



Karel de Grote-Hogeschool
start met voorsprong

INDUSTRIE- & PROJECTBOUW 2010
Renovatie van industriële gebouwen

Warmtenetten: concept en regeling

Thermal Grid 
een alternatief concept voor warmtedistributie

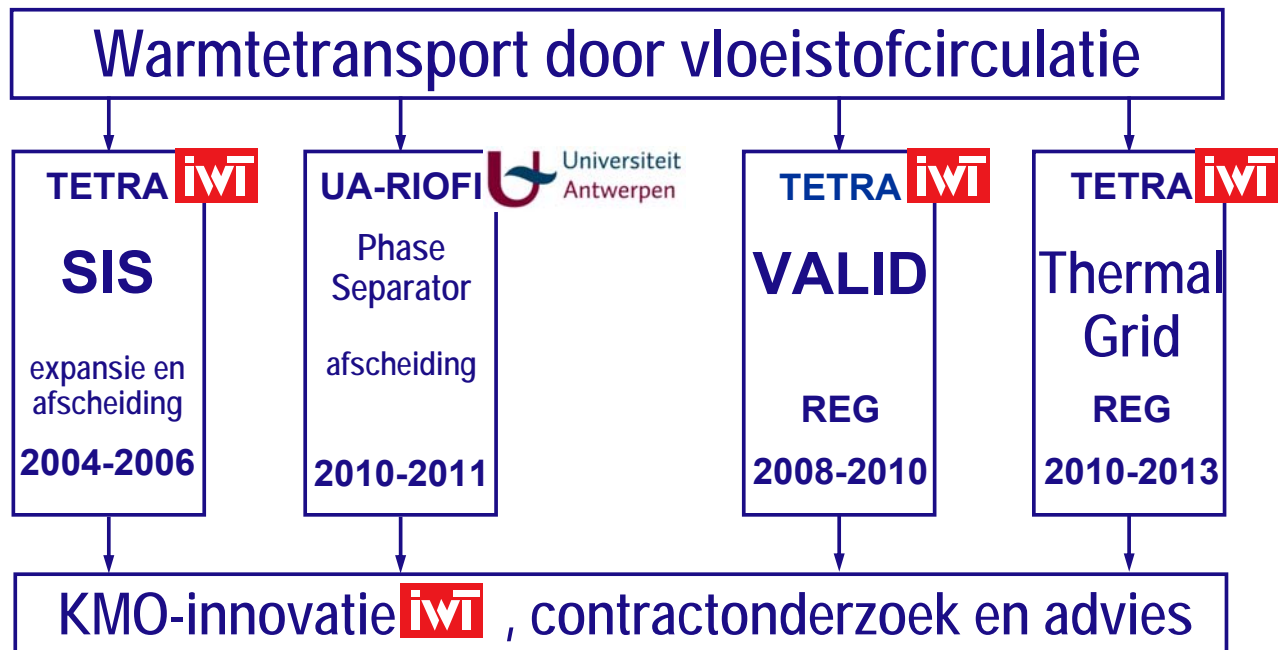
Warmtenetten: concept en regeling

Eddy Janssen

KdG - Energie & Duurzame Ontwikkeling

www.en-do.be

1. E&DO

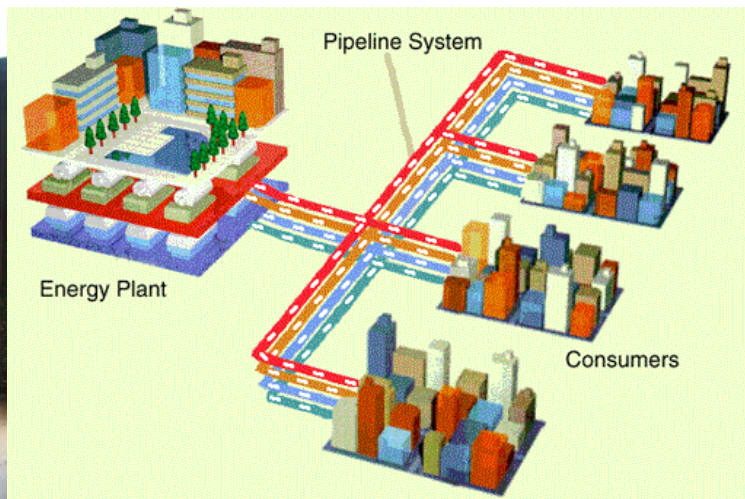


1. E&DO | 2. Variabel debiet | 3. Thermal Grid | 4 Sick Installation Syndrome

1. E&DO

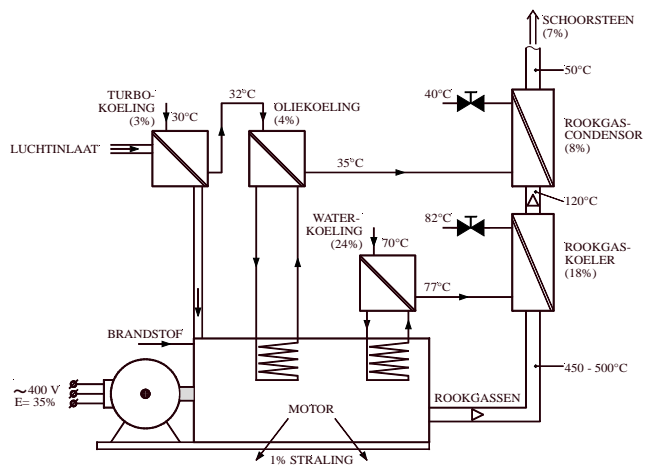
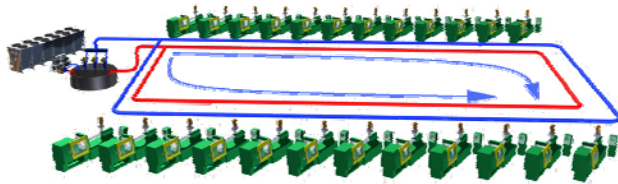


