

RHPP Metering update for Industry

Chris Wickins

chris.wickins@decc.gsi.gov.uk

t: 0300 068 6880

m: 07774 554105

- Purpose of monitoring
- How are we going about it?
 - Who is involved?
 - Design paradigm
 - Monitoring specification
 - Data frequency and resolution
 - Automated analysis
- Some data
- Next steps

Why are we monitoring?

The Challenge

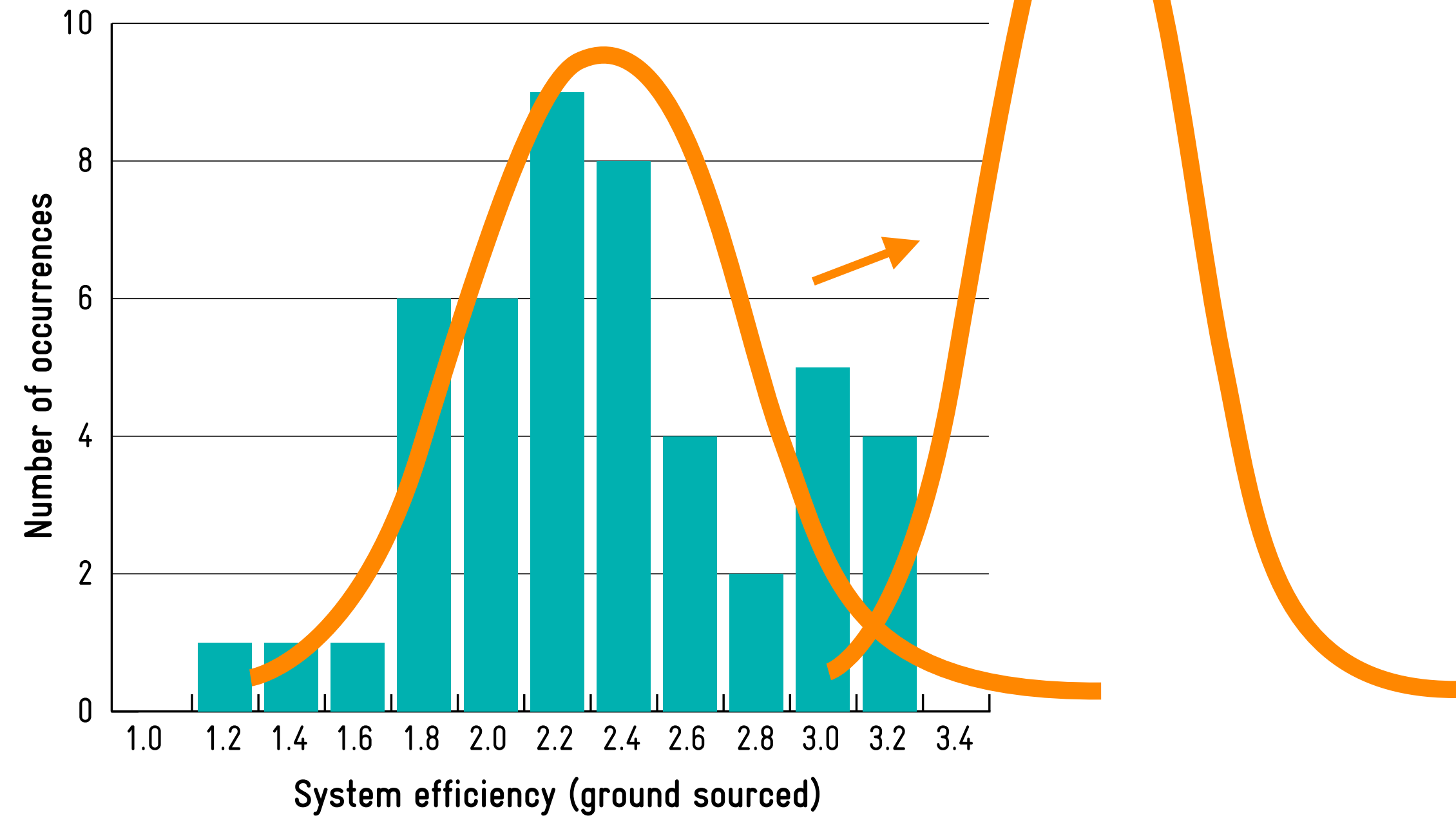
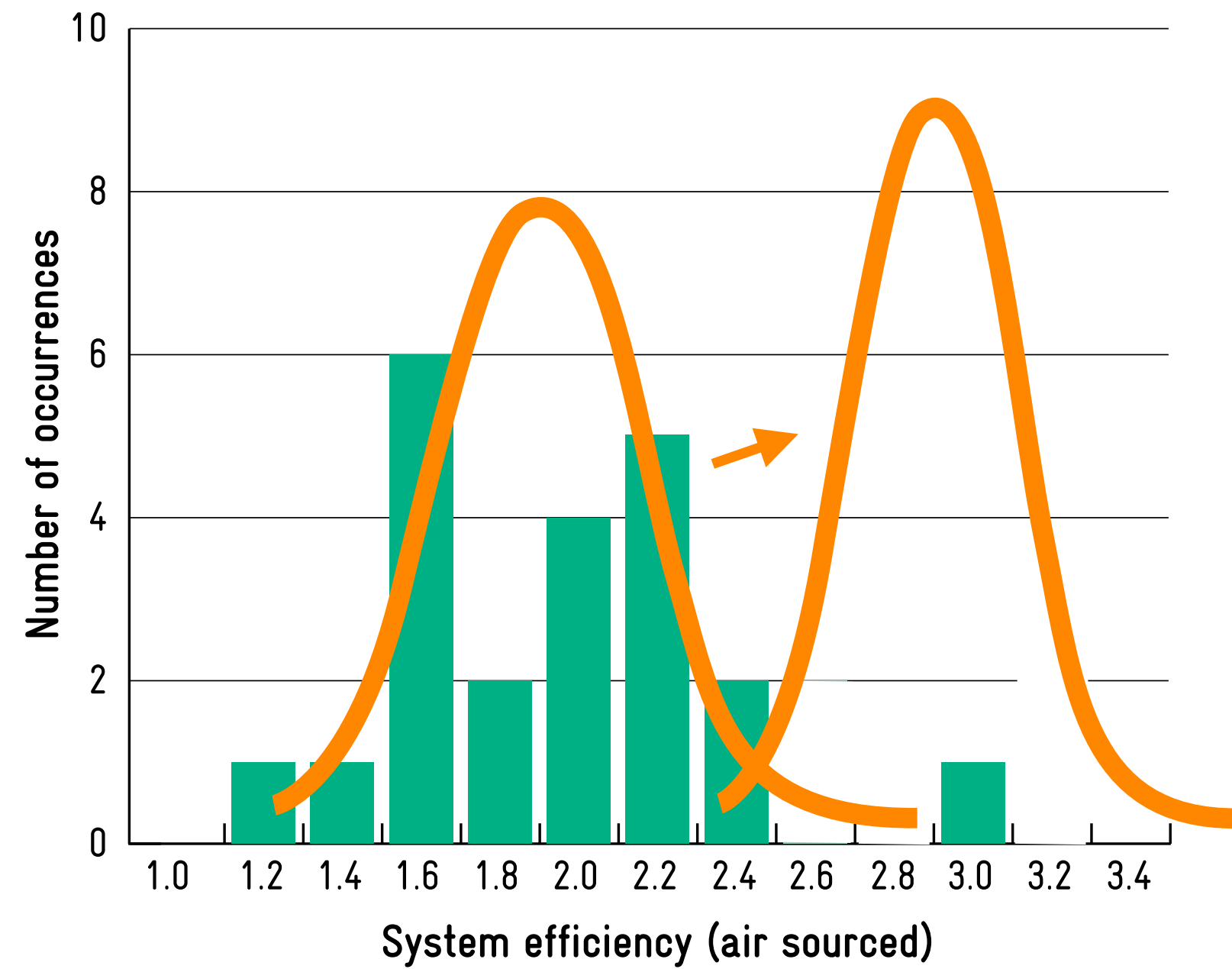
Low Carbon Solutions

