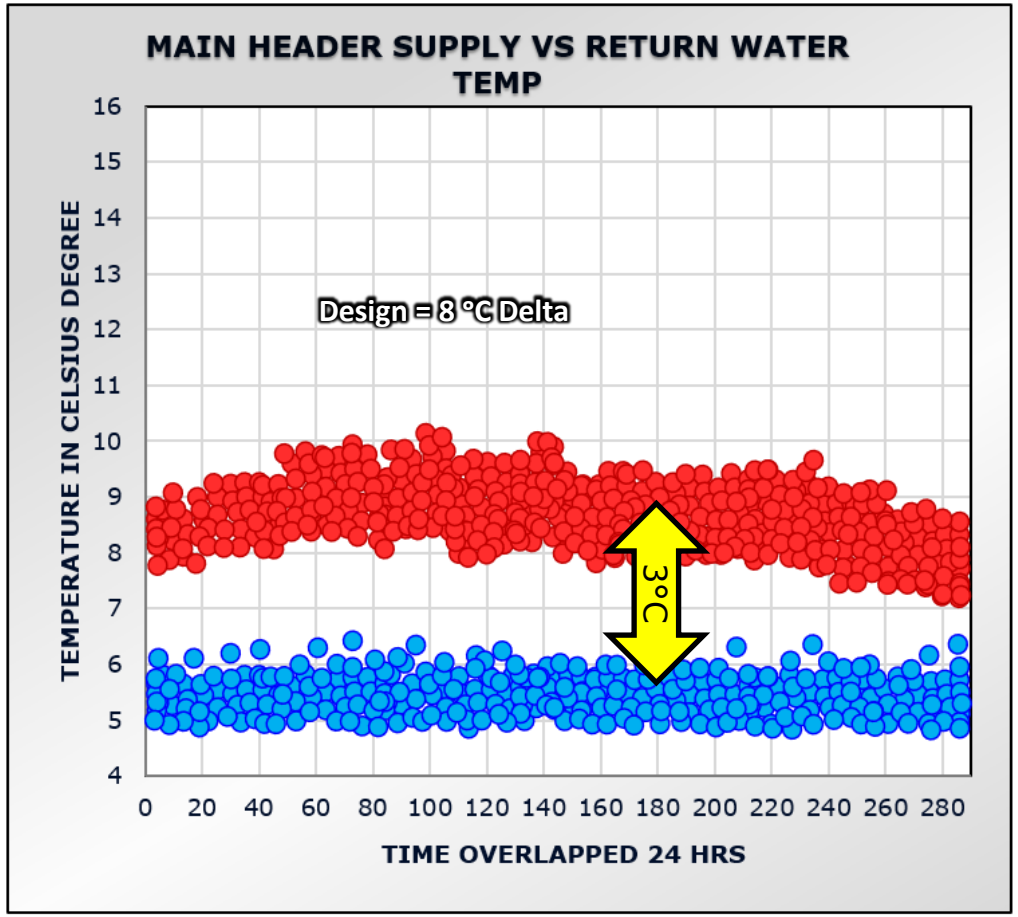




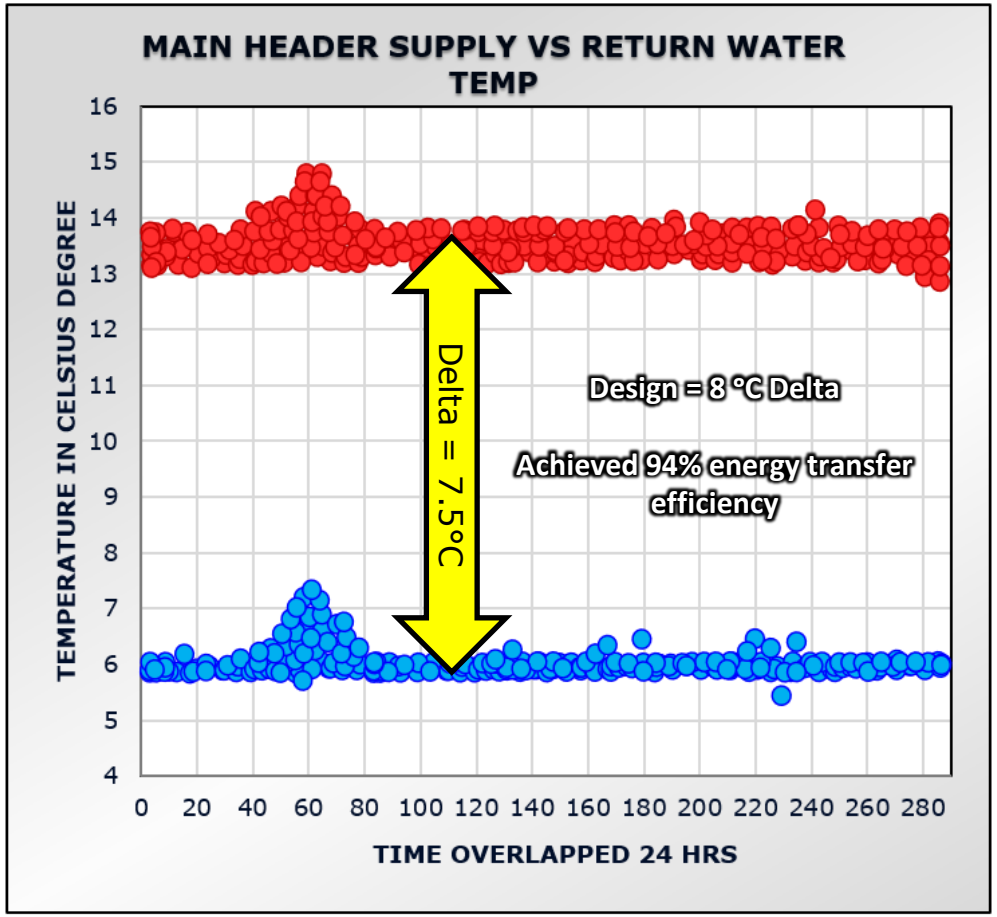

Classified as Business

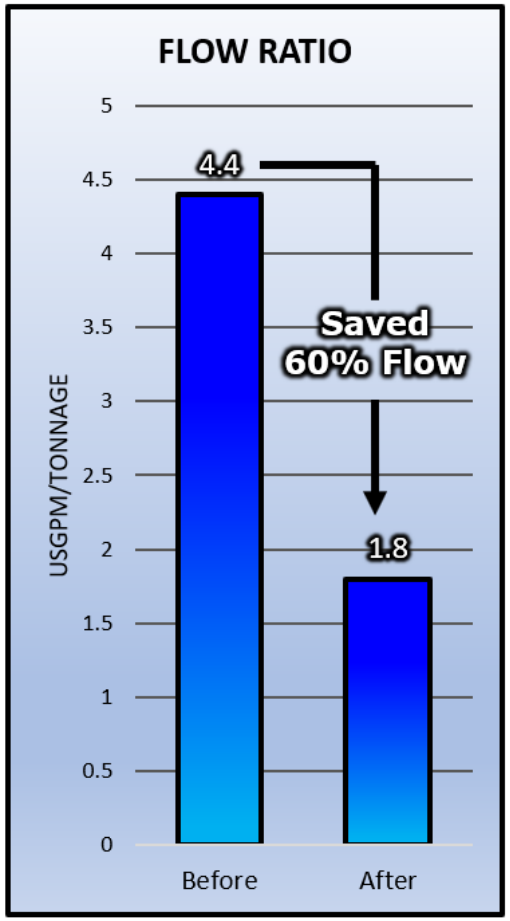
# Gebäude 2

## Vor Umrüstung




## Nach Umrüstung
## Dynamischer hydraulischer Abgleich



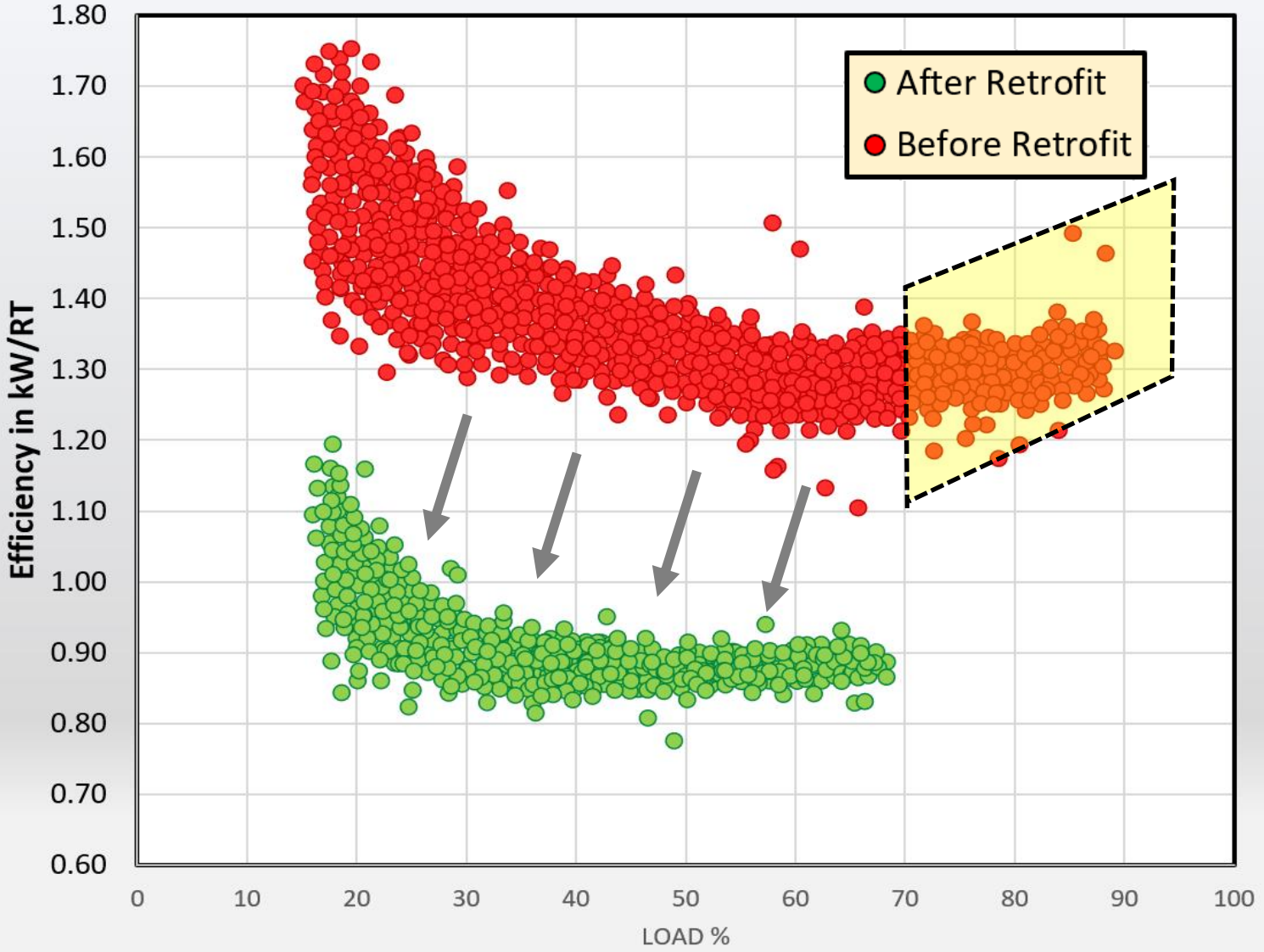