HVAC



Stadsverwarming

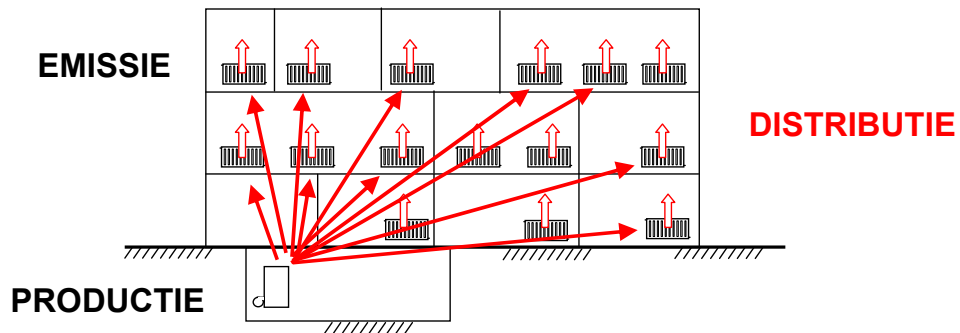
1. E&DO



Indirecte koeling

Warmtekrachtkoppeling

2. Variabel debiet



- Doel :
- Transport van **warmte** of **koude**
 - Regelen thermisch vermogen

2. Variabel debiet

Thermo-hydronisch netwerk



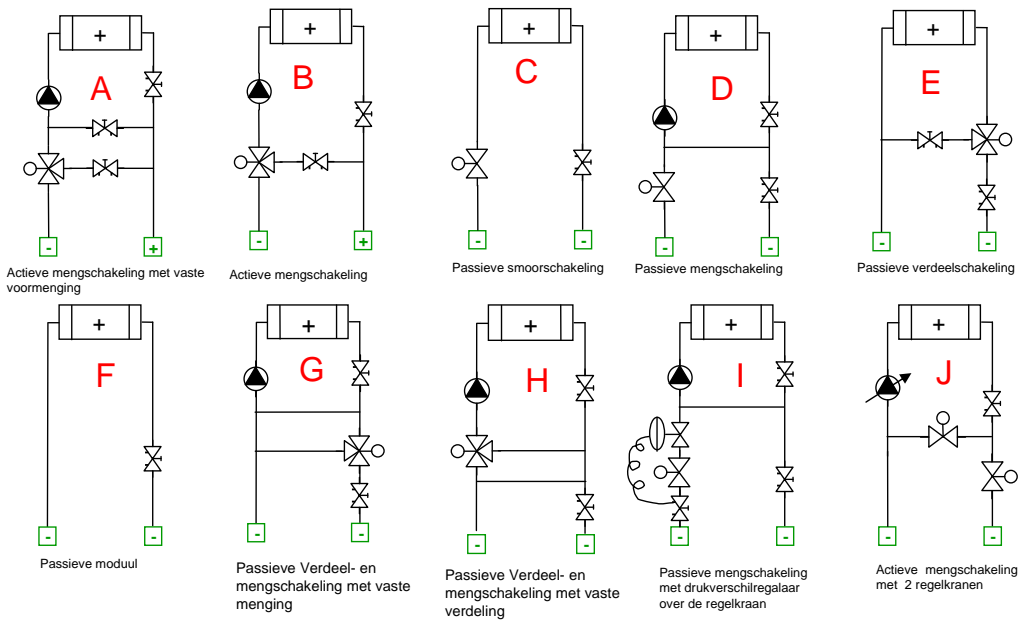