Heat Strategy



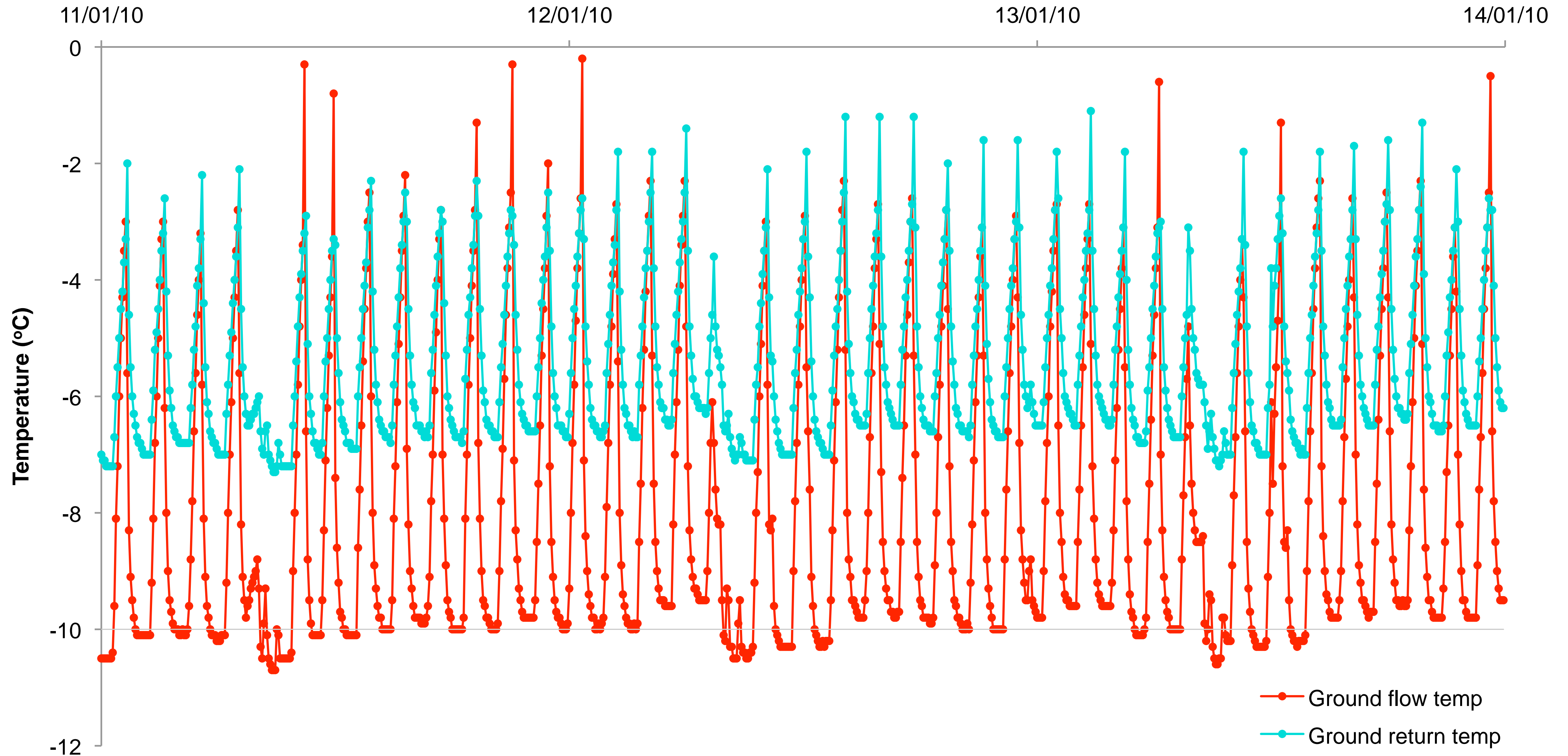
Why are we monitoring?

Monitoring will show us if measured performance has improved



Why are we monitoring?

Measured data has previously provided the evidence for revising industry standards and improving skills



Maximum power to be extracted per unit length of borehole heat exchanger (W/m) with 1200 FLEQ run hours

Conditions for use:

