

# Vattenfall Heat UK – Bristol Heat Network Connection FAQ

Revision	Date	Description	Produced by	Checked by
Rev 1.0	03/11/2023	This document provides answers to frequently asked questions by developers.	Joe Carroll	Cian Quinn

## Introduction

The purpose of this document is to outline frequently asked questions and provide answers to general questions. This document will also help provide basic information about Bristol Heat Network (BHN) and/or Vattenfall Heat UK (VHUK). A full document list can be found at the end of the document.

## Frequently Asked Questions

### 1. Who is Vattenfall?

Vattenfall is one of Europe’s largest producers and retailers of electricity and heat, with a goal of living fossil fuel free within a generation. We are a Swedish, state-owned company that operates in many countries, including the UK. VHUK is the owner and operator of Bristol Heat Networks Limited, working with the Bristol City Leap scheme.

- **What is Bristol City Leap?**

The City Leap Energy Partnership is a twenty-year joint venture between Bristol City Council, Ameresco and Vattenfall Heat UK which will enable the delivery of over £1 billion of investment into Bristol’s energy system. During the first five years of the partnership, nearly £500 million will be invested in a range of large infrastructure projects including the significant expansion of Bristol’s award-winning Heat Network that provides local businesses and residents with access to reliable, affordable low carbon heat from sustainable sources. Solar panels and low carbon heating systems will be installed at local schools, the council’s social housing will be made more energy efficient to tackle the cost-of-living crisis, and substantial investment will go into community-owned renewable energy projects to help residents play a part in Bristol’s journey to carbon neutrality.

- **What can our customers expect?**

Commitment	What that means to you
Clear and transparent communications	Our heat supply agreements will be in plain English and Crystal Marked.
Choice in how & when they communicate with us.	Our digital platforms, including website, live chat, app & customer portal give customers control and flexible options to manage their account.
A UK-based call centre	With skilled advisors ready to help.
Customer protection	Aligned to the rest of the energy market including access to the Energy Ombudsman.
All of our networks are registered with Heat Trust	Regulated and audited to ensure compliance

Support for vulnerable customers	Priority Service Register that aligns with the regulated market
Smart meters as standard	Ensuring all bills are accurate with automated meter readings.
Reliable heat provision	>99% heat availability
To be part of the conversation.	We committed to having a <b>positive impact in the communities we serve</b> . We invite our customers to an open dialogue in how we can help them achieve a fossil free future.



Figure 1: Vattenfall customer needs

- **What is our energy strategy for Bristol Heat Networks?**

The District Heating Network within Bristol has been designed to **maximise affordability** and **minimise carbon content** of the heat generated.

Vattenfall will operate a 4<sup>th</sup> Generation Low Temperature District Heat Network (DHN) that uses a combination of air source heat pumps (ASHP) and water source heat pumps (WSHP) for low carbon base demand (majority of yearly demand) aided by Thermal Stores and Electric Boilers to meet winter peak demands. Vattenfall are also developing a Strategic Heat Main to extract waste heat from existing energy from waste plants in Avonmouth to feed the networks within the city. We are also actively investigating the potential of waste heat sources such as cooling uses (e.g. data centres) supply heat to the network and connections to sewer and minewater.