vele configuraties en regelstrategieën

vermogenregeling door regeling van:

- waterdebiet
- watertemperatuur



2. Variabel debiet



2. Variabel debiet

Thermo-hydronisch netwerk



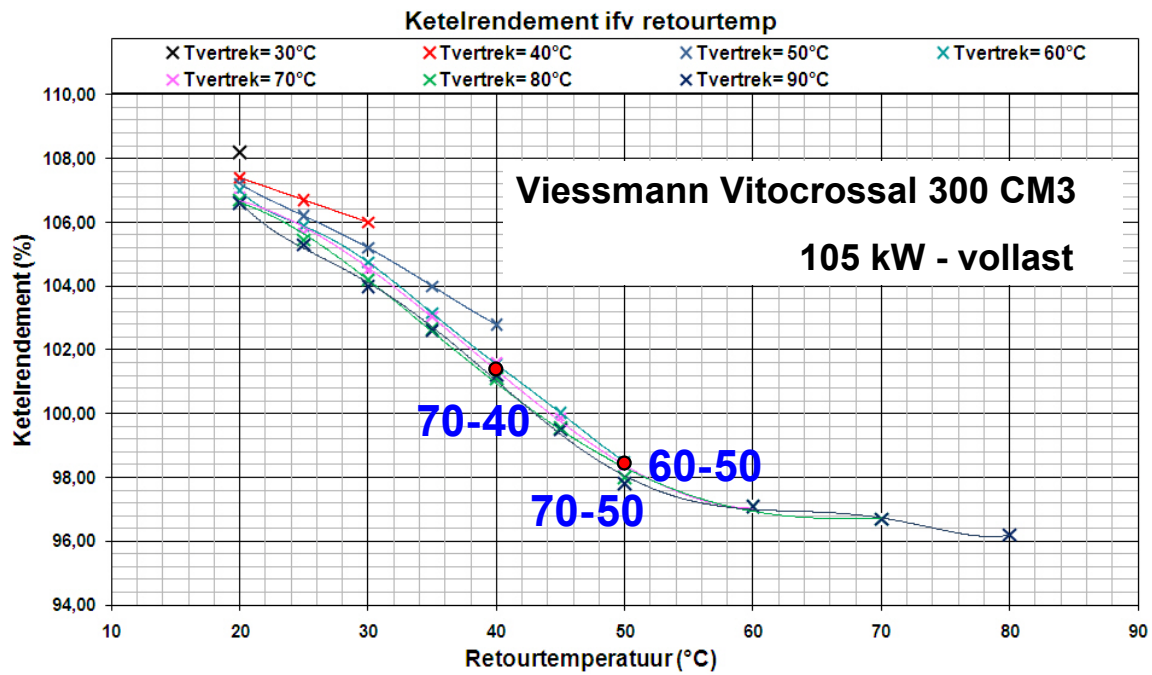
vele configuraties en regelstrategieën
vele problemen en gemiste kansen



