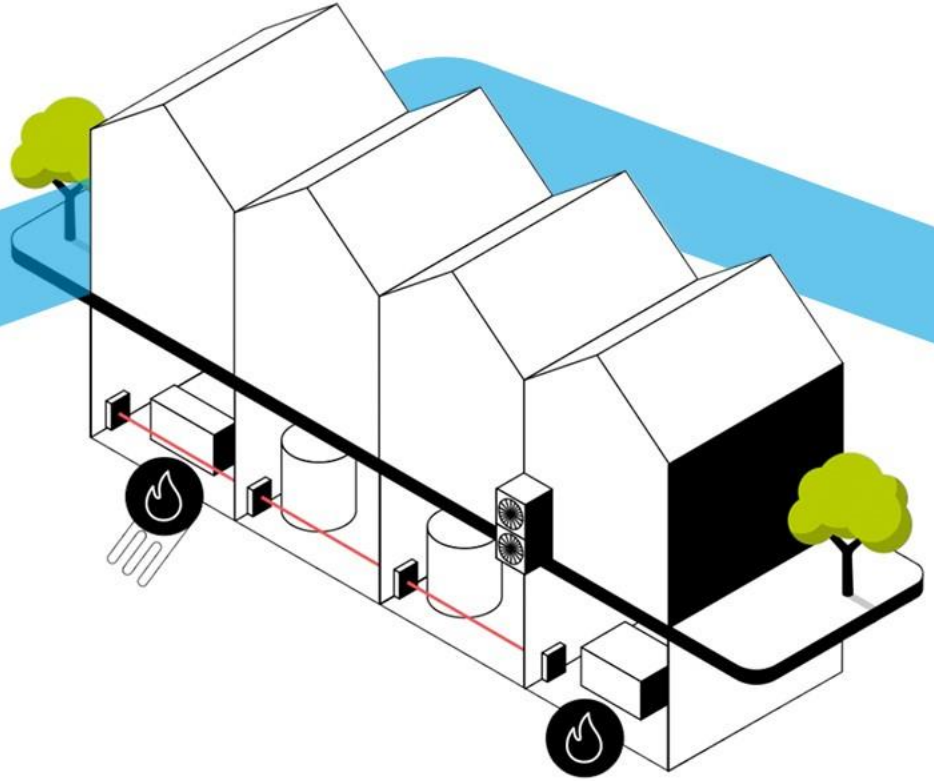
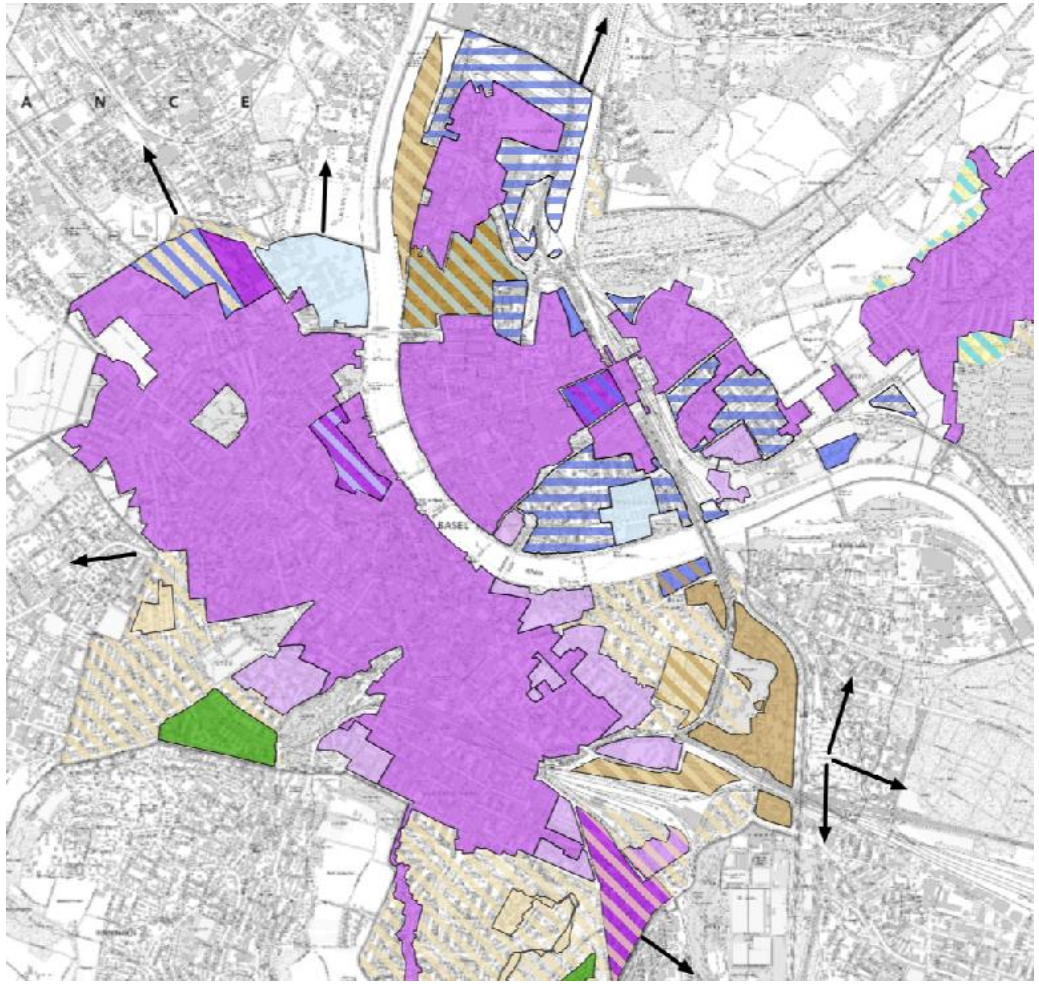


NANOVERBUND

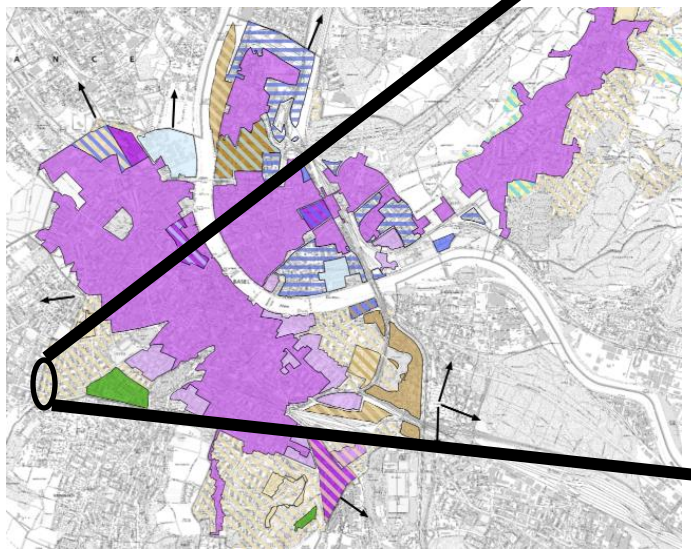
Dominik Born | Innovation Manager

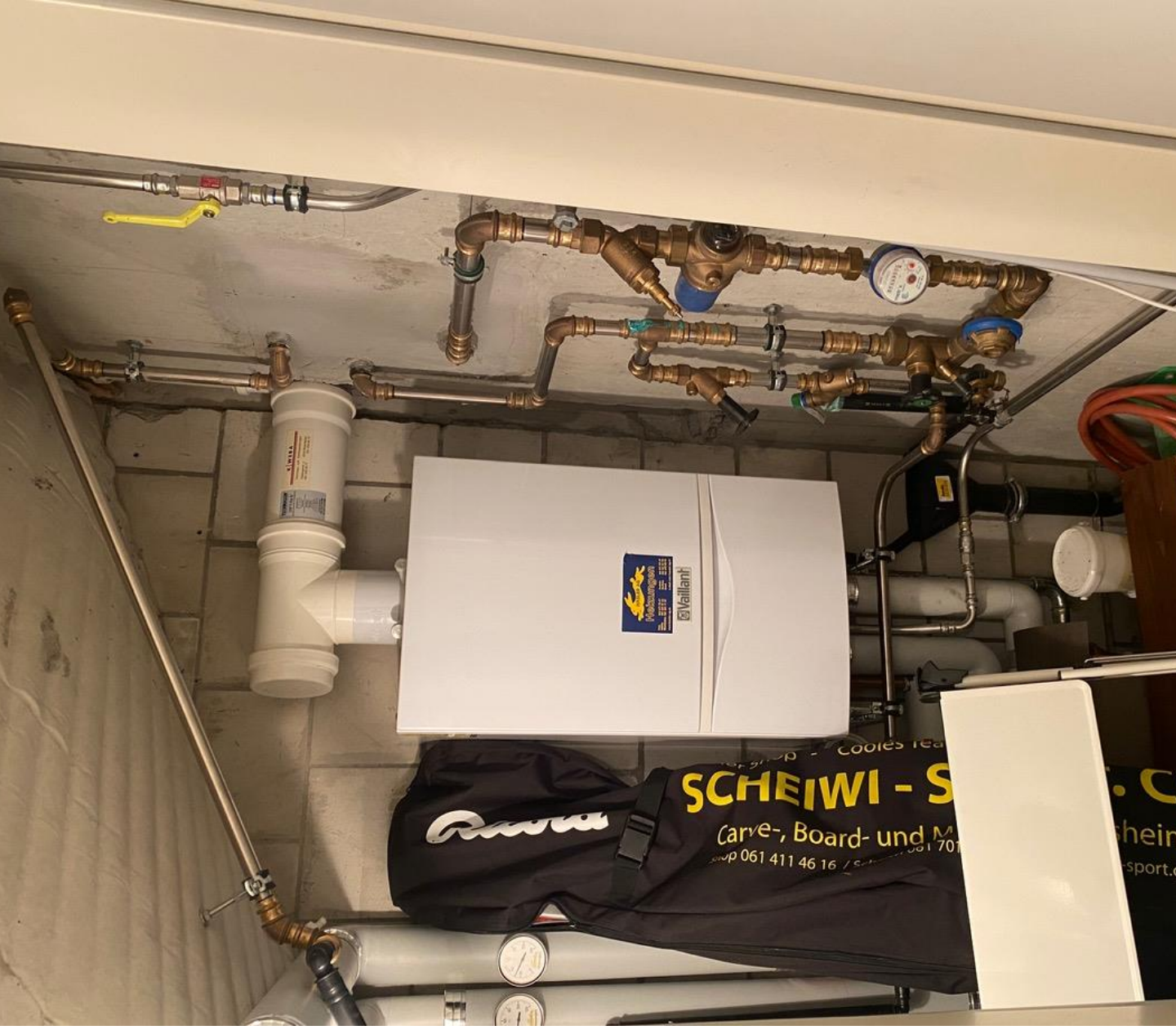
Initial situation



- Fossil heating systems impossible by law
- Gas is being phased out
- District heating too expensive in less populated areas and smaller buildings
- Alternative solutions not always easy to implement
- Older heating systems were often oversized based on rules of thumb and planning data

Areas without district heating connection




Vaillant
SCHEIWI - S
Carve-, Board- und M
061 411 46 16

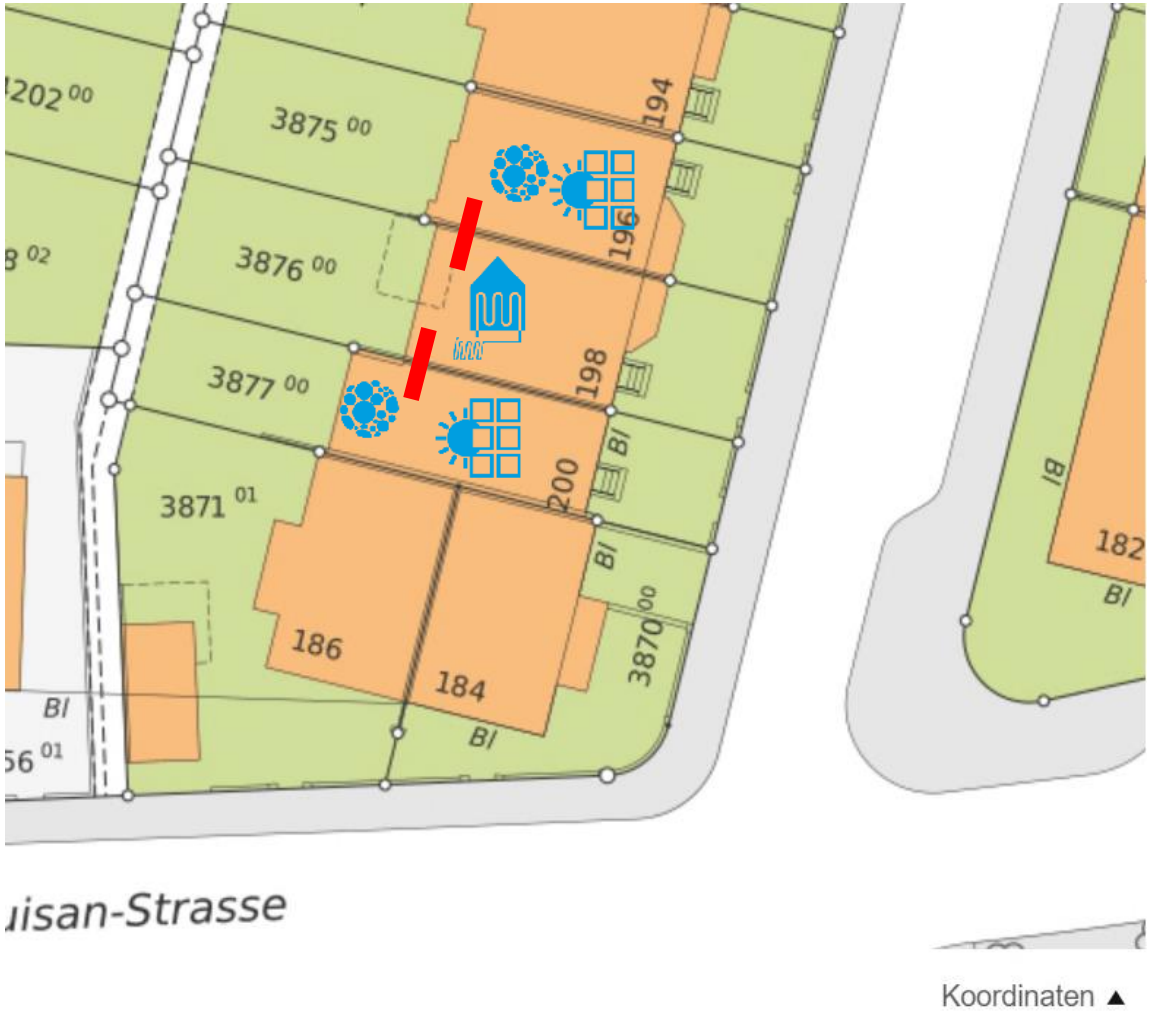

Carve-, Board- und Mi
Shop 061 411 46 16 / Scheiwi 061 70
Vaillant

Overview Pilot 'Langen Loh'