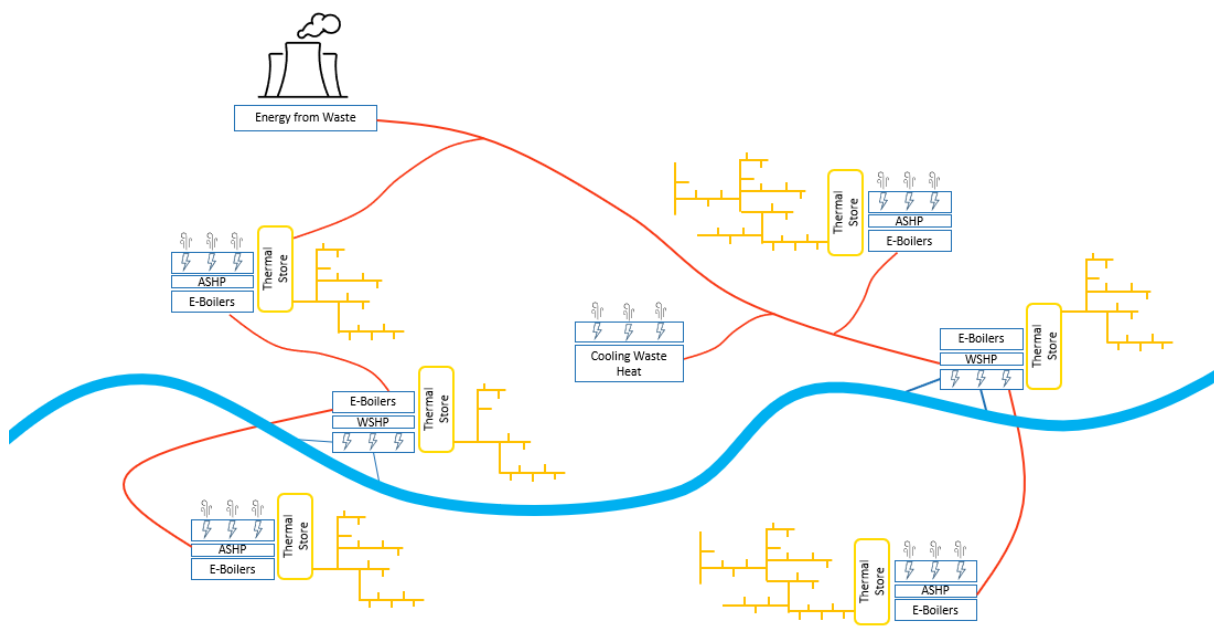


Figure 2: Indicative Bristol heat network concept

- **What are Vattenfall’s technical requirements?**
- **Technical specifications for the District Networks**

		Design parameters
Secondary Network Temperatures	Flow	57°C
	Return	35°C
Final customer temperature regime space heating	Flow	50°C
	Return	<30°C
Final customer temperature regime domestic hot water	Flow	50°C
	Return	<25°C (10°C cold water design temperature)

Table 1: Flow and Return Temperatures

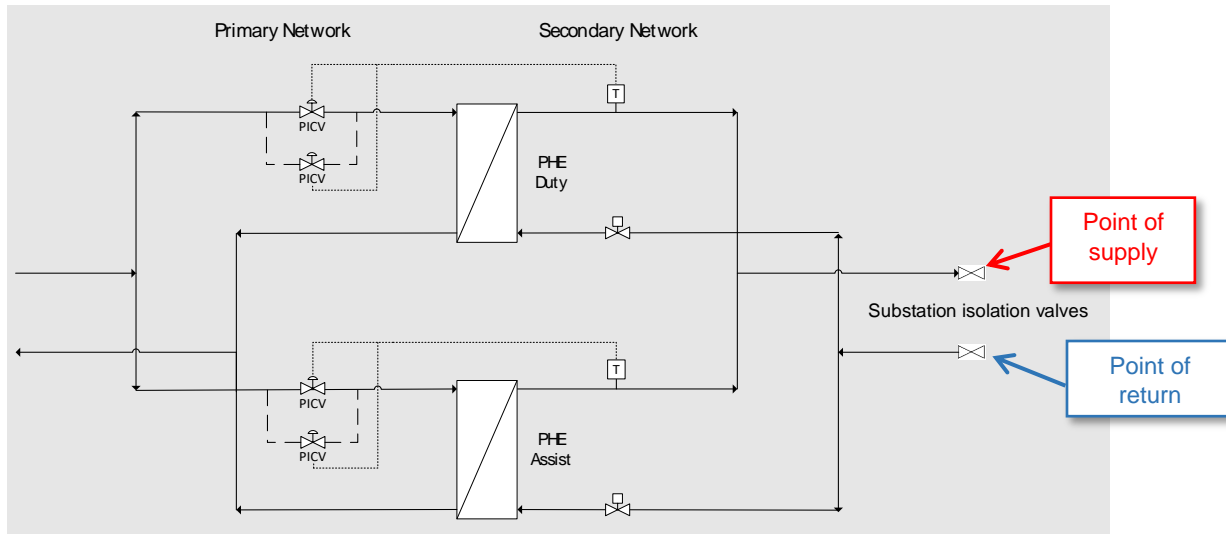


Figure 3: Typical plate heat exchanger connection layout

- **What are the primary network temperatures of the network?**

Bristol Heat Network operates with a varying supply temperature based on the time of year and area of the city. Temperatures to secondary networks are controlled by Vattenfall through the use of the pressure independent control valves (PICV) on the heat exchanger skids which will ensure that the set point is met.

- **What is Vattenfall’s technical specification?**

For sites with a bulk supply connection please refer to **230526\_BCL\_Plot Design Standard**. This document outlines the design requirements for secondary networks in developments connecting to the Bristol Heat Network. It should be read in conjunction with the following documents which provide additional design guidance and requirements:

- Vattenfall Technical Standard – Domestic metering and billing technical standard;
- Vattenfall Technical Standard – Heat Interface Unit technical standard;
- Vattenfall Technical Standard – Tertiary system specification for dwellings;
- Guidelines for Pre-Insulated District Heating Pipes and Communication Ducts Building Entries;
- Cold Laid Pre-Insulated Steel District Heat Network Design Principles.

For sites in which secondary networks will be adopted please refer to **230526\_BCL\_Plot Adoption Design Standard**. This document outlines the design requirements for adoption of the secondary network of a development connecting to the Bristol Heat Network. It should be read in conjunction with:

- Vattenfall Technical Standard – Domestic metering and billing technical standard;
- Vattenfall Technical Standard – Heat Interface Unit technical standard;
- Vattenfall Technical Standard – Tertiary system specification for dwellings;
- Guidelines for Pre-Insulated District Heating Pipes and Communication Ducts Building Entries;
- Cold Laid Pre-Insulated Steel District Heat Network Design Principles;
- BCL Plot Adoption Installation Specification;
- BCL Plot Adoption Commissioning Specification;
- BCL Plot Adoption Tests and Records.

- **What are the carbon emissions achieved by our District Heating Network?**

As part of City Leap, Vattenfall has made contractual commitments to Bristol City Council, chief among which is a commitment to:

- a) not install any further permanent fossil combustion assets in Bristol following Vattenfall’s purchase of Bristol Heat Networks Ltd on 04/01/2023,

b) to decommission all currently existing gas plant by 31/12/2030 with aspiration to bring this forward.

Both of these obligations are enshrined via Vattenfall's sub-concession agreement with Ameresco, as are the below carbon reduction commitments over the 20-year length of the concession.

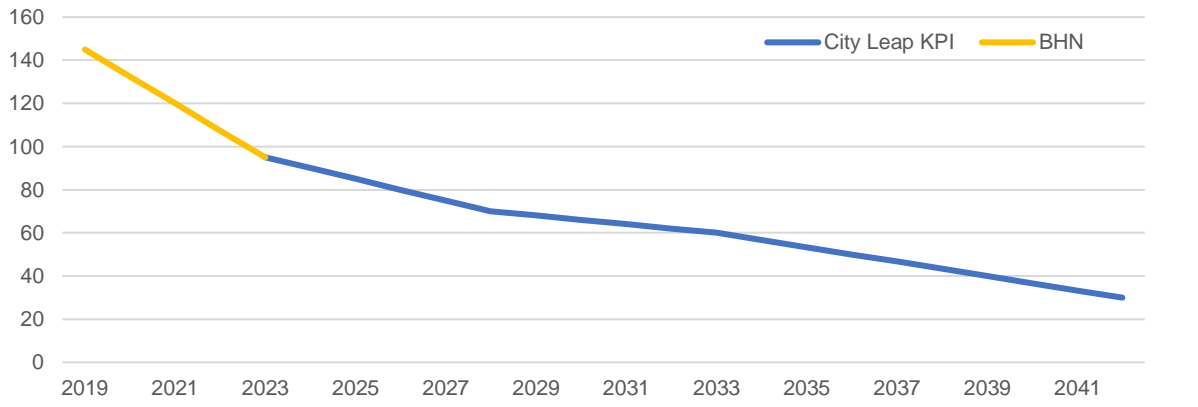


Figure 4: Bristol Heat Network Carbon Reduction KPI's

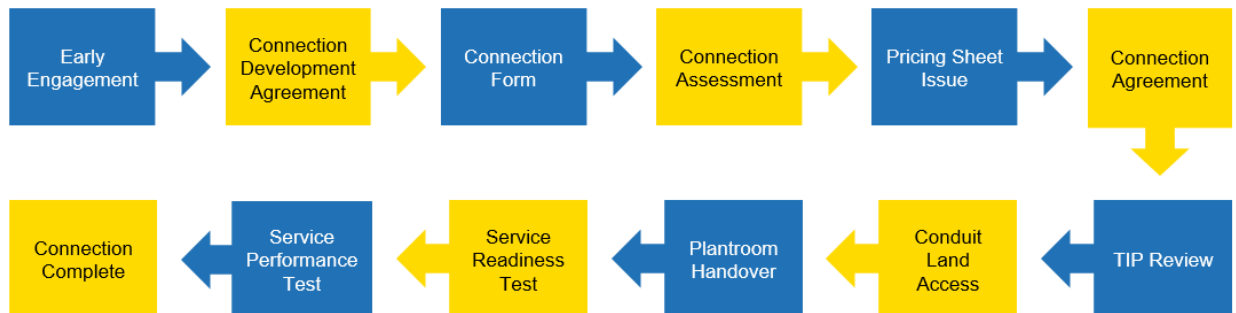
City Leap KPI: Carbon emissions of heat network	Period 1	Period 2	Period 3	Period 4	Period 5
	Go-live	31/03/29	31/03/34	31/03/37	31/03/40
	31/03/28	31/03/33	31/03/36	31/03/39	31/03/42
gCO <sub>2</sub> /kWh	70	60	50	40	30