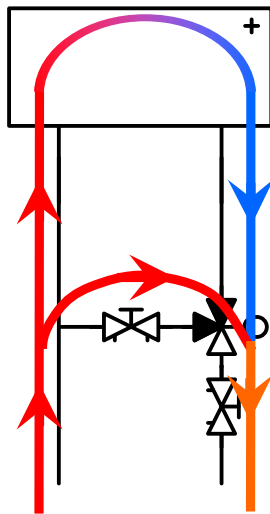
ONDERZOEK E&DO:

- regeltechniek → stabiliteit, snelheid, nauwkeurigheid
- energie → thermisch (productie), elektrisch (pompen)

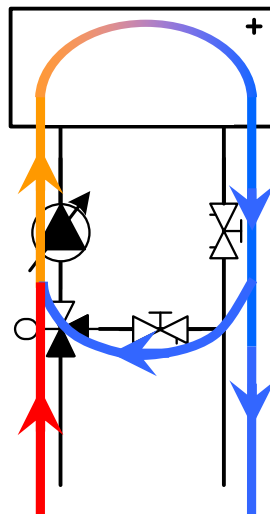
2. Variabel debiet



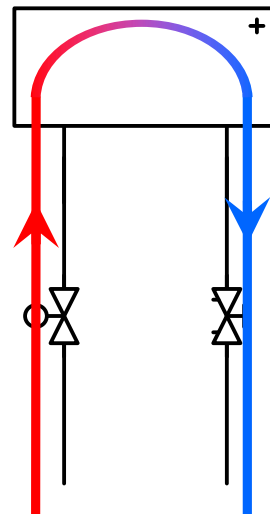
2. Variabel debiet



Verdeling



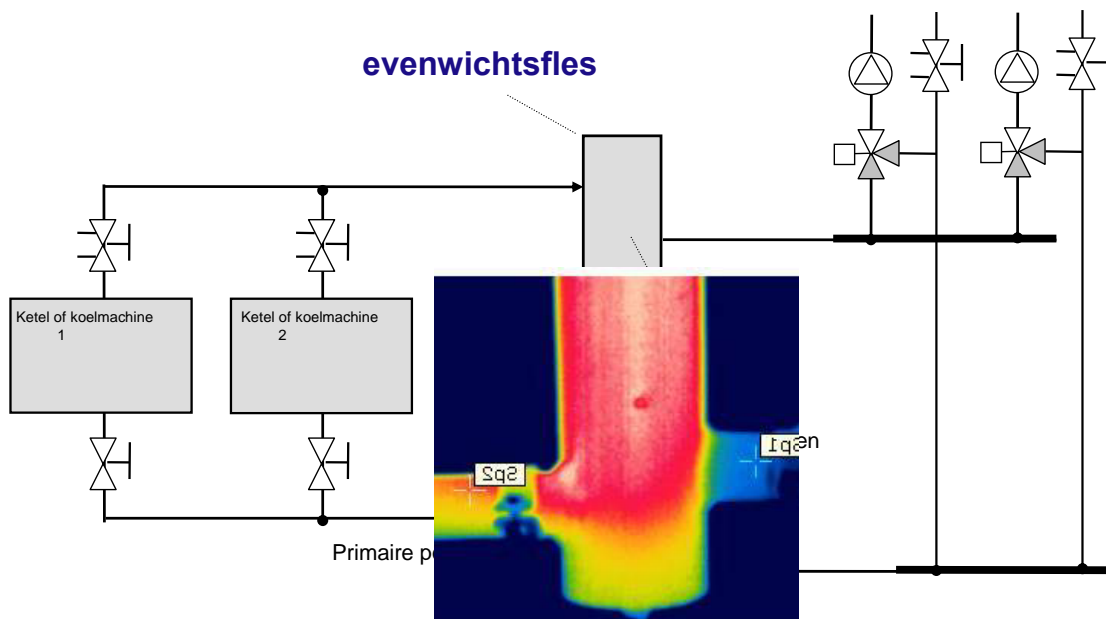
Menging



Smoor/debiet

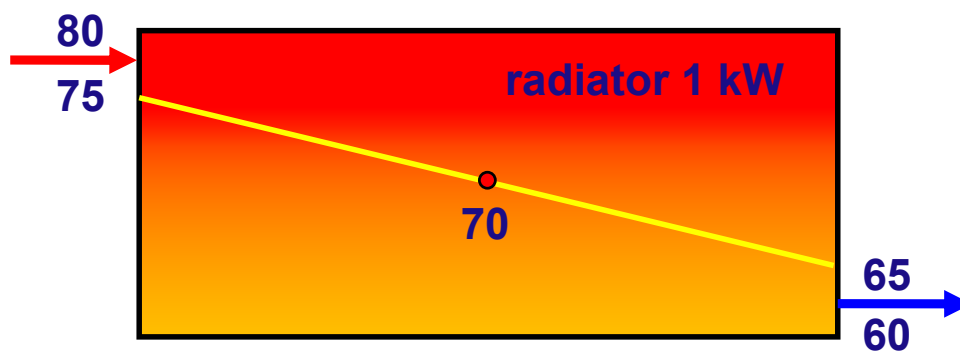
2. Variabel debiet

Invloed mengpunten op t_{retour} en ketelrendement

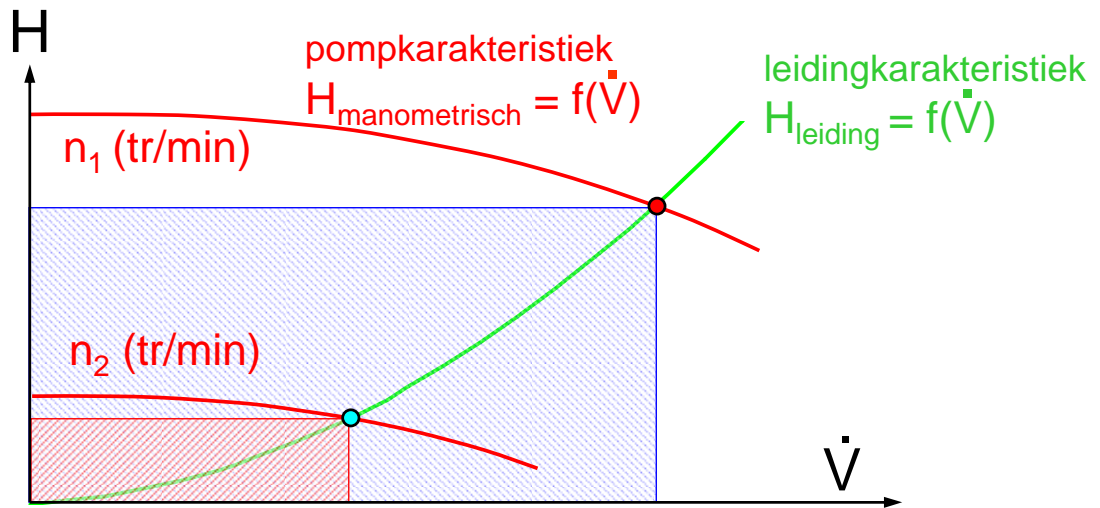


2. Variabel debiet

b) debiet ↓ (afhankelijk van de belasting)



