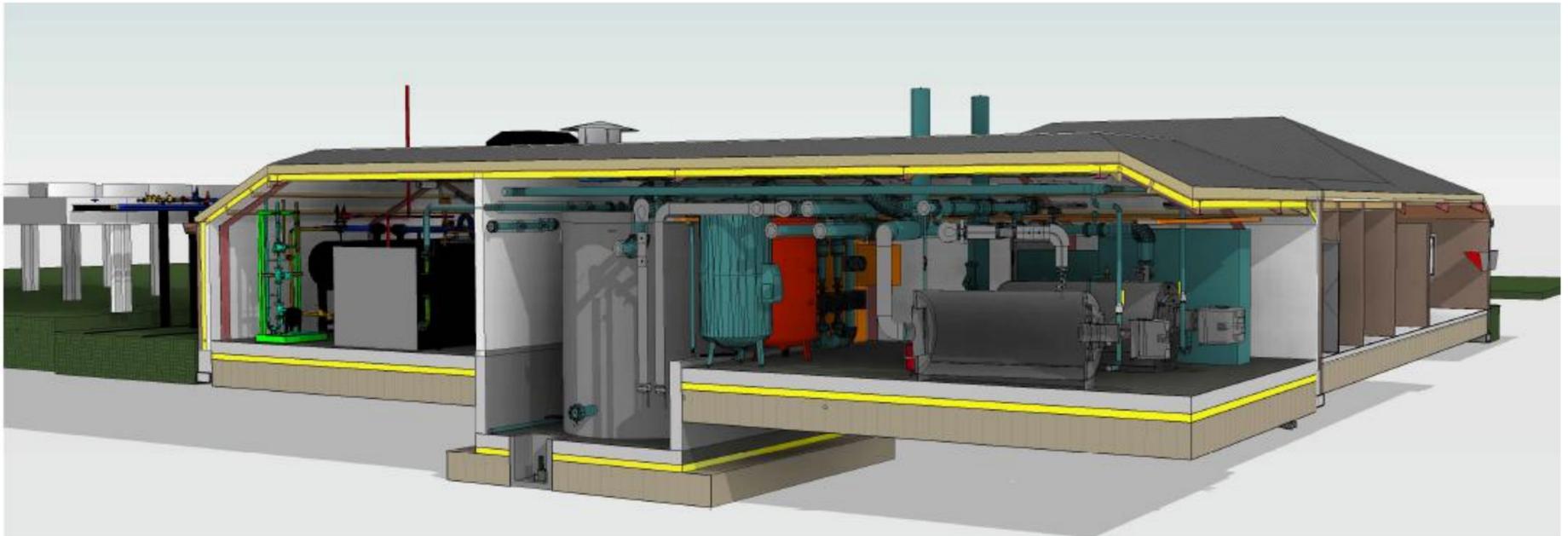


District Heating Plant for the Benedenbuurt in Wageningen, the Netherlands

This project aims to establish a complete district heating plant to supply 461 consumers in Wageningen, the Netherlands. The pipe network has already been contracted, and the tender for the heating plant itself is now imminent. The project is unique in that the heating plant must be integrated into an existing building located near protected nature and residential areas, where strict building regulations apply.

The project is expected to deliver a peak power of 2.7 MW and is designed with a focus on future-proofing and environmental sustainability. The infrastructure is already established with 2 MVA electrical power available (contract for 1,5 MW) , as well as a gas connection in the area. The heat central must be designed to operate at an anticipated temperature set of 75/40°C and must include the possibility for later upgrade and expansion of capacity.



Previous technical design by Dutch engineering firm, for inspirational purposes



Technical Requirements and Capacity

Heat Pump Solution

The heat pump will serve as the primary heat source, with the current permit allowing a maximum thermal output of 800 kW. Subject to compliance with spatial, acoustic, and economic considerations, a capacity increase of up to 1.2 MW is regarded as technologically feasible.

An electrical connection of 2 MVA connection with a contracted uptake of 1.5MWhas been secured with the grid operator, providing a comfortable margin for operation and potential future expansion.

- **Expected temperature set:** 75/40 °C
- **Total peak load:** 2.7 MW

Backup and Thermal Storage

A gas boiler with LowNOx technology serves as the backup system.

Buffer tank: minimum 26 m³ inside the building

If space and layout allow, a larger internal tank is encouraged to improve efficiency and operational stability. This will require careful spatial planning to ensure optimal integration within the available building volume.

800 kW

Heat pump maximum output

26 m³

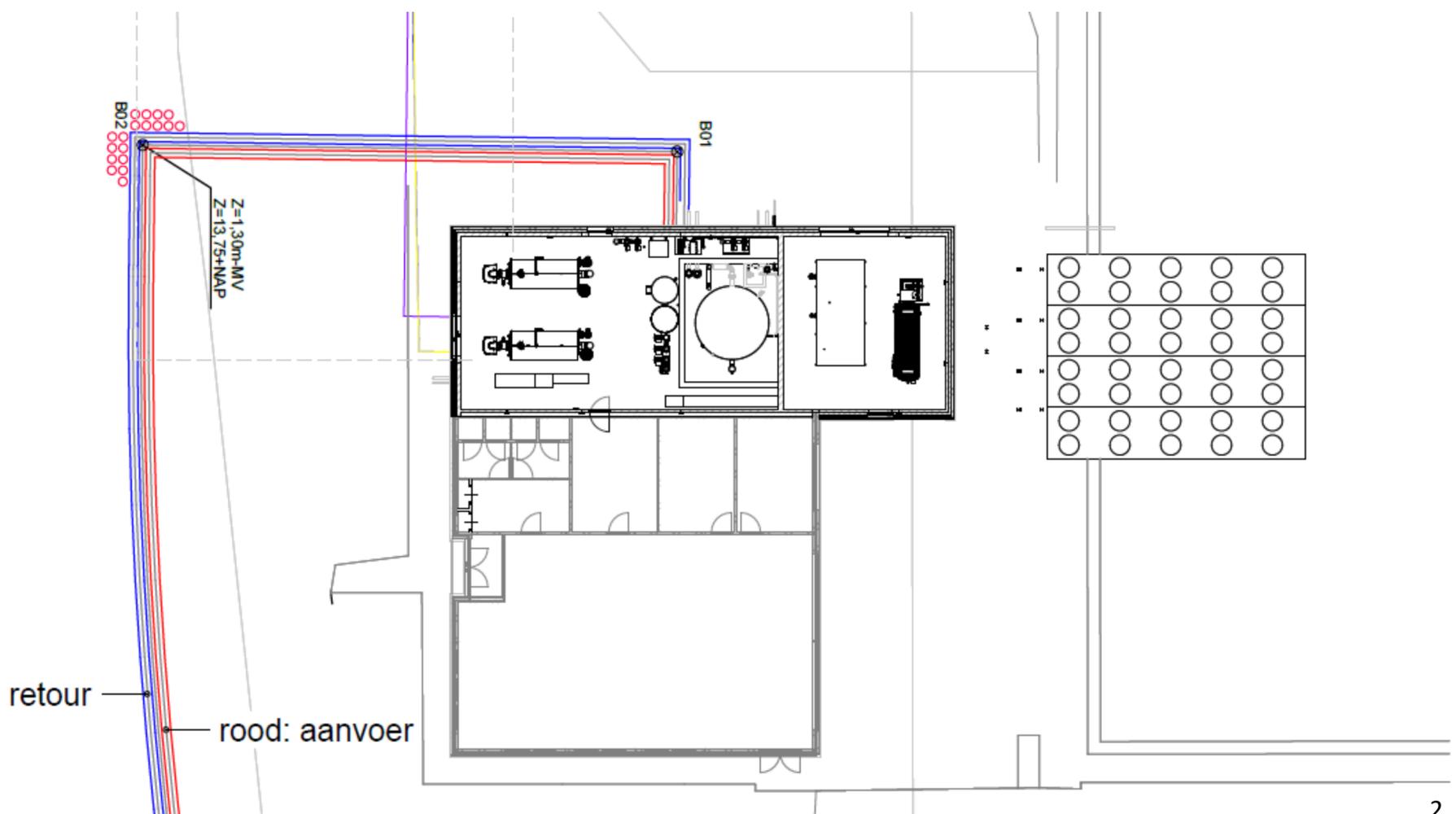
Buffer tank minimum volume

1.5 MW

Available electrical capacity

461

Number of max. consumers



Building Constraints and Dimensions

The heating plant will be integrated into an existing building with fixed dimensions and clear planning restrictions. The site is located in a sensitive area, close to protected natural zones and residential properties, which imposes strict building requirements.

Because any external modification to the building would trigger a lengthy new permitting process, the design must be fully accommodated within the existing envelope. This makes precise spatial planning and smart equipment integration essential for project success.

1**Building Length**

22.5 metres in length to accommodate all technical equipment

2**Building Width**

8.5 metres in width requires efficient layout

3**Above Ground**

3.4 metres height above ground for installations

4**Below Ground**

1.4 metres below ground should be utilised for certain components

5**Total Building Height**

Maximum 4.4 metres with a sloping roof – no exceedance permitted

6**Cooling Yard**

Maximum 10 × 10 metres for outdoor cooling system

The total available building volume of 22.5 × 8.5 m with a maximum height of 4.4 m requires precise 3D planning to ensure all components fit efficiently. The buffer tank ($\geq 26 \text{ m}^3$) must be located indoors, alongside the heat pump, gas boiler, and auxiliary systems.

The outdoor cooling yard must be carefully designed within the 10 × 10 m limit to provide sufficient cooling capacity while minimising visual and acoustic impact on the surroundings.

Future Expansion and Phased Planning

A central requirement for the project is that the heating plant must be future-proofed with the option for later upgrading and capacity expansion. The design must therefore incorporate flexibility to connect additional components without major modifications to the core facilities.



Phase 1: Initial Installation

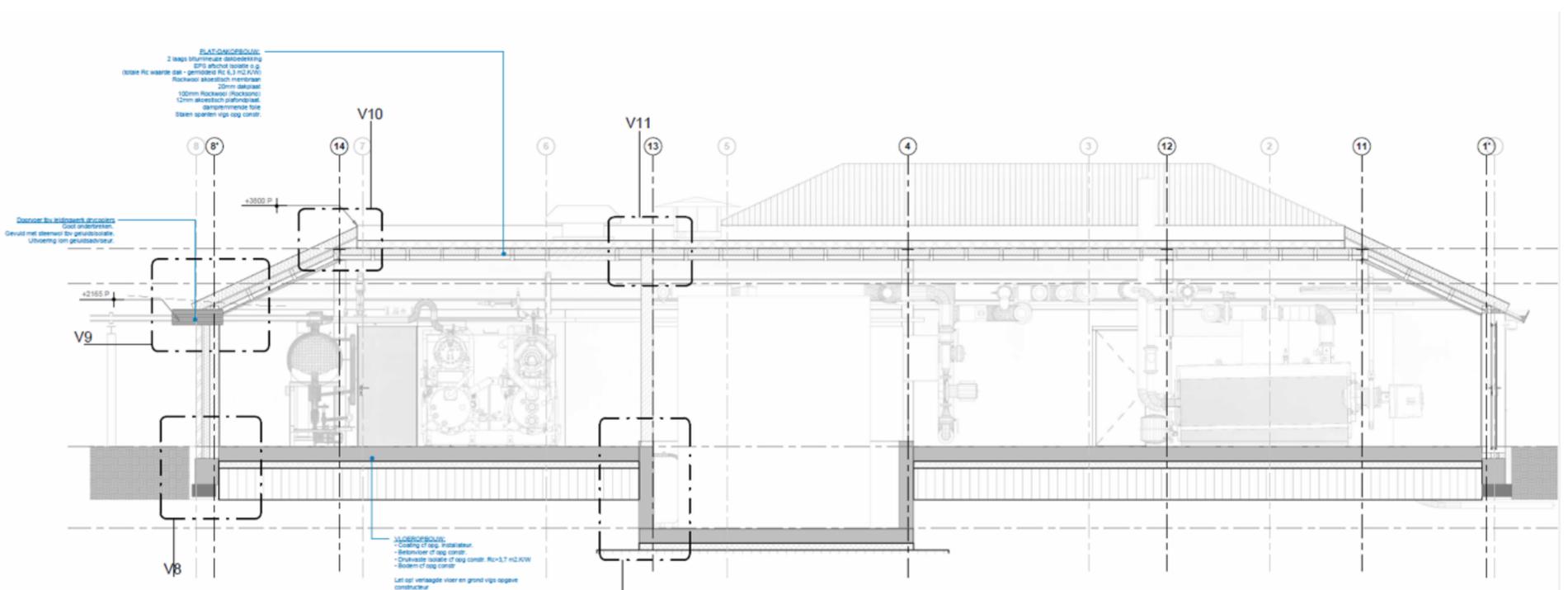
An 800 kW heat pump, gas boiler with LowNOx, and 26 m³ buffer tank are installed with a focus on optimal utilisation of the existing building

Phase 2: Capacity Expansion

Possibility of installing a larger accumulation tank and expanding heat pump capacity if and when consumption increases

The future-proofing strategy focuses on three main areas: expansion of heat accumulation, upgrading of heat pump capacity, and integration of alternative energy sources. The initial 26 m³ buffer tank must be dimensioned and positioned so that a larger accumulation tank can be added later.

The heat pump system must be designed modularly, allowing for additional capacity to be added as demand increases. The available electrical power of 2 MVA provides scope for a future increase in heat pump capacity, provided that the gas boiler can continue to function as a backup. Pipework, electrical installations, and control systems must therefore be dimensioned with future expansion in mind.



Critical Success Factors

The project balances technical, environmental, and regulatory challenges, all of which must be addressed simultaneously to ensure successful implementation. The combination of strict spatial constraints, nitrogen requirements, and ambitious performance targets calls for an integrated and well-coordinated design approach.



No External Changes

The building must not be altered externally. Any deviation will result in long delays in case processing. All equipment must fit within the existing structure.



Nitrogen Compliance

The Netherlands' strict nitrogen requirements might dictate project phasing. LowNOx technology is critical.



Future-proofing

The design must allow for a larger external tank if and when extra consumers are to be connected. A doubling of heat pump capacity. Pipework, foundations, and electrical capacity must be dimensioned accordingly.



Optimal 3D Layout

Limited building volume requires intelligent placement of the 26+ m³ buffer tank, heat pump, gas boiler, and other equipment within 22.5 × 8.5 × 4.4 metres.

Technical Integration

1.5 MW electrical power can be optimally utilised together with gas supply for hybrid operation with maximum green energy share.

Local Area Considerations

Protected nature and nearby residences require noise attenuation, visually discreet design, and environmentally friendly operation.

Security of Supply

Up to 461 consumers depend on a reliable heat supply throughout all project phases and seasons.

Successful delivery of the project depends on close collaboration between technical design, environmental documentation, and regulatory authorities.

The attached documentation forms the basis for detailed engineering and invites innovative technical solutions that can meet the project's environmental goals within the given spatial and regulatory framework.