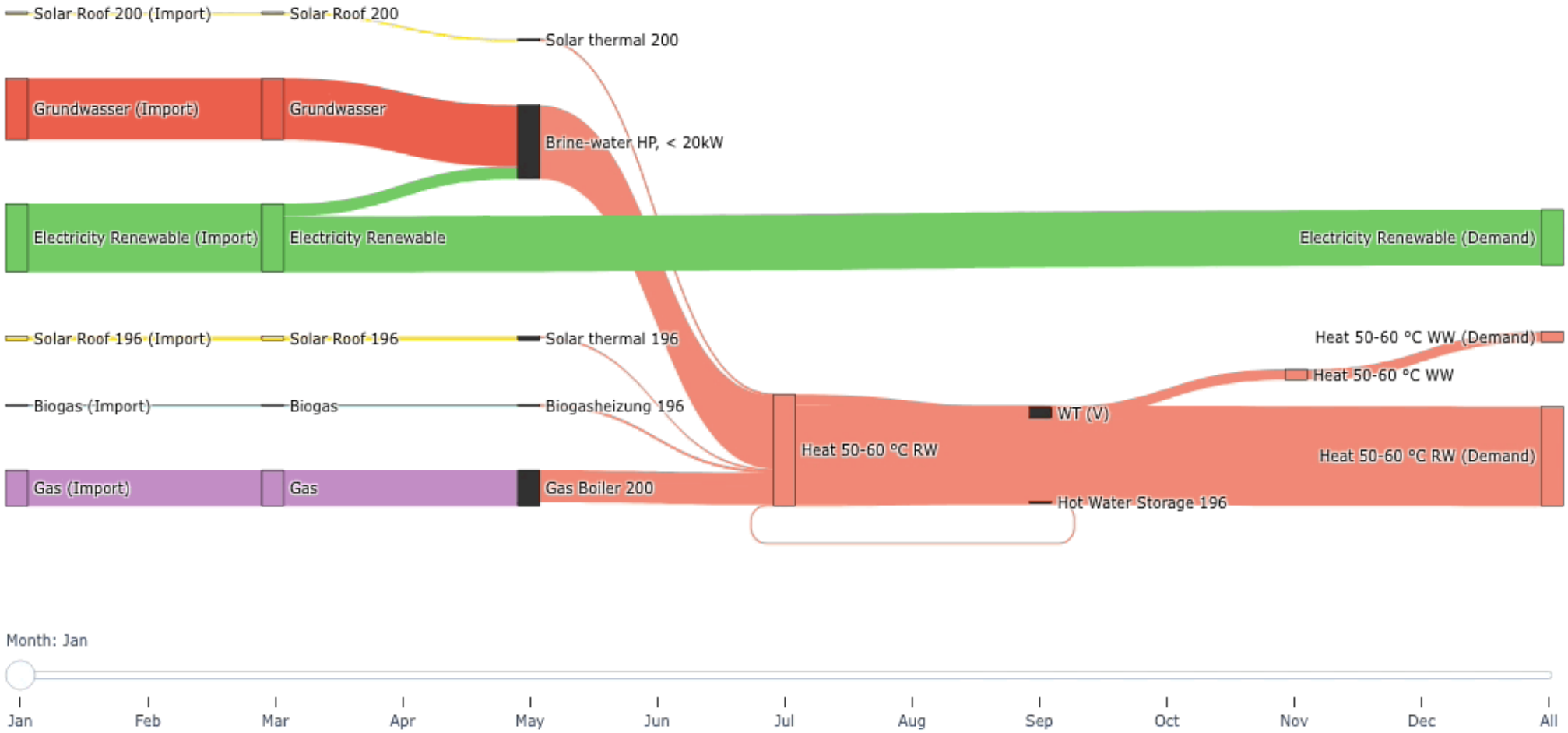
Gas heating

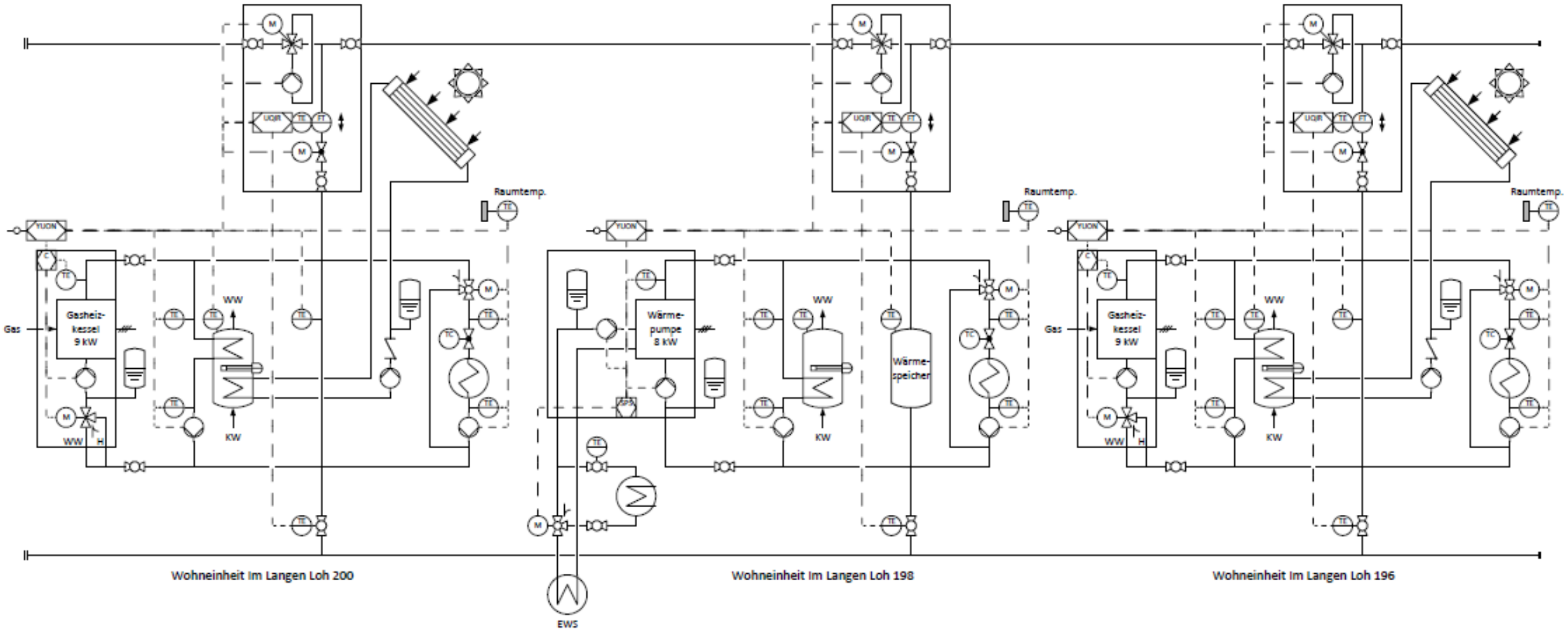
EWS-WP

Solar thermal energy



Connecting pipe


Solar Roof 200 (Import)
Solar Roof 200
Solar thermal 200
Grundwasser (Import)
Grundwasser
Brine-water HP, < 20kW
Electricity Renewable (Import)
Electricity Renewable
Electricity Renewable (Demand)
Solar Roof 196 (Import)
Solar Roof 196
Solar thermal 196
Heat 50-60 °C WW (Demand)
Heat 50-60 °C WW
Biogas (Import)
Biogas
Biogasheizung 196
WT (V)
Heat 50-60 °C RW
Heat 50-60 °C RW (Demand)
Gas (Import)
Gas
Gas Boiler 200
Hot Water Storage 196
Month: Jan
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
All


Raumtemp.
Gas
Gasheiz-
kessel
9 kW
WW
KW
Wärme-
pumpe
8 kW
Wärme-
speicher
EWS
Wohneinheit Im Langen Loh 200
Wohneinheit Im Langen Loh 198
Wohneinheit Im Langen Loh 196


SAN FRANCISCO


kambly
Miele

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Energie BFE

iwb

PATHFNDR project

WP5 P+D Nanocomposite

sweet swiss energy research for the energy transition

PATHFNDR

ETH zürich Empa PAUL SCHERRER INSTITUT PSI zhaw HOCHSCHULE LUZERN UNIVERSITÉ DE GENÈVE EPFL

Project text

- Heating systems in buildings are designed to provide sufficient heat on the coldest days of the year. This means that most of the time the **heating systems** are **not utilised at 100%.** If **terraced houses** are connected to a **thermal network**, heating can be more efficient locally, as the most efficient heating system can always be operated to cover the demand of all houses.

- These thermally connected buildings with adapted operating strategies (called "nano-networks") can also provide **more flexibility** to local DSOs and energy suppliers. Especially when mixed building energy systems are present, different storage/conversion technologies can provide **added value** for all participants/stakeholders.

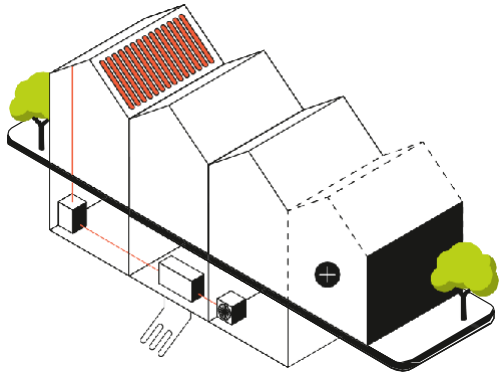
- **A pilot plant** with three terraced houses with flexibility-conscious operation in Basel will **demonstrate** the **potential** of the nanoverbund concept. In addition, a stakeholder ecosystem study will identify the important key points of all participants.

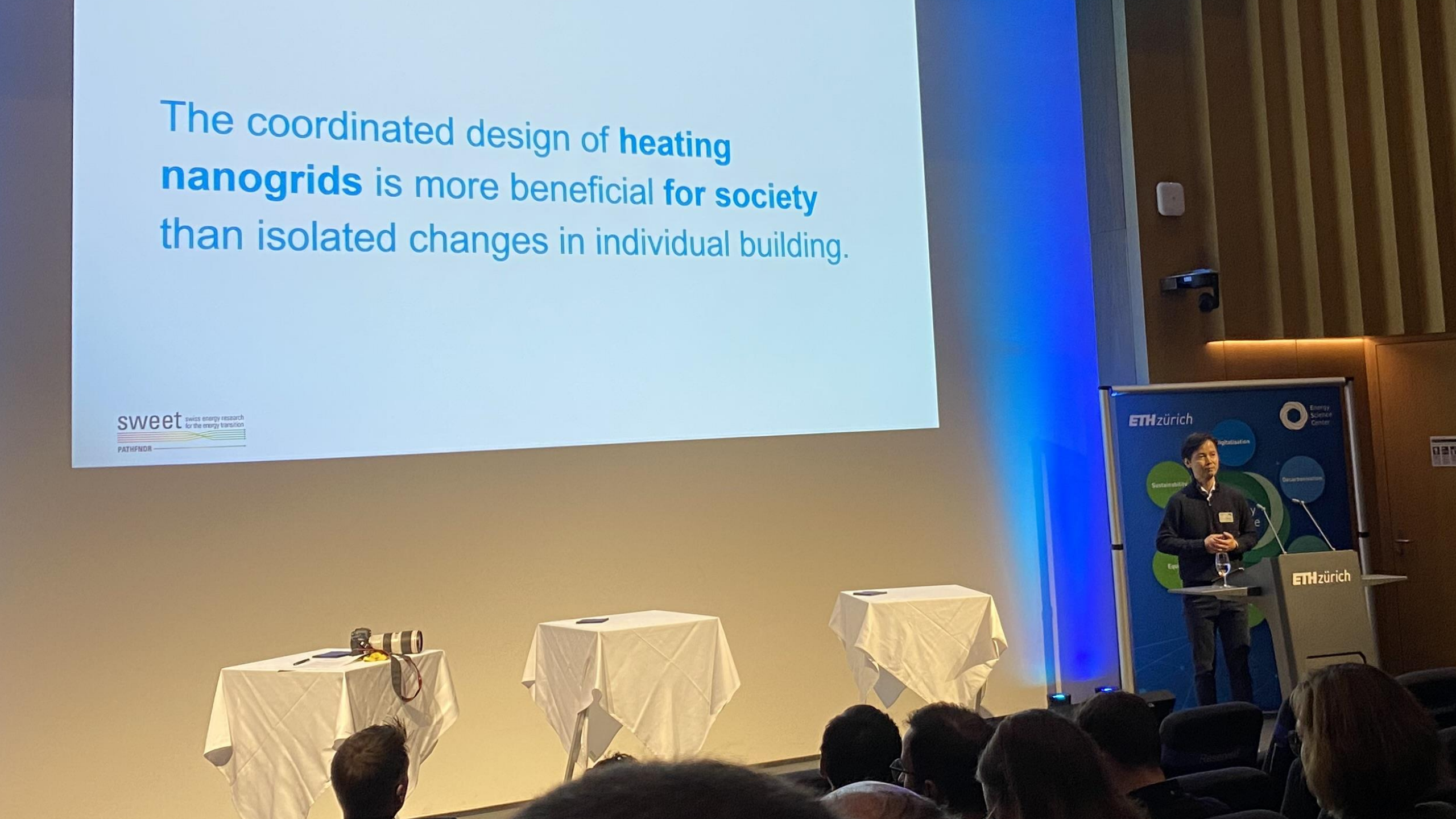
#	Name	WP Lead	Contributors	'23				'24				'25	
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
WP1	Model extension & Definition of cases	HSLU	IWB, Empa, Sympheny					MS3					
WP2	Flexibility awareness in operation	Empa	ETH PSL, HSLU					MS2					
WP3	Measurement campaigns	IWB	Empa, HSLU			MS1				MS5			MS7
WP4	Economical and ecological assessment	Empa	IWB, Sympheny, HSLU, ETH PSL										MS8
WP5	Ecosystem alignment study	ETH SUSTEC	IWB, Sympheny						MS4		MS6		
WP6	Aggregation & Upscaling study	ETH PSL	HSLU, Sympheny, IWB, Sustec, Empa										MS9
WP7	Project Management	Empa	All										
				'23				'24				'25	
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2

Current publications: www.nanoverbund.ch

Potential for Switzerland

- Over 75,000 suitable building networks identified
- Savings of 1,079 GWh of fossil energy
- Avoidance of 252,000 tonnes of CO_2 per year <u>without heating replacement</u>



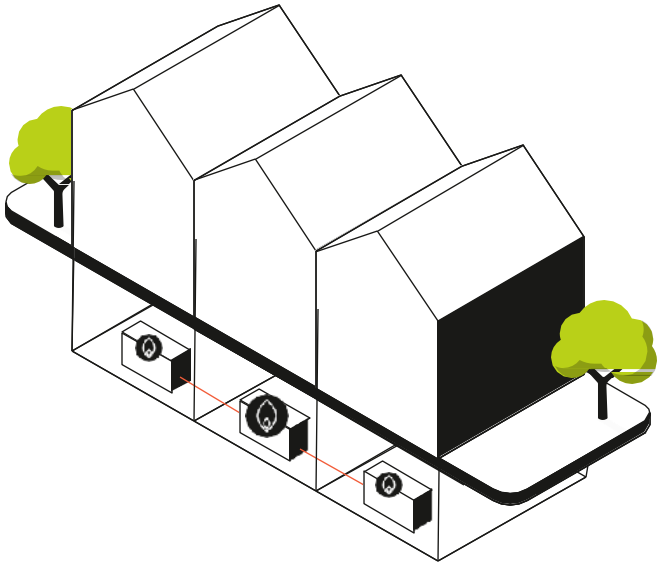

The coordinated design of **heating nanogrids** is more beneficial **for society** than isolated changes in individual building.
sweet swiss energy research for the energy transition
PATHFNDR
ETH zürich
Energy Science Center
ETH zürich


von natur aus klimafreundlich
iwb
IWB NANOVERBUND
DER WÄRMEVERBUND FÜR DIE NACHBARSCHAFT
Nanoverbünde – Wärme smart teilen.
iwb.ch/nanoverbund
Nanoverbünde – Wärme smart teilen.
iwb.ch/nanoverbund


Nanoverbund kommt mit der Lösung von Yuon Control
iwb
Die intelligente und vorausschauende Heizungssteuerung, welche gesamtheitlich und vollautomatisiert optimiert.
Reduziert den Energiebedarf und CO_2 Emissionen um bis zu 20%.
yuon CONTROL

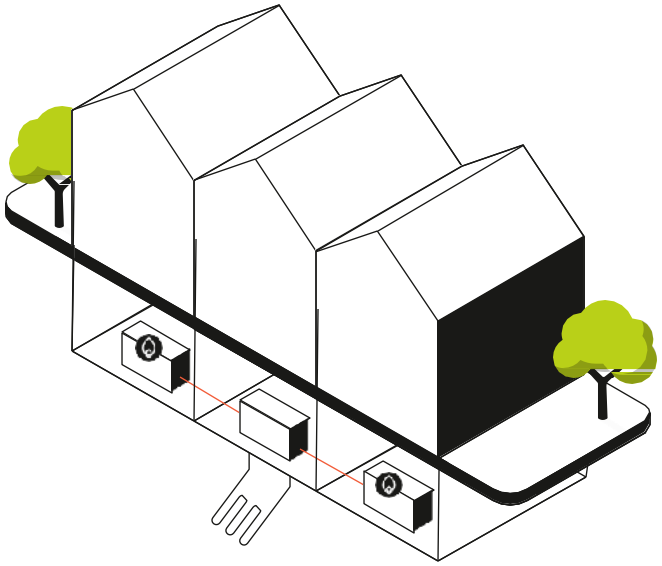
Step by step to climate neutrality

Step 1



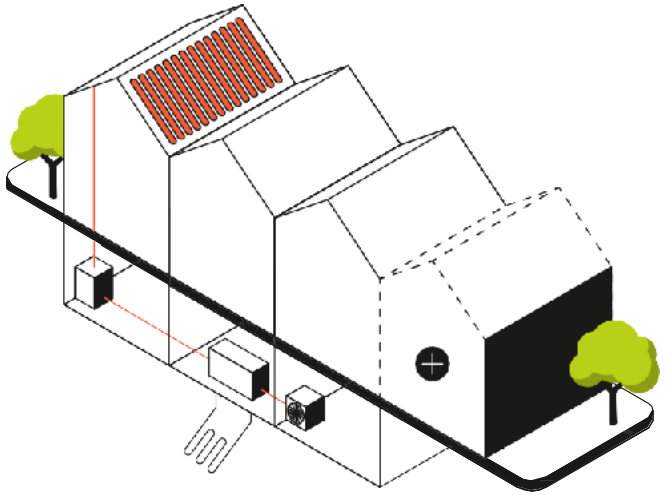
- Connecting existing heating systems
- Measure and optimise
- Up to 20% energy savings
- Minimise the risk of heating failure

Step 2



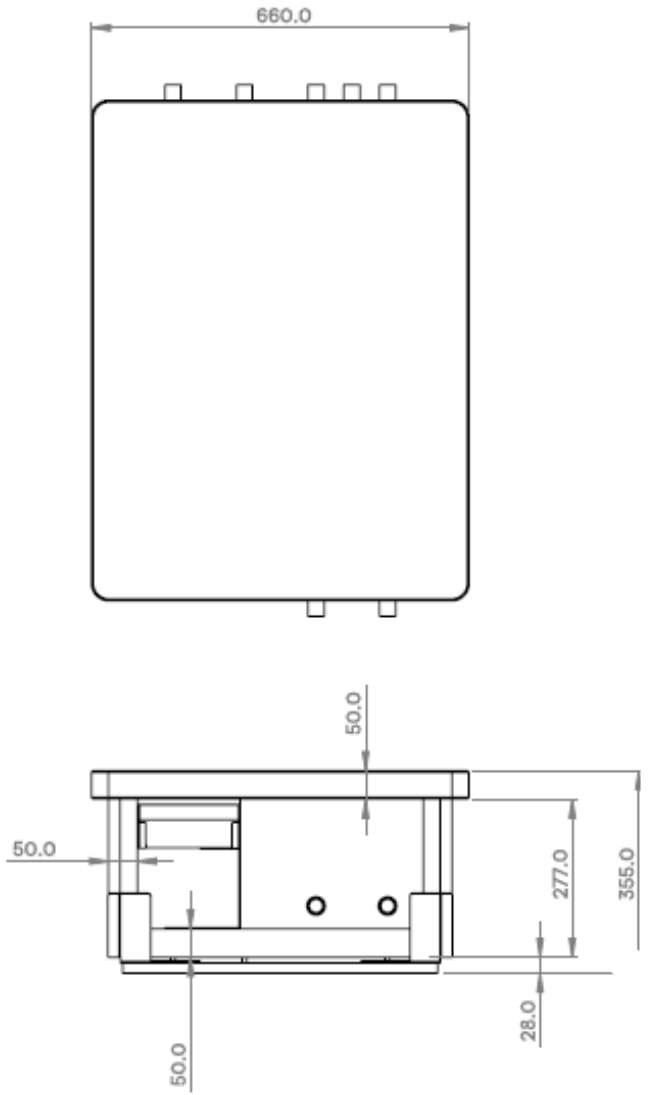
- Install renewable heating
- Already 91% renewable
- Up to 15% more favourable in operation and investment compared to a single solution

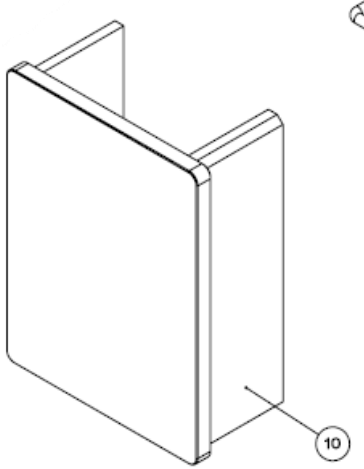
Step 3

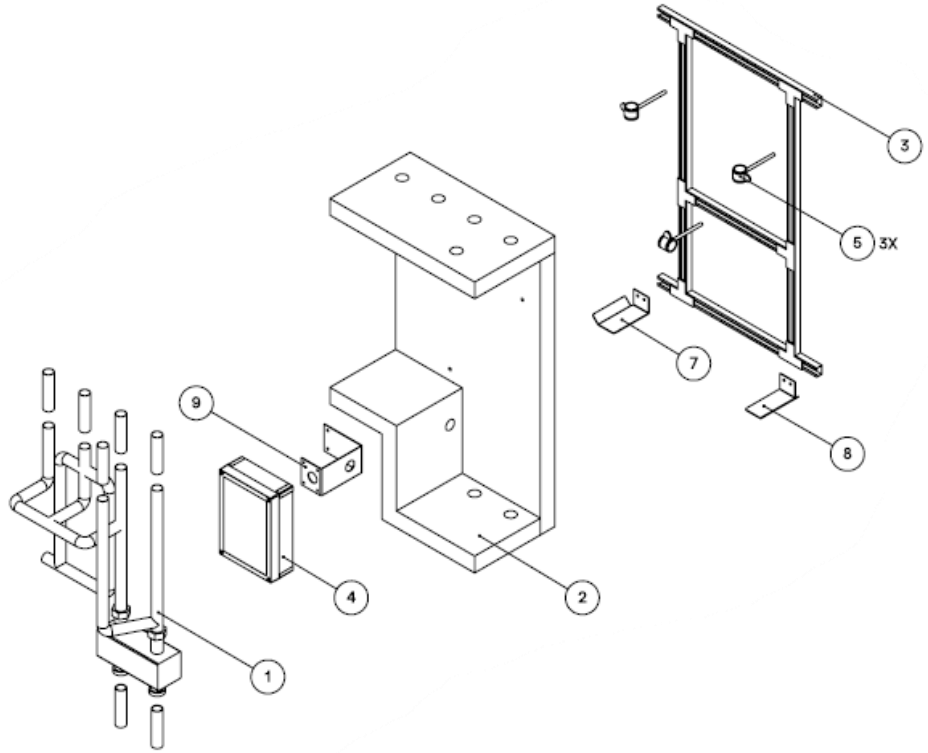


- Replacement with a sensibly dimensioned heating system
- Space savings through distribution
- Expansion possible at any time
- Reaction options thanks to technology flexibility

Own wall station reduces installation effort



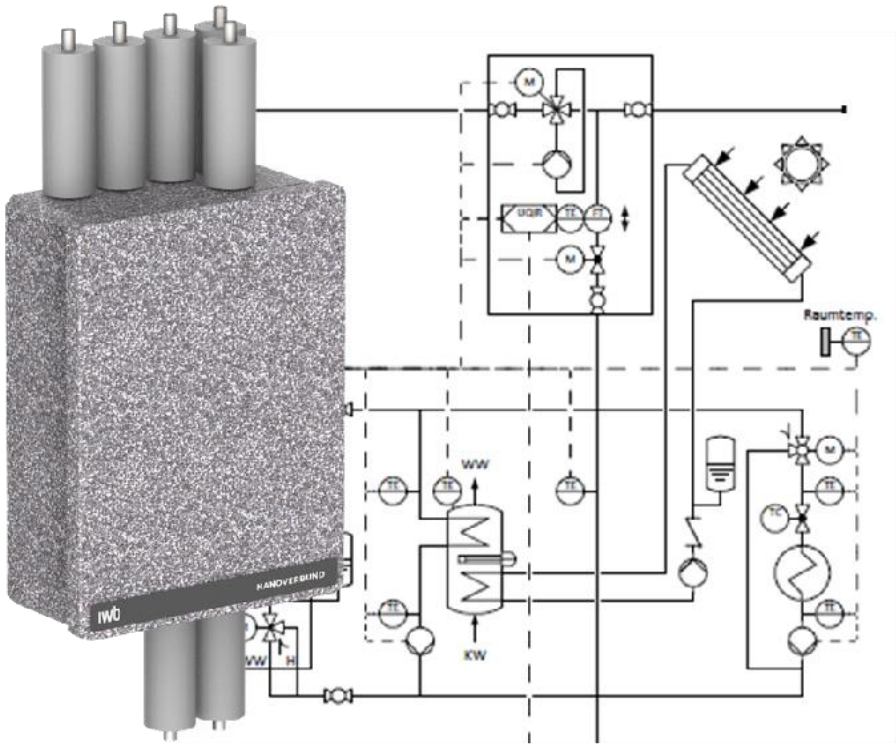




Service IWB in collaboration with Yuon

Construction

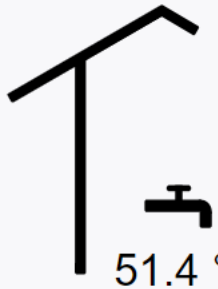
Wall station, plans, sample contract



Operation

Optimisation, measurement and support

Heizung | Nanoverbund | Konto



4.6 °C
Aussen

51.4 °C
Warmwasser

20.2 °C
Innen

3.4 kW
Leistung

Heating mode

auto | manual | off

boost

Room Temperature — 20 °C

Absence

now to 28.08.2024

Time program

Zeitprogramm 1

10:00 to 16:00

Mon Tue Wed Thu Fri Sat Sun

-1°C

Statistics

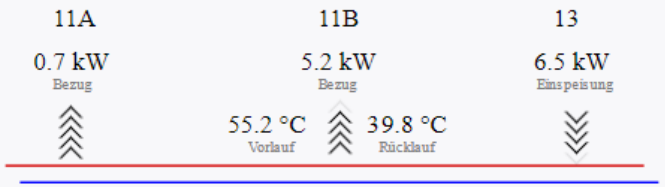
48 h | week

4 °C

Settings

Hotwater

Heizung | Nanoverbund | Konto



Energiemengen

Zeitraum	01.07.2024 to 26.08.2024
Einspeisung	171 kWh
Bezug	549 kWh
Nettobezug	378 kWh

Einstellungen

Nanoverbund aktiv

Prioritäten

Energiekosten

Abrechnung & Einsparungen

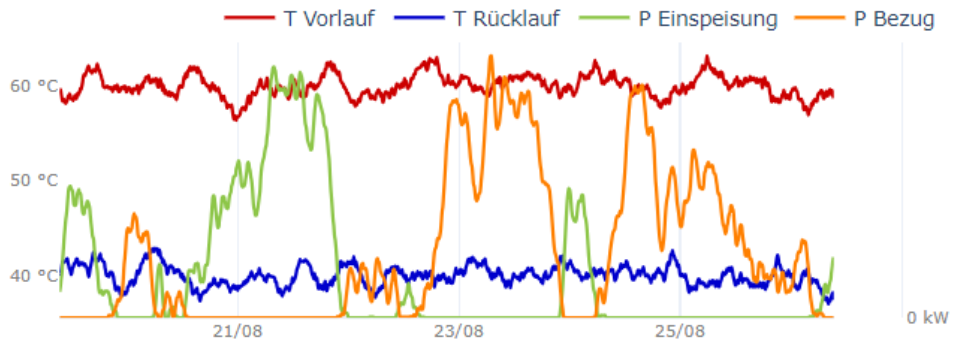
Zeitraum	01.07.2024 to 26.08.2024
Einsparungen Gebäude 11B	102.45 Fr.
Einsparungen Verbund	307.35 Fr.
Bezugskosten *bezahlbar an T. Muster, 13*	385.65 Fr.

Kosten ohne Verbund †

Erneuerbare

Statistics

48 h | week



Nanoverbund transitional solution for district heating (Lucerne) (1/2)

Gemäss GWR-Daten oder Aufnahme Begehung oder Kontaktaufnahme

Legende

Heizung mit Erdgas:

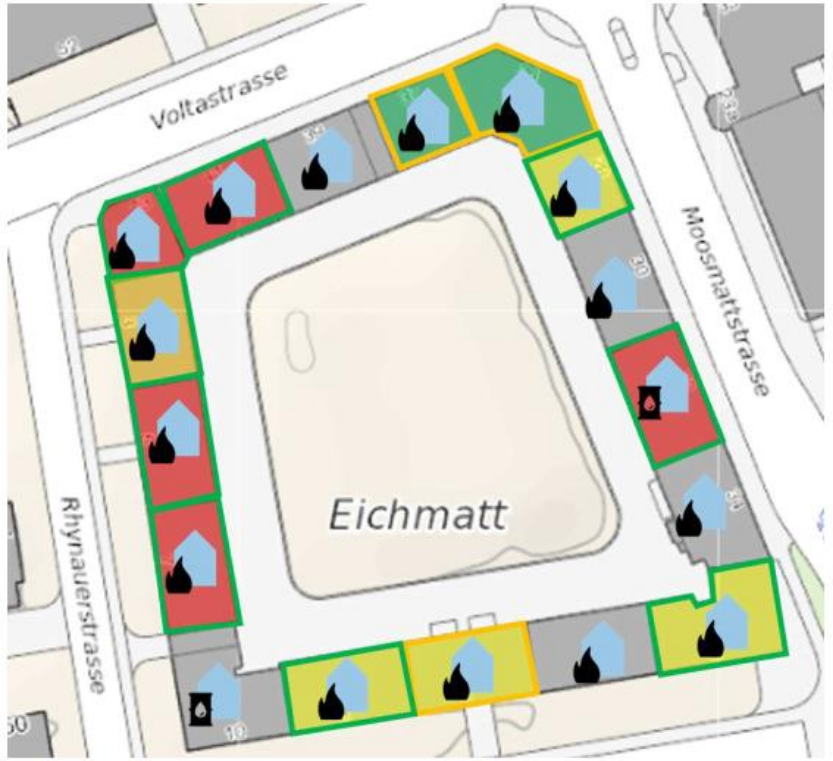
Heizung mit Heizöl:

Heizungsalter in Jahren:

	0-10 Jahre
	10-15 Jahre
	15-20 Jahre
	Älter als 20 Jahre
	Keine Information

Beteiligt an Beratungsstufe 2

Offenheit bekundet



Source: diePROJEKTFABRIK

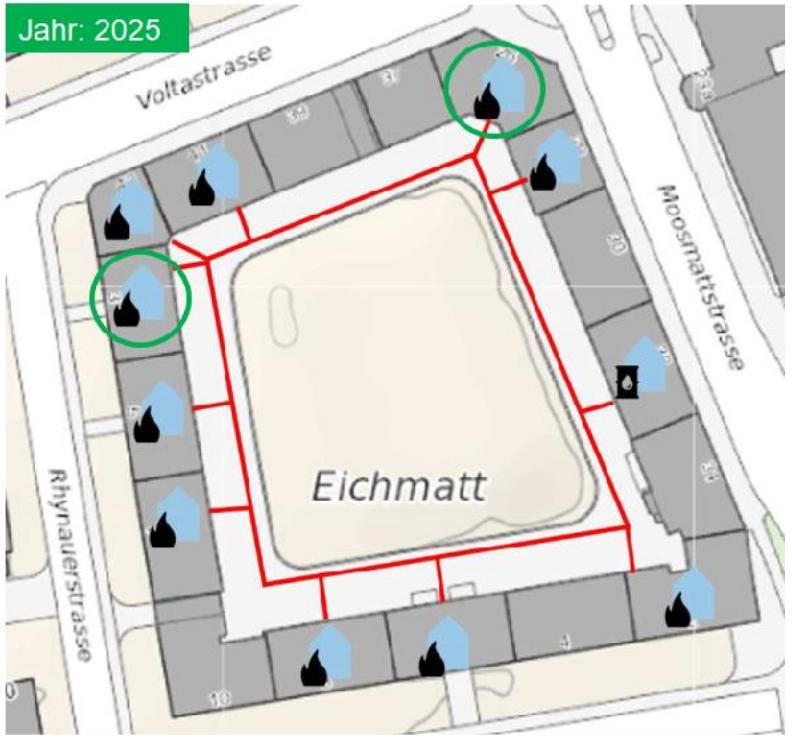
Nanoverbund transitional solution for district heating (Lucerne) (2/2)

Variante 2.2: «Fernwärme mit Übergang Gas dezentral»

Resultate der Machbarkeitsklärung 2025

- Zusammenschluss zum «Nanoverbund»
- Alle Gebäude können produzieren und beziehen
- Die **effizientesten** Heizungen laufen prioritär

	Leistung (kW)
Heizleistung Bedarf	360
Heizleistung installiert	590
Reserve im Verbund	**230**



Source: diePROJEKTFABRIK

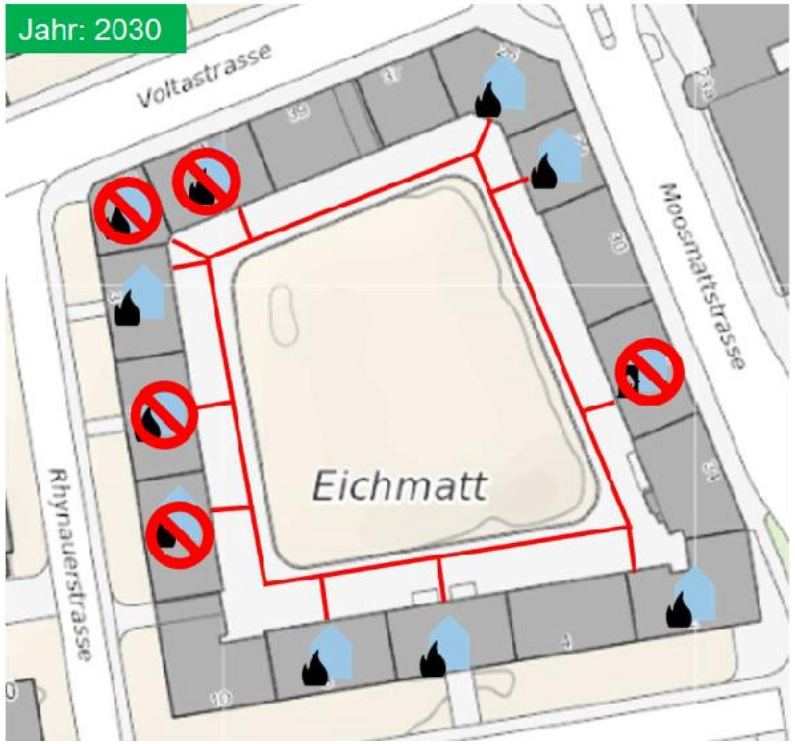
Nanoverbund transitional solution for district heating (Lucerne) (2/2)

Variante 2.2: «Fernwärme mit Übergang Gas dezentral»

Resultate der Machbarkeitsklärung 2030

- Kontinuierliche Optimierung der Heizungen und Reduktion des Heizleistungsbedarf um min. 15%
- Ausfall der 5 ältesten Heizungen (>25 Jahre)

	Leistung (kW)
Heizleistung Bedarf	320
Heizleistung installiert	330
Reserve Im Verbund	**10**



21 Stadt Luzern Umweltschutz – «gemeinsam heizen» Bodelerhof Stufe 2

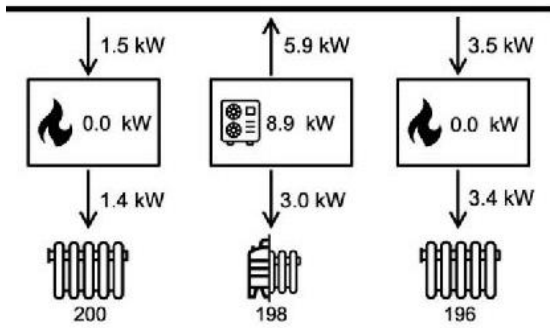
Source: diePROJEKTFABRIK

Terraced single-family house and terraced multi-family house

Single-family house
- up to max. 25 kW / building
- Connection DN 25
- Wall mounting
- 40 kg
- Availability: in stock

Apartment block
- Up to max. 85 kW / building
- Connection DN 50
- Floor standing
- Approx. 150 kg
- Availability: Q2/2026

Nanoverbund at a glance



- ✓ Online user interface calculates and provides information on the joint and individual heat balance
- ✓ Online remote control and monitoring of your own heating system
- ✓ Advice, checklists and standard contracts are available
- ✓ Maintenance, ongoing optimisation of the network and initial advice on replacing heating systems
- ✓ Heating network with synergy effect, without heating centre and connection rate

Savings in energy costs & CO_2 while increasing flexibility and security of supply

Canton of Basel-Stadt and Baselland promote the Nanoverbund

Maximum funding amount
- BS: up to max. 40% of the total investment costs
- BL: up to max. 50% of the total investment costs

Composition of the funding amount
- BS: Basic amount CHF 4,000 + CHF 200/kW_{th}
- BL: Basic amount CHF 5,000 + CHF 200/kW_{th}

Requirements for funding
- Funding is provided for the connection or replacement of fossil-fuelled heating with renewable heating
- Fossil heating system must be replaced within 5 years (BS) or 3 years (BL)

Outside BS/BL
- Other cantons in clarification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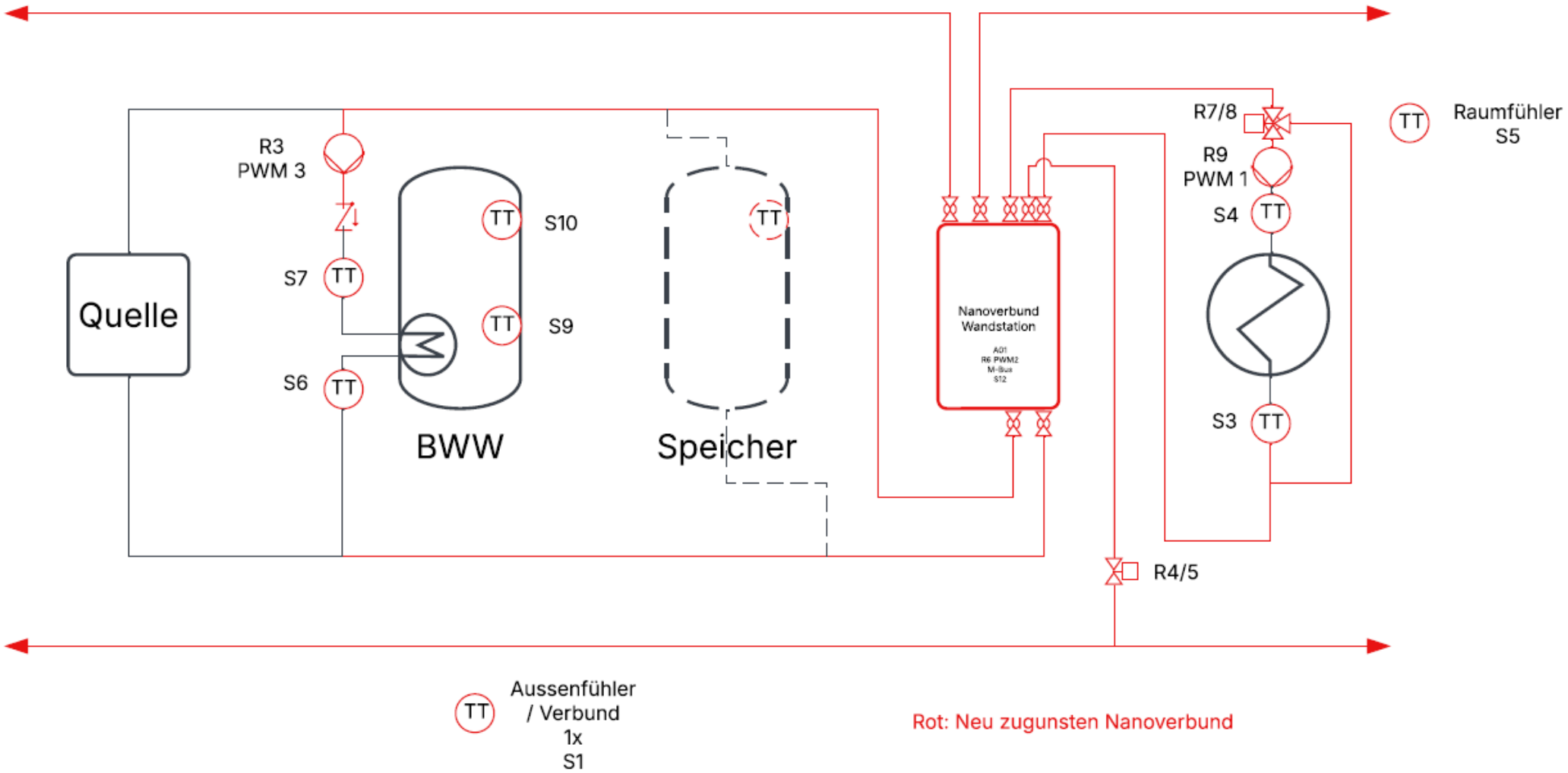
klimafreundlich

iwb

Attachments


R3
PWM 3
S7
S6
S10
S9
Quelle
BWW
Speicher
Nanoverbund
Wandstation
R7/8
R9
PWM 1
S4
S3
R4/5
Raumfühler
S5
Aussenfühler
/ Verbund
1x
S1
Rot: Neu zugunsten Nanoverbund