2. Variabel debiet

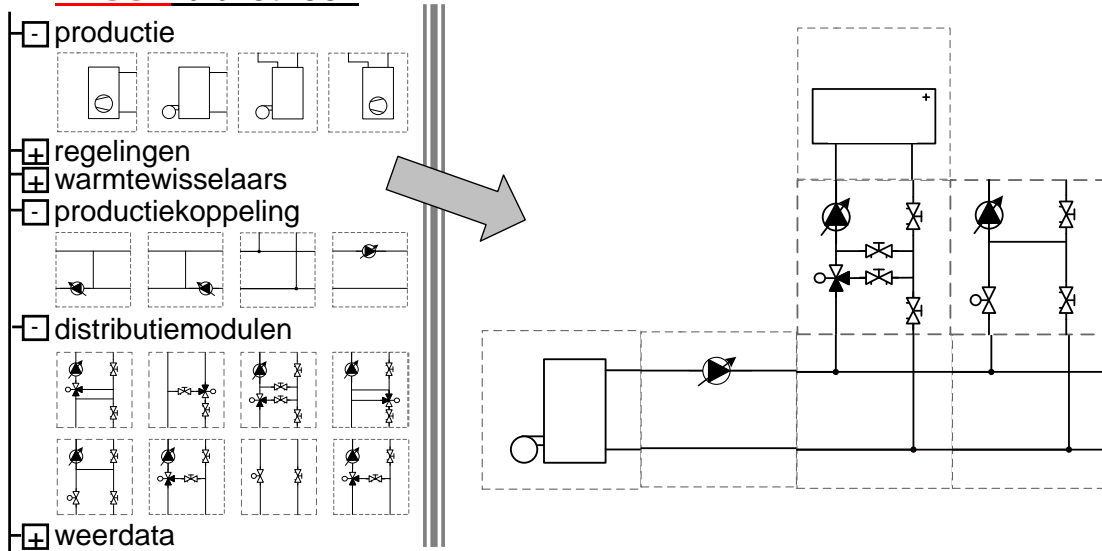


$$\dot{V} \times 1/2 \quad \rightarrow \quad H \times 1/4 \quad \rightarrow \quad P \times 1/8$$

2. Variabel debiet

VALID: simulatiemodellen HYSOP

HYSOP-bibliotheek

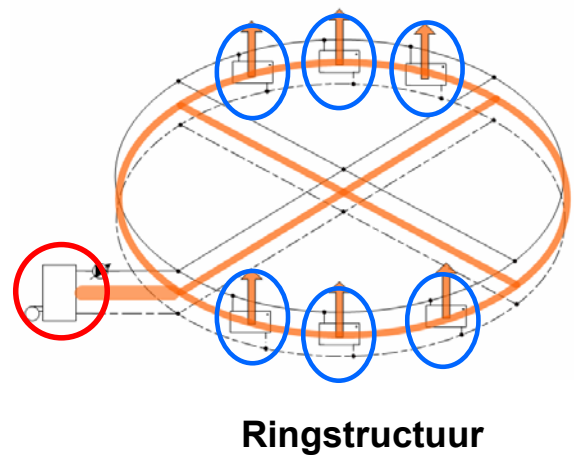
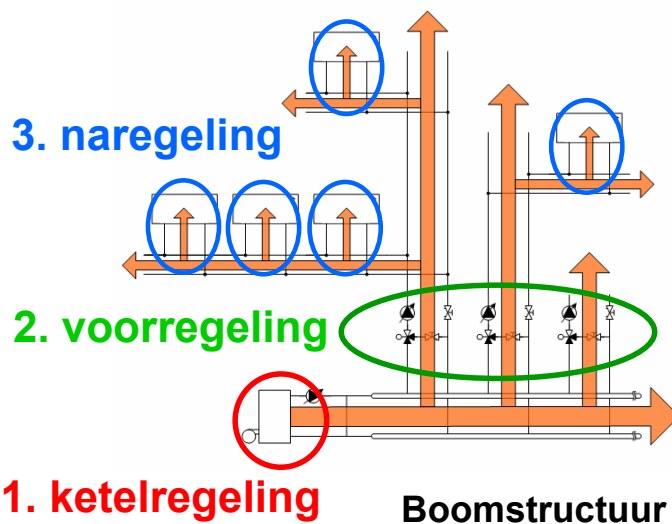


3. Thermal Grid

State of the art



Thermal Grid

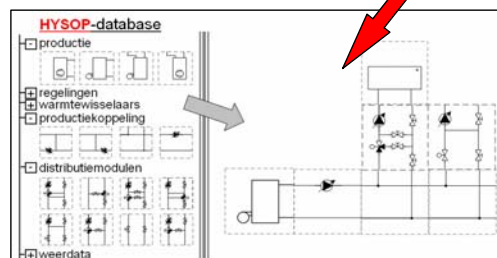


3. Thermal Grid

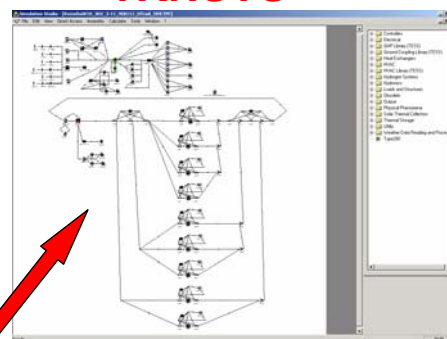
Onderzoek:

- **iWT** TETRA
- KdG + KH Kempen
- Simulaties

EES, HYSOP




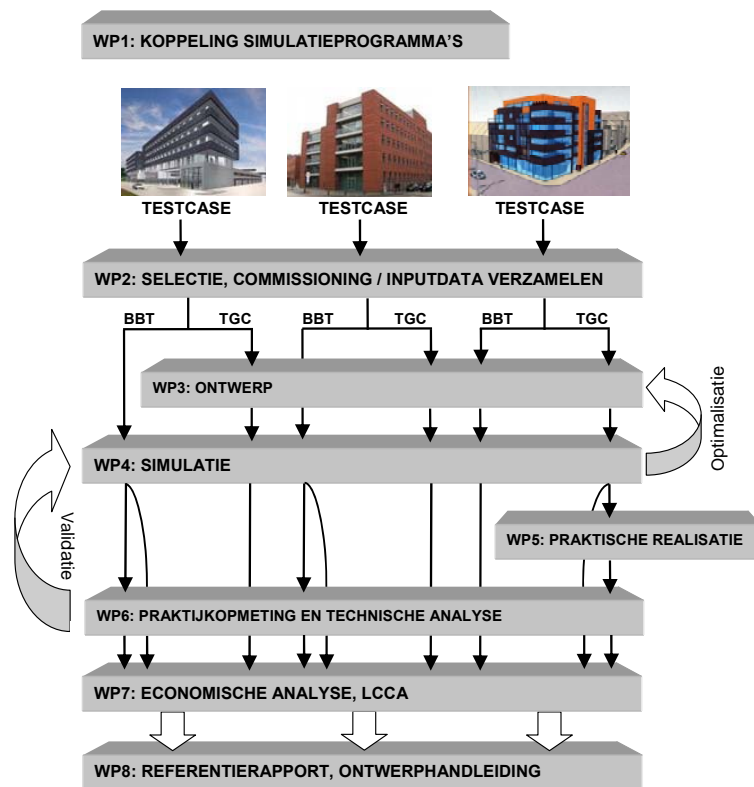
TRNSYS



3. Thermal Grid

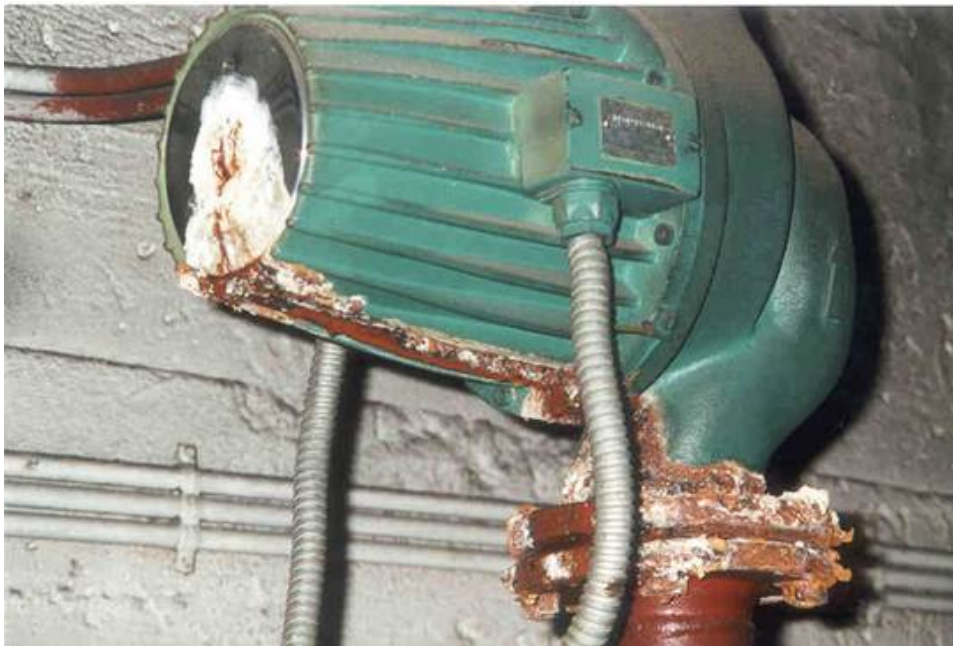
Onderzoek:

-  TETRA
- KdG + KH Kempen
- Simulaties
- Testcases



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4. Sick Installation Syndrome



Schade

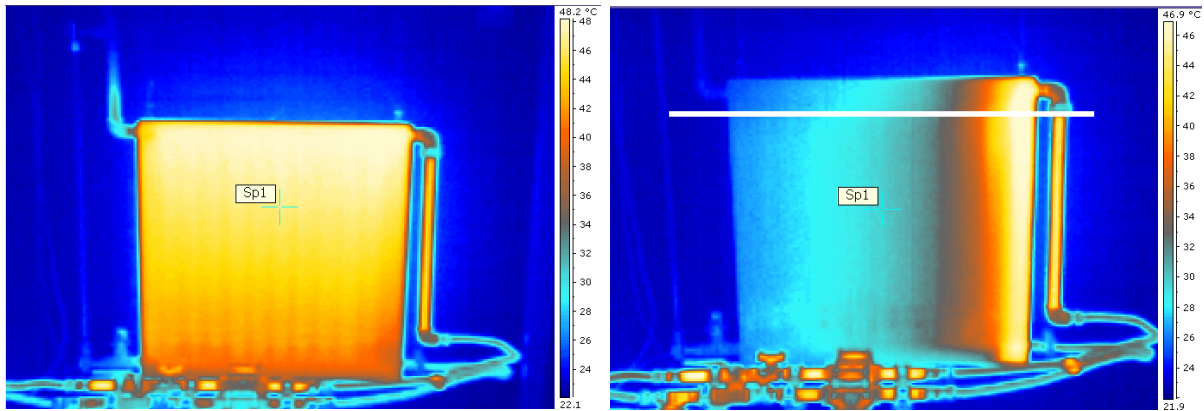
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4. Sick Installation Syndrome



Energieverlies

Besluit

Belang van:

- **conceptkeuze en ontwerp**
- **regeling en inregeling**
- **onderhoud en opvolging**