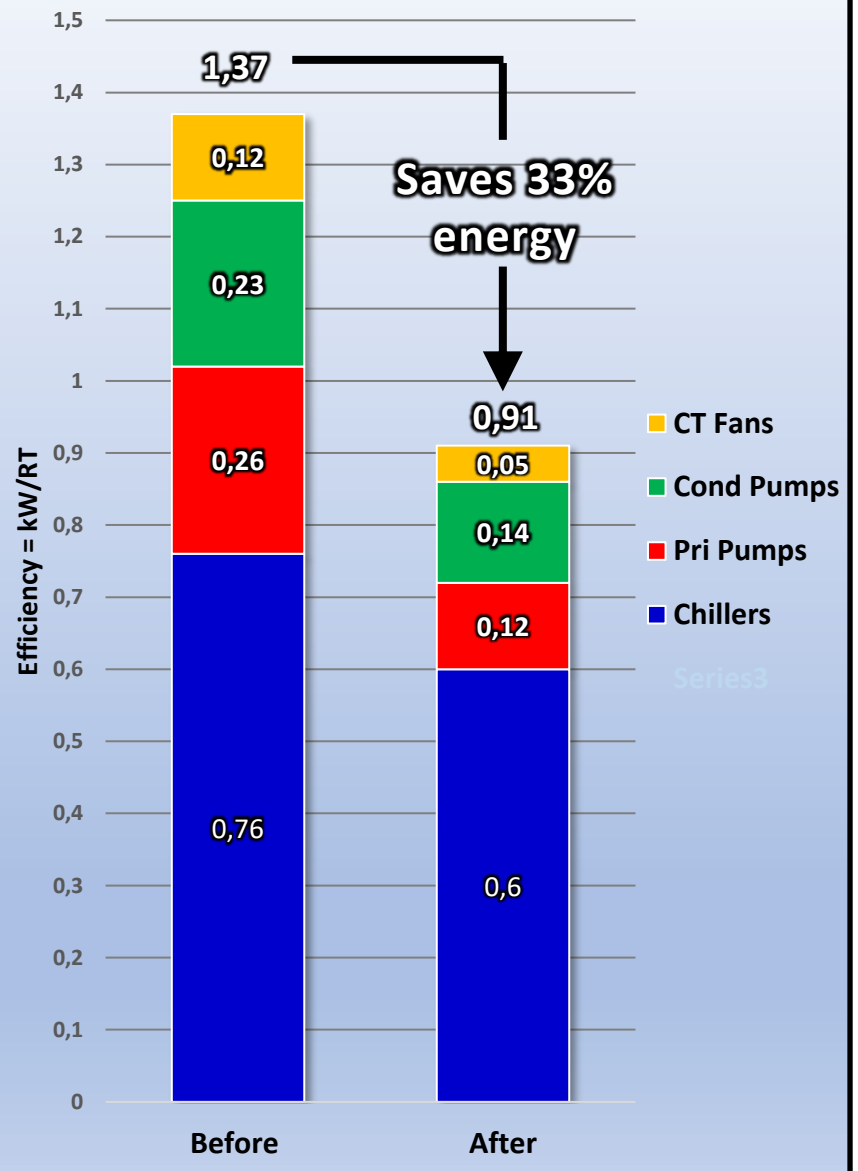

Classified as Business

Gebäude 2

## CHILLER PLANT PERFORMANCE



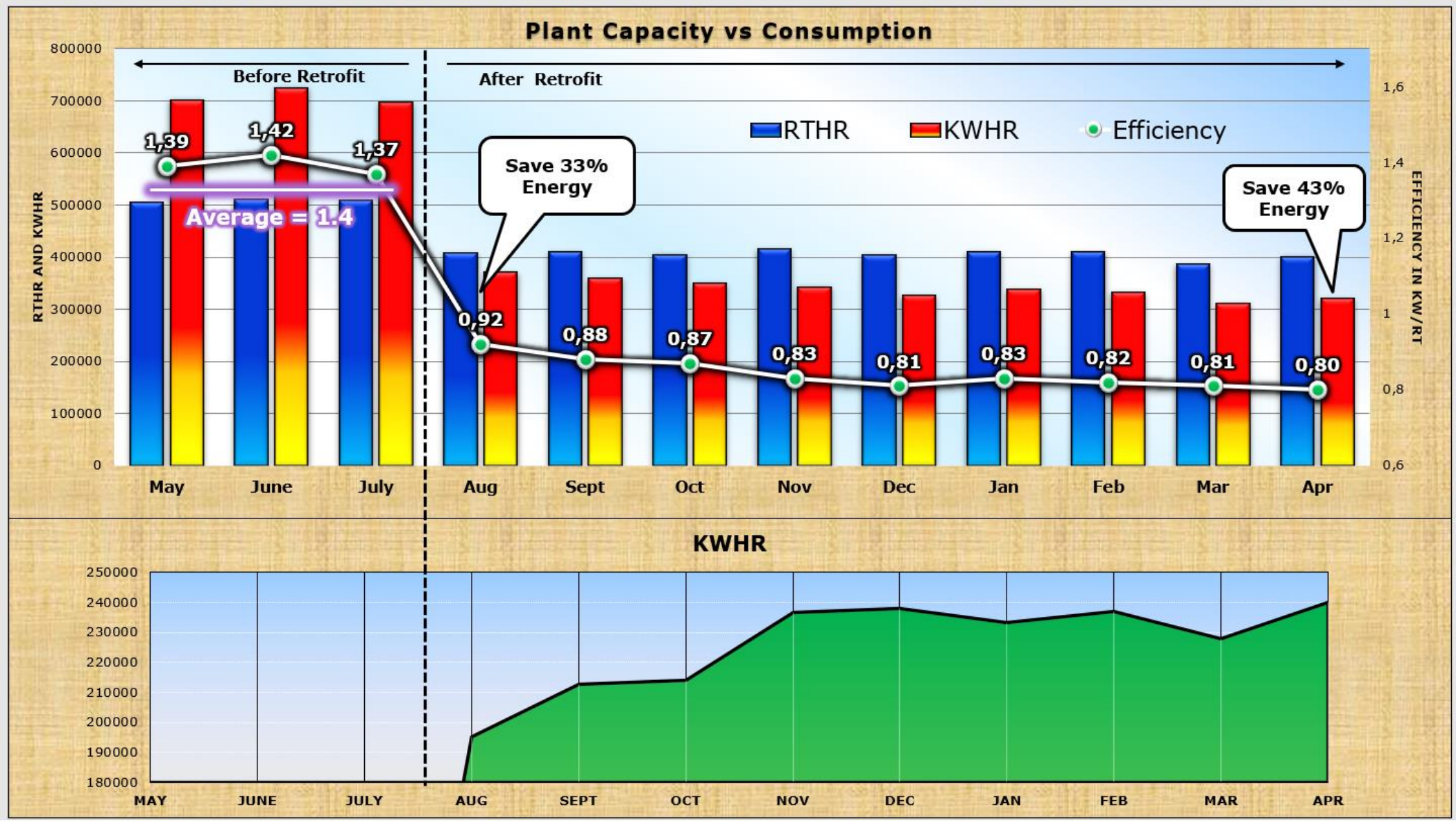

## Cumulative Plant Efficiency






Classified as Business

# Gebäude 2

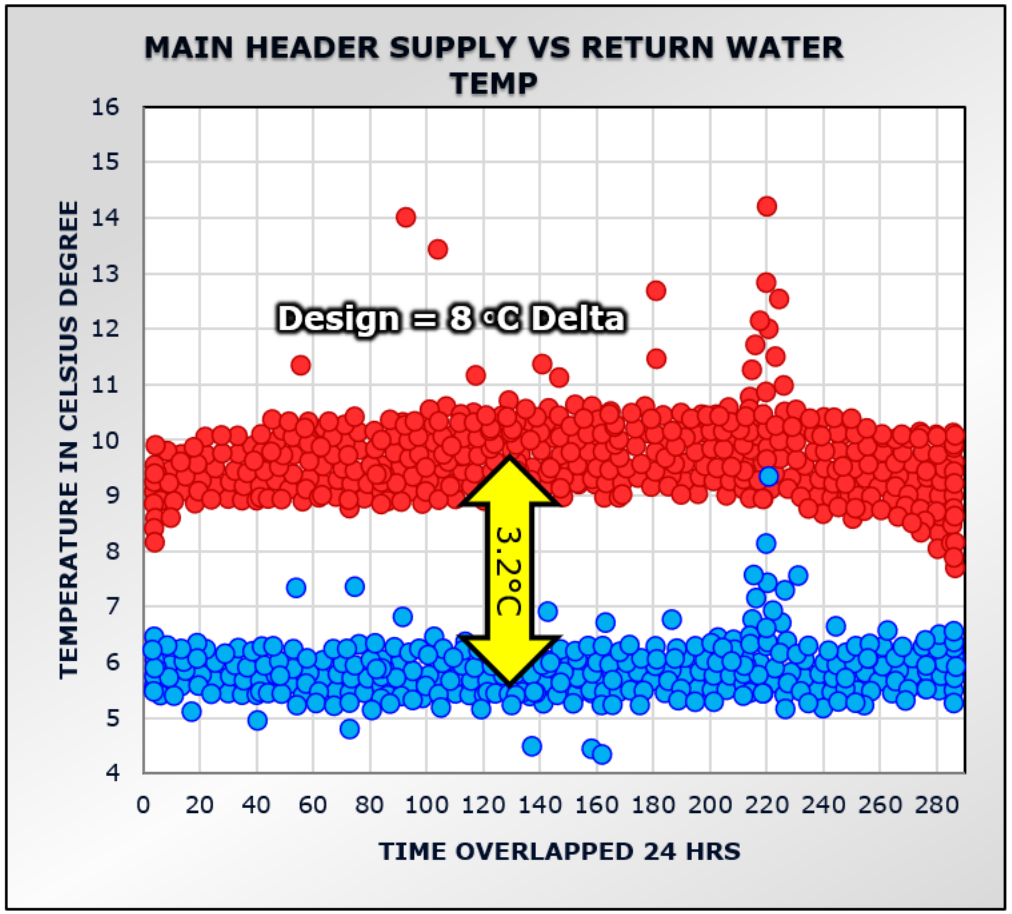




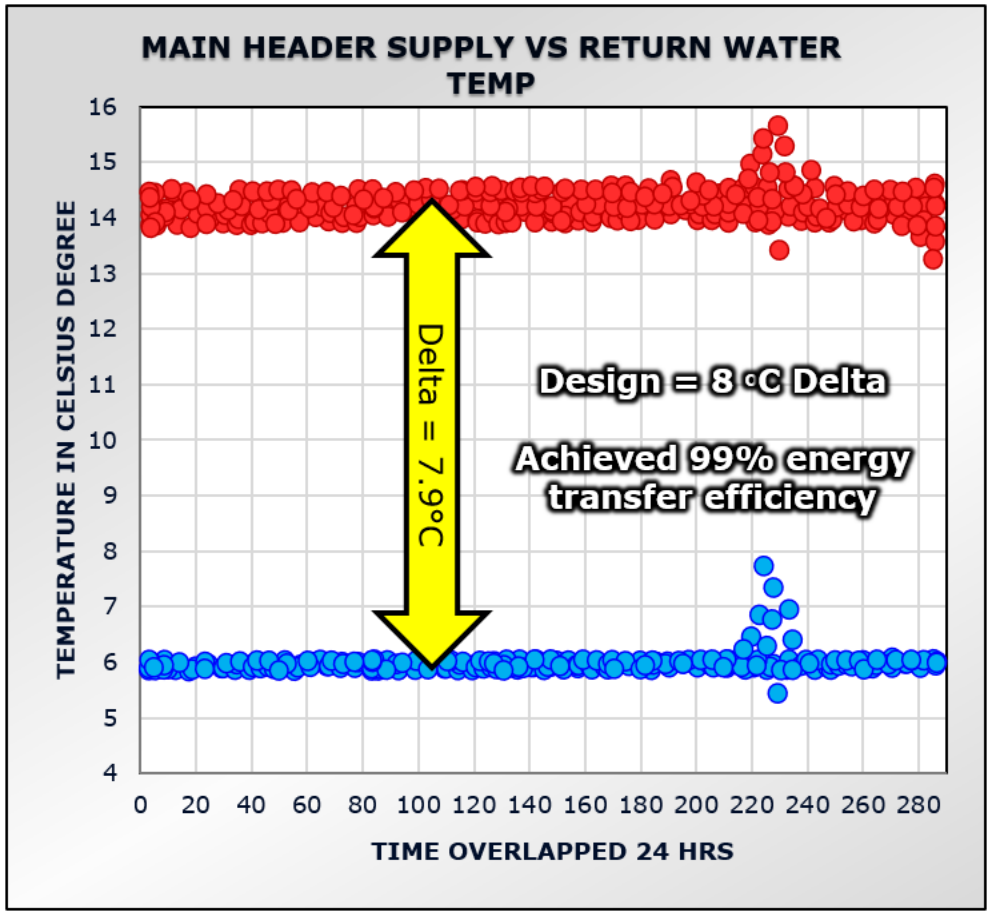

Classified as Business

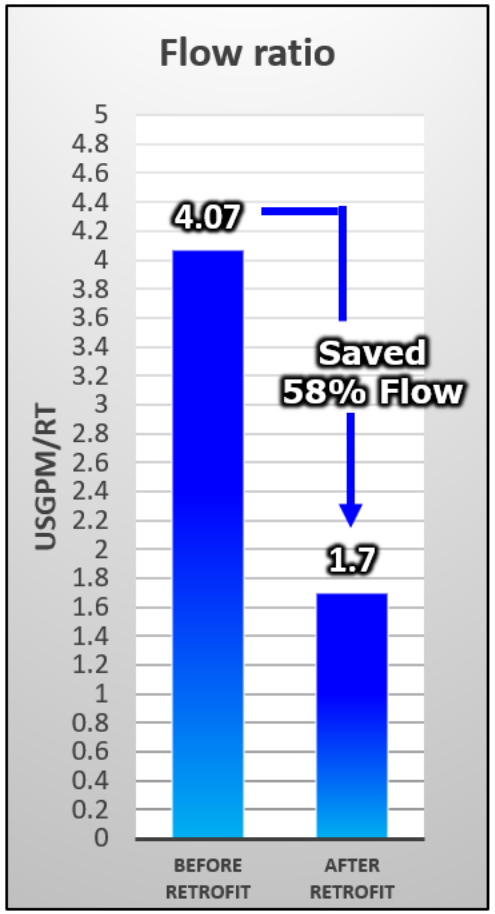
# Gebäude 3

## Vor Umrüstung

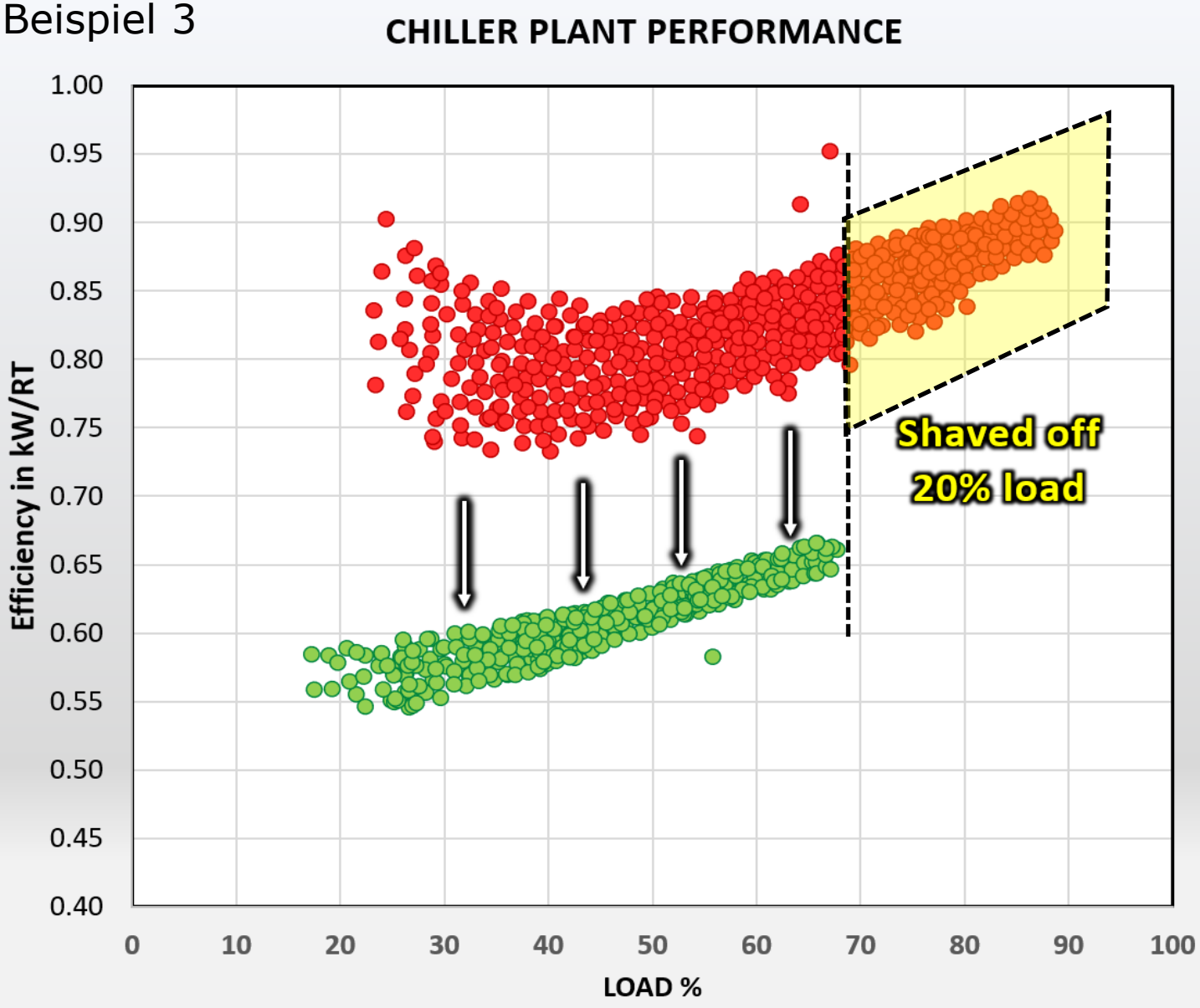


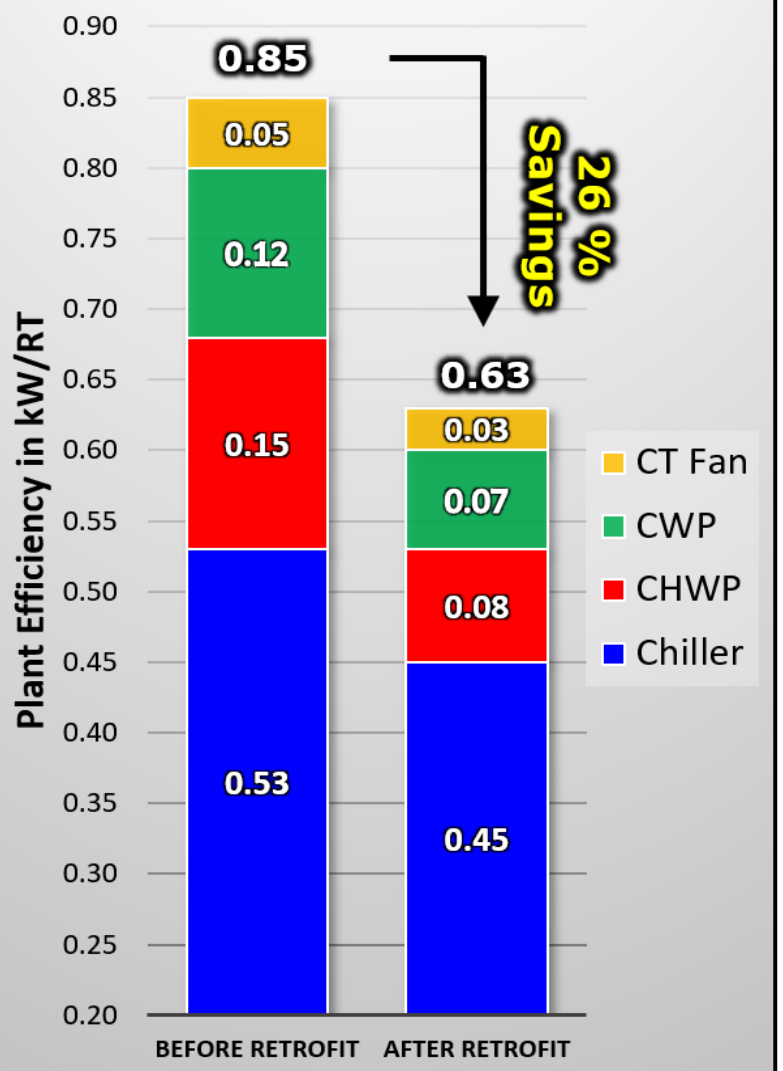

## Nach Umrüstung
## Dynamischer hydraulischer Abgleich



Beispiel 3

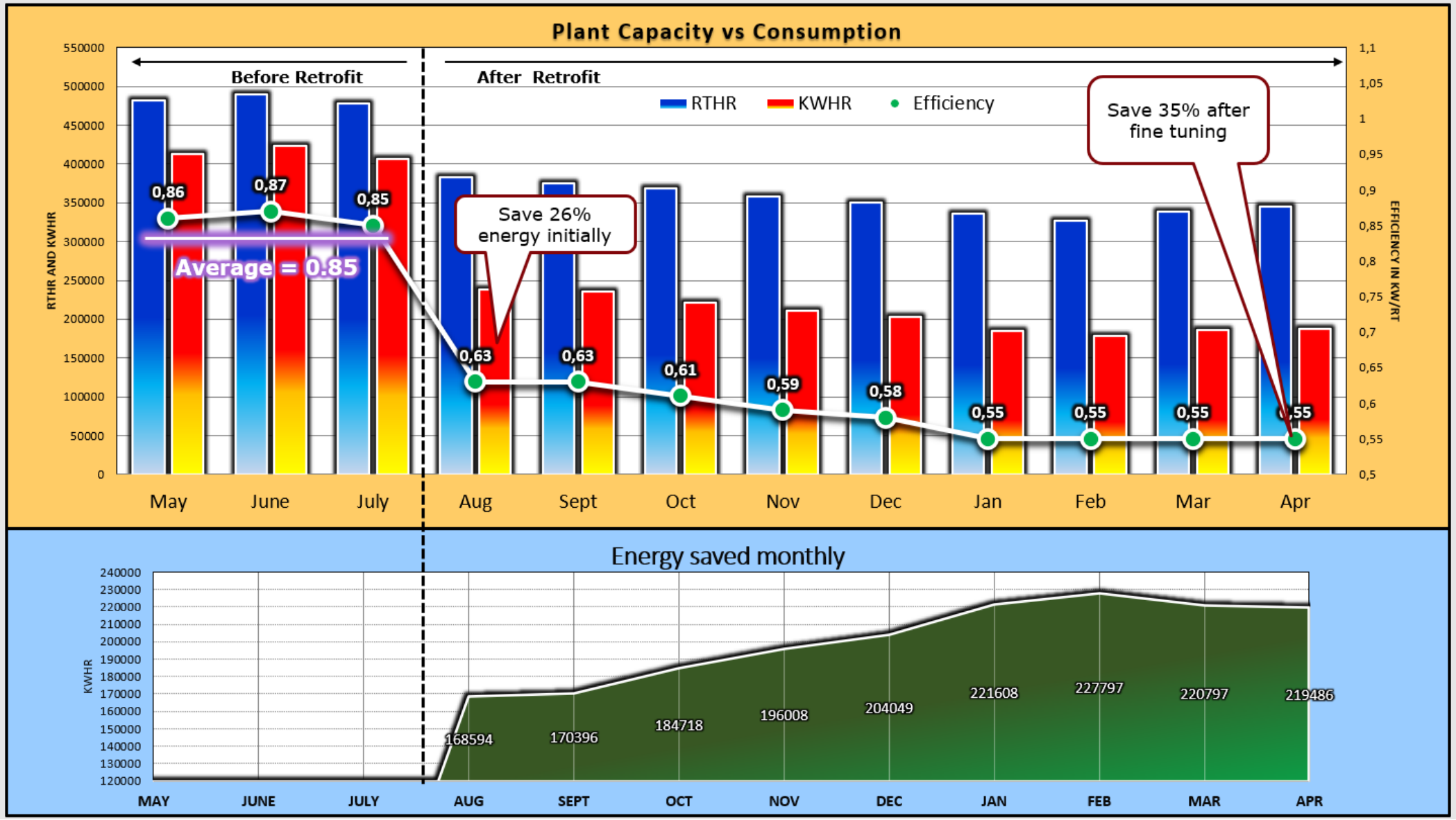





Classified as Business

# Gebäude 3



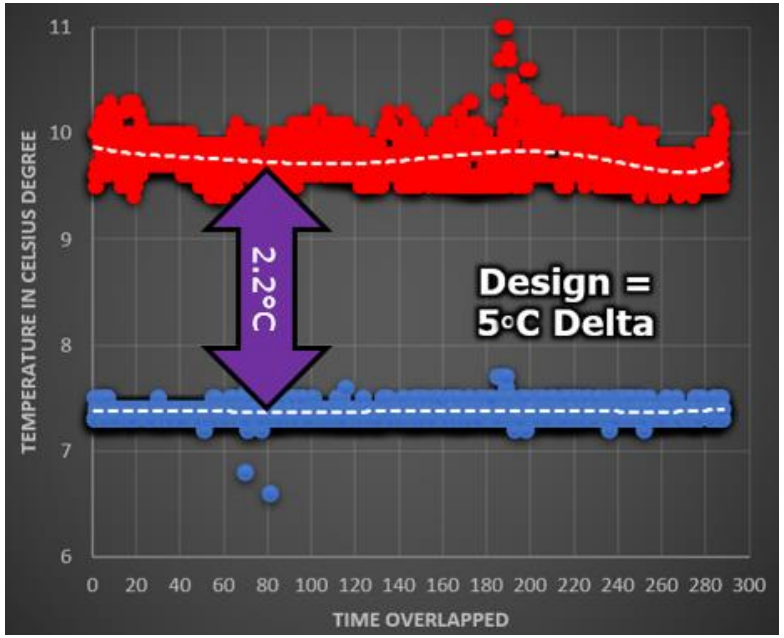


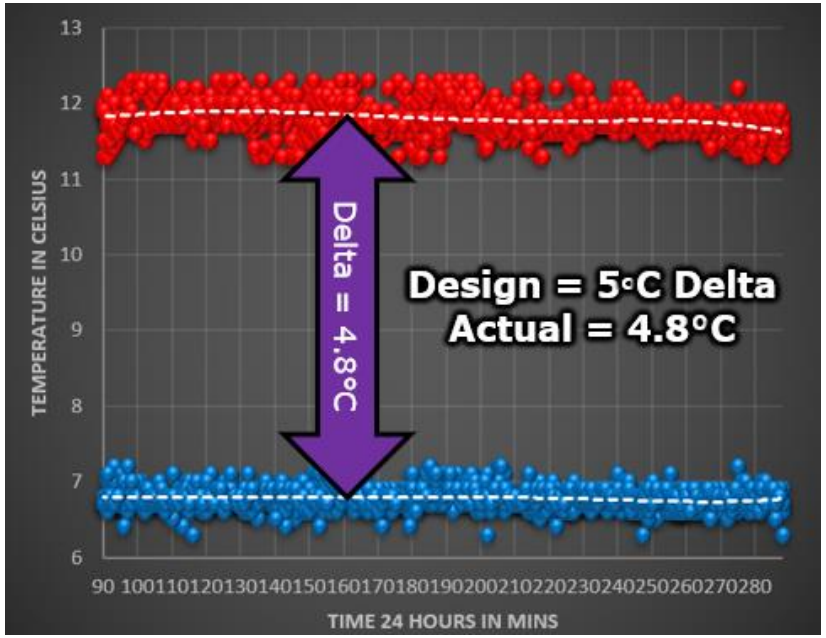

Classified as Business

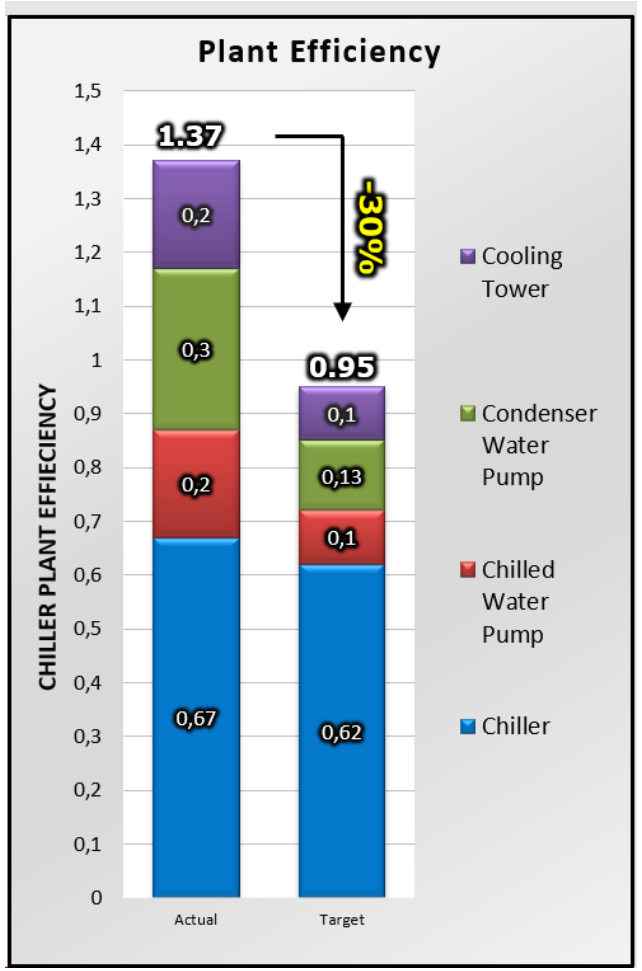
# Gebäude 4

Nach Umrüstung
Dynamischer hydraulischer Abgleich

Vor Umrüstung



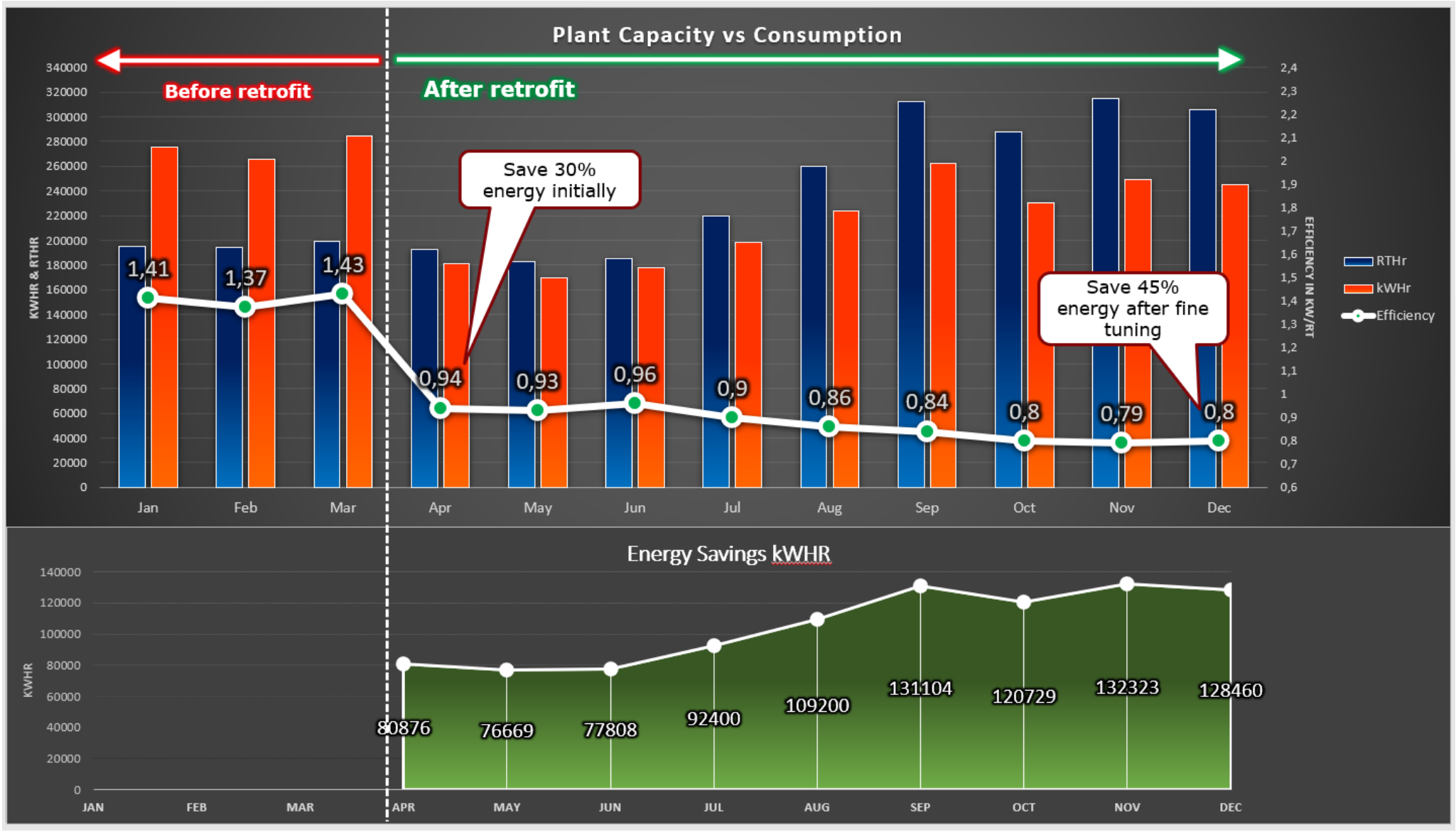





Classified as Business

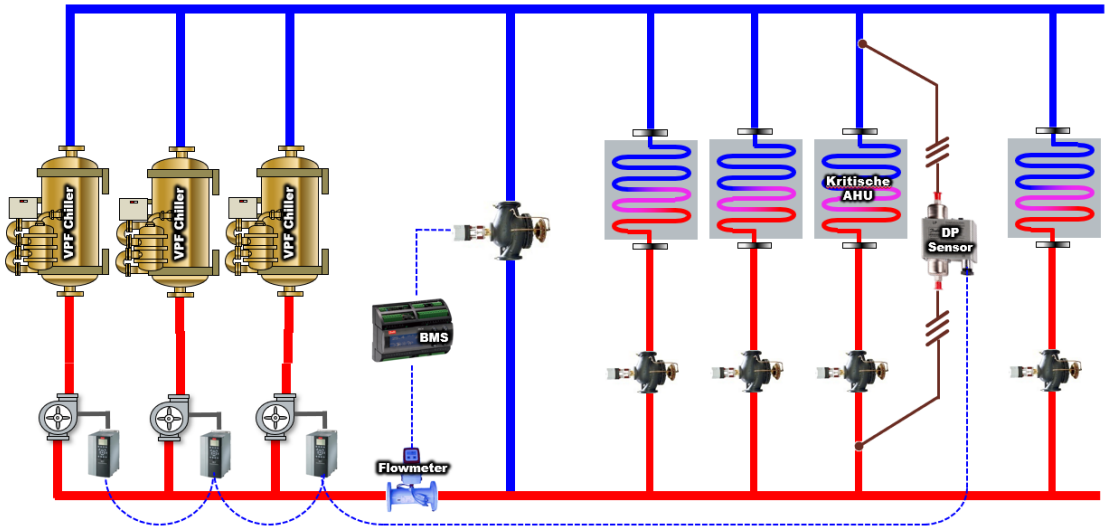
# Gebäude 4






Classified as Business

# Hydraulik im Griff : bessere Gesamtanlage




Stabile Vorlauftemperatur

- **Keine Unter- und Überkapazität**
- **Stabileres System–> höhere Rücklauftemperatur**
- **Höhere Vorlauftemperatur möglich -> COP**
- **Gleichmßigere Raumtemperatur -/ Komfort**

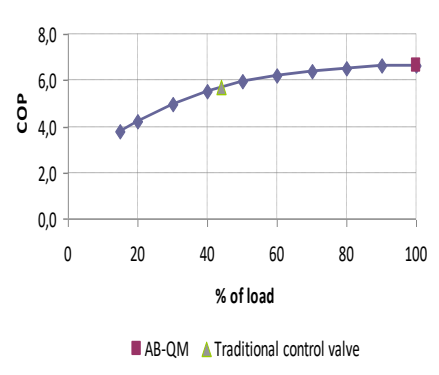
Weniger Verdichterstarts / -stops

- **Längere Lebensdauer der Verdichter**
- **Stabilerer Betrieb**
- **Geringere Leistungsaufnahme**

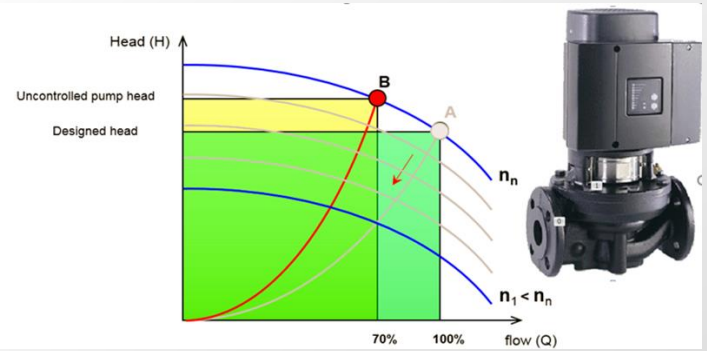

Classified as Business

# Zusammenfassung

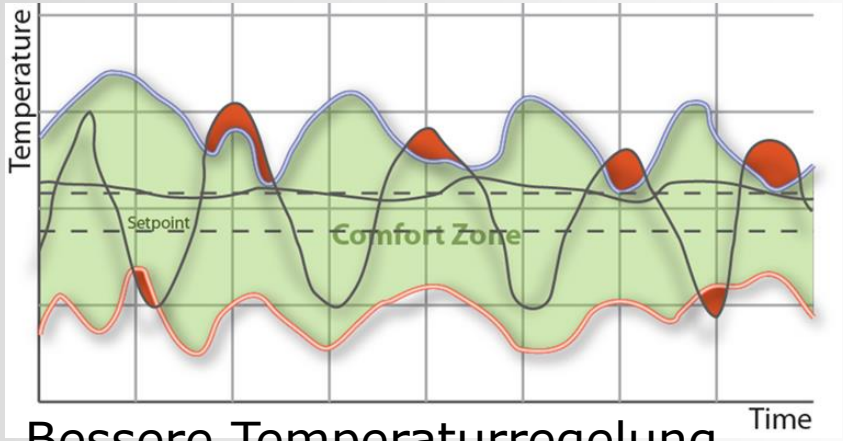
## Hydraulik im Griff ->
## keine Verwässerung sondern Verbesserung



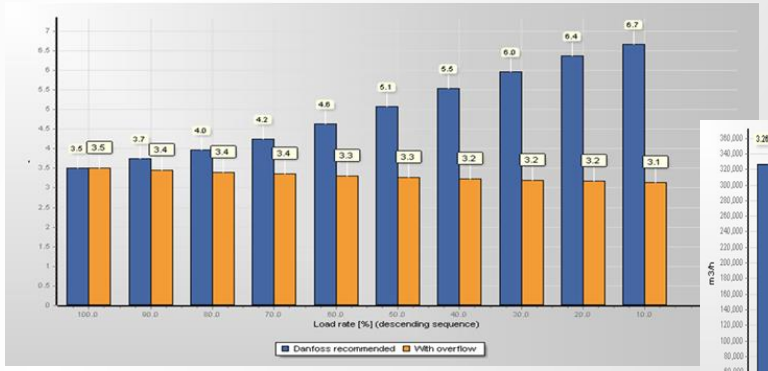

Höhere KWS Effizienz

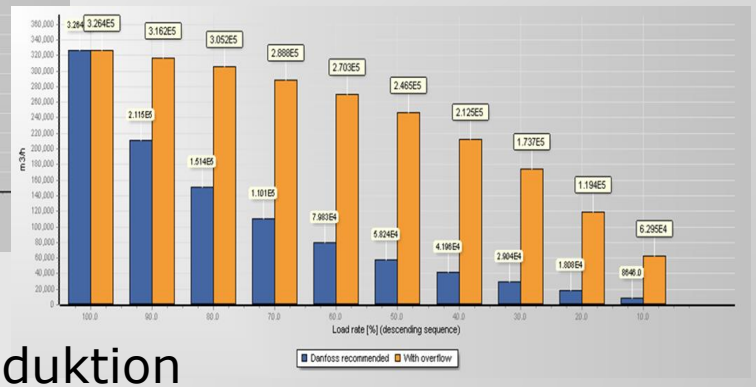



Einsparungen Pumpenergie




Bessere Temperaturregelung




Betriebskostenreduktion



Classified as Business

# Vielen Dank für Ihre Aufmerkamkeit