Table 2: Carbon Reductions – Utilising BEIS Data Tables 1 Electricity Emission Factors Forecasts

For building regulation compliance (Part L) carbon intensity of heat and primary energy factors, please see Bristol Heat Network Part L Guidance note, agreed with Bristol City Council for carbon performance to 2027.

## 2. Site Related Questions

- **What is the connection process for a site?**



The above graphic lays out the connection journey of the site from the early engagement with Vattenfall business development and engineering teams to the final live connection. The below lays out the areas which require engineering input from the site:

- **Early Engagement** – basic site information including, site layouts, accommodation/area schedule and development programme.
- **Connection Form** – site layout and pipework conduit route, heat substation plantroom space allowance, connection capacity, estimated annual heat demand, detailed accommodation/area schedule.
- **TIP Review** – detailed design information regarding building plans, civils network, heat substation plantroom, secondary network and HSE.

- **Do I need a heat substation for my plot?**

All sites connecting to BHN will require a heat substation within the site. This will include a plate heat exchanger to ensure hydraulic separation between the primary DHN and the secondary networks of buildings. This point forms the demarcation between ownership for Bulk supply connections.

For sites being designed to have adopted secondary systems please contact Vattenfall to discuss the possibility of utilising direct connection for the site.

- **Your system runs at low temperature, how is the legionella risk mitigated?**

The risk of legionella is associated with the domestic hot water (DHW) circuit within dwellings. The Heat Interface Unit (HIU) supplies instantaneous hot water, meaning that there is no requirement for hot water storage. The only “stored” volume of water is in the dwelling’s own HIU and the internal DHW pipework, which is of short length and low volume. The designer must ensure that the internal volume of each circuit is less than 15 litres<sup>1</sup>. This low volume of water is continually replenished as water is drawn by normal use, correctly controlling the risk of legionella growth.

To summarise, dwelling water is supplied by a HIU which is classified as an instantaneous hot water device. The HIUs DHW temperature will be set to deliver 50°C and this is in accordance with Water Regs, HSE and other regulatory requirements. Furthermore, the hot water supply temperature supports the requirements of CP1 2020 Code of Practice. This is to achieve 45°C within 45 seconds at a tap outlet.

Please also check the recent publication of the CIBSE Guidance Note: *Domestic hot water temperatures from instantaneous HIUs*

Dwelling DHW design must take into account these specifications (usually by manifold design) to allow delivery of hot water at outlets within these parameters.

<sup>1</sup> CP1 2020 Section 3.4.16 and supported by CIBSE Guidance Note: Domestic hot water temperatures from instantaneous heat interface units

For non-domestic spaces with DHW demands, developers are encouraged to also utilise HIUs within clusters of demand, for example bed clusters within student accommodation or communal showers in offices. The risk of legionella will therefore be mitigated in the same way as outlined above, however, particular care should be taken regarding the volume of water within the internal circuit.

It should also be noted that there are a number of WRAS approved water treatment systems, such as chlorine dioxide which can allow for lower distribution temperatures without the risk of legionella formation.

- **Why are thermal stores not permitted and how can I meet peak demands?**

Thermal stores, calorifiers and buffer vessels are not permitted in new build developments connecting to BHN to reduce the risk of high return temperatures onto the network and increase network efficiency. The removal of these items will also provide a number of benefits to developers including: minimise heat losses within the secondary systems, provide space savings, CAPEX savings, reduce legionella risk and reduce the complexity of secondary systems.

BHN can provide instantaneous heat to secondary networks and commits through the heat connection and master supply agreements to reliability KPIs in meeting this. If instantaneous heat is required it is important to ensure that the secondary networks have effective keep-warm functionality. For residential connections, HIUs should place a keep-warm flow on the network through low demand being called by HIU units. For non-residential connections care must be taken to ensure that the secondary return temperatures do not rise beyond the limits set within the specifications. This can be achieved through consideration of the intended usage pattern and using building management systems to ensure heat is available when it would be required for use (e.g. pre-heat before an office building opens).

For non-domestic properties with particularly high DHW usage, as outline above, the preferred method to provide instantaneous hot water is through the use of cluster level HIUs. In instances where this is not possible please contact Vattenfall to discuss the possibility of utilising separate space heating and domestic hot water plate heat exchangers.

- **What level of redundancy is provided for my connection?**

Connections to Bristol Heat Network are through a duty assist arrangement of brazed plate heat exchangers sized at 50% of the requested capacity each. Plate heat exchangers are simple and reliable components, with no moving parts and are therefore have limited failure modes. The main cause of reduced performance for plate heat exchangers of this kind is fouling from poor water quality. High levels of water quality are required within secondary networks through the Vattenfall Technical Specification requiring VDI 2035 water quality standards to be met and connections should ensure that these standards can be achieved by the proposed water quality strategy.

Through contractual agreements with connections to BHN, Vattenfall is required to achieve heat available to the point of supply for at least 99% of time. This is achieved through heat generation redundancy within energy centres and provisions for emergency supply for unforeseen events.

- **Can ambient loop networks connect to BHN?**

While it is technically feasible to connect ambient loops to BHN, it is not supported. BHN can provide heat at 57°C to secondary networks, and therefore, downgrading this heat to an ambient temperature is an inefficient form of heat transfer and wasteful. For developments proposing ambient loop systems for heating only, there are limited benefits of this and the operation and maintenance costs for ambient loop systems are typically higher than standard LTHW networks.

For sites proposing heating and cooling, within residential developments an LTHW system with trim cooling units within Mechanical Ventilation with Heat Recovery (MVHR) systems can be an effective way of mitigating overheating risk, which allows sites to connect to the heat network. Large sites proposing a full heating and cooling solution should get in contact with Vattenfall to discuss the possibility of exporting heat to the heat network.

- **How much is the connection charge for my plot?**

The connection charge depends on the plot and in relation to the connection size, please contact Vattenfall Heat UK for a specific connection offer.

## About Vattenfall Adoption Specifications

- **When are the adoptions specifications applicable?**

The adoption specification is only required when Vattenfall will be adopting and operating the secondary systems within a building. These specifications are only relevant to new residential developments. Please contact Vattenfall to understand the potential for secondary system adoption.

- **What is the Adoption Specification?**

The adoption specification is the process outlining how VHUK will adopt and operate assets. Please refer to the adoption process laid out within the specification, with design responsibilities laid out below.

Network	Guidance and requirements	RIBA Stage 2 Concept Design		RIBA Stage 3 Developed Design		RIBA Stage 4 Technical Design		
		Prepare	Review	Prepare	Review	Prepare	Review	Approve
Secondary Network	VHUK	Developer	VHUK	Developer	VHUK	Developer	VHUK	VHUK
Final Customer System	VHUK	Developer	VHUK	Developer	VHUK	Developer	VHUK	Developer – not adopted by VHUK

Table 3: Summary of design responsibilities for secondary network adoption.

- **What are the access requirements to plant (Conduit land, substations, HIUs) ?**

Detailed access requirements are stipulated within the Vattenfall specifications, however, the below provides a high level summary:

- **Conduit route** – access shall be provided throughout its length for future maintenance, repair, and replacement of its installed services.
- **Substations** – 24/7 access shall be allowed for, with no third party reliance. Access to the heat substation must be lockable, in line with plantroom requirements as per VFHUK specification and should not be shared with other third party services or equipment.
- **HIU** – where possible, HIUs should be installed in corridor cupboards outside the dwelling to allow for ease of access and maintenance and to minimise lateral lengths.



- **What are the specifications for Heat Interface Units (HIU)?**

The full specification is in the Design and Adoption specification, in Section 4.2.3 HIUs. The current, preferred suppliers are shown below.



Figure 5: Preferred HIU Suppliers

If you have any more enquiries, please contact Vattenfall.

Vattenfall expect HIUs to be installed externally to domestic properties. An example of installation practice below:



Figure 6: Multi-HIU Utility Cupboard Example

- **What are Vattenfall’s account billing requirements?**

Vattenfall specify Secure Liberty Connect 100 Electronic Interface Units. We are working with Secure and HIU suppliers to include the module pre-fitted in the HIU factory. The Liberty 100 captures the energy usage from the heat meter and communicates this wirelessly over the secure PayPoint network to Vattenfall’s billing system. The unit allows the customer to view their account balance and to make account payments using the PayPoint network. The Pipit 500 In-Home Device is a remote unit which can be located in a convenient place in the home to display account information to the occupier.

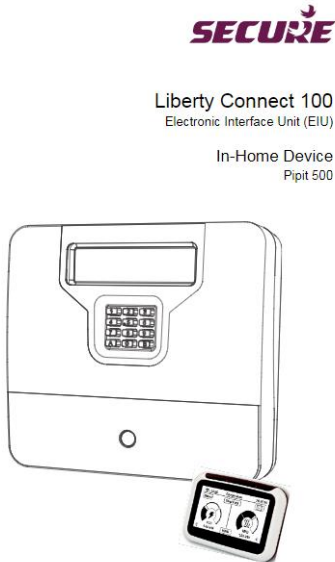


Figure 7: Energy Interface module and In-Home Unit

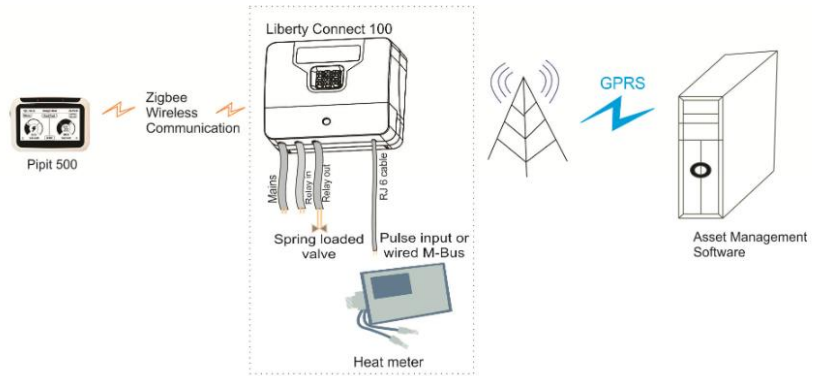


Figure 8: Typical Communications Setup

- **What are Vattenfall’s heat metering requirements?**

Vattenfall specifies fiscal grade Heat Meters factory installed in the HIU to measure and record heat consumption. The heat meter is connected to the Secure Liberty device by wired M-Bus. The Secure Liberty device then communicates heat consumption over a secure wireless network to the Vattenfall billing platform. This wireless link provides flexibility and reduced installation costs.

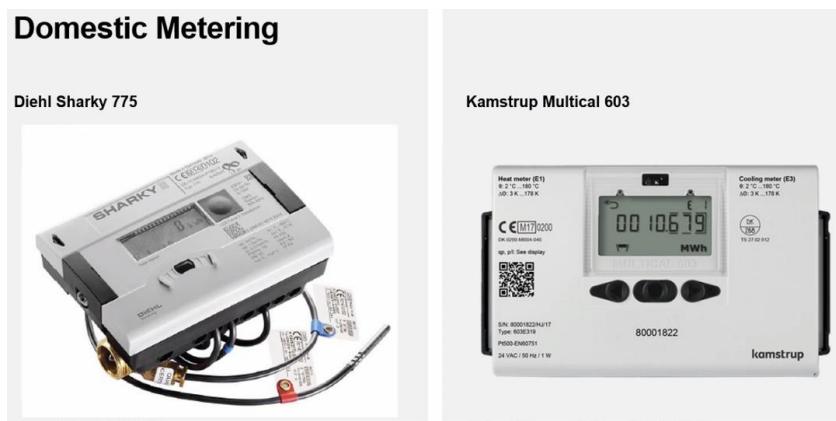


Figure 9: AMR Specified Metering

If you have any more enquiries, please contact Vattenfall.

## Document List

A list of documents referred to with this guide and for further reference. Please contact VF for a copy of these documents.

Description	A-Site Number	Revision	Date
Plot Design Specification	230526_BCL_Plot Design Standard	1	23/06/2023
CP1 2020 Code of Practice	ISBN 978-1-912034-79-6		2 <sup>nd</sup> Edition
CIBSE Guidance Note: <i>Domestic hot water temperatures from instantaneous HIUs</i>	ISBN 978-1-912034-92-5		2021

Table 4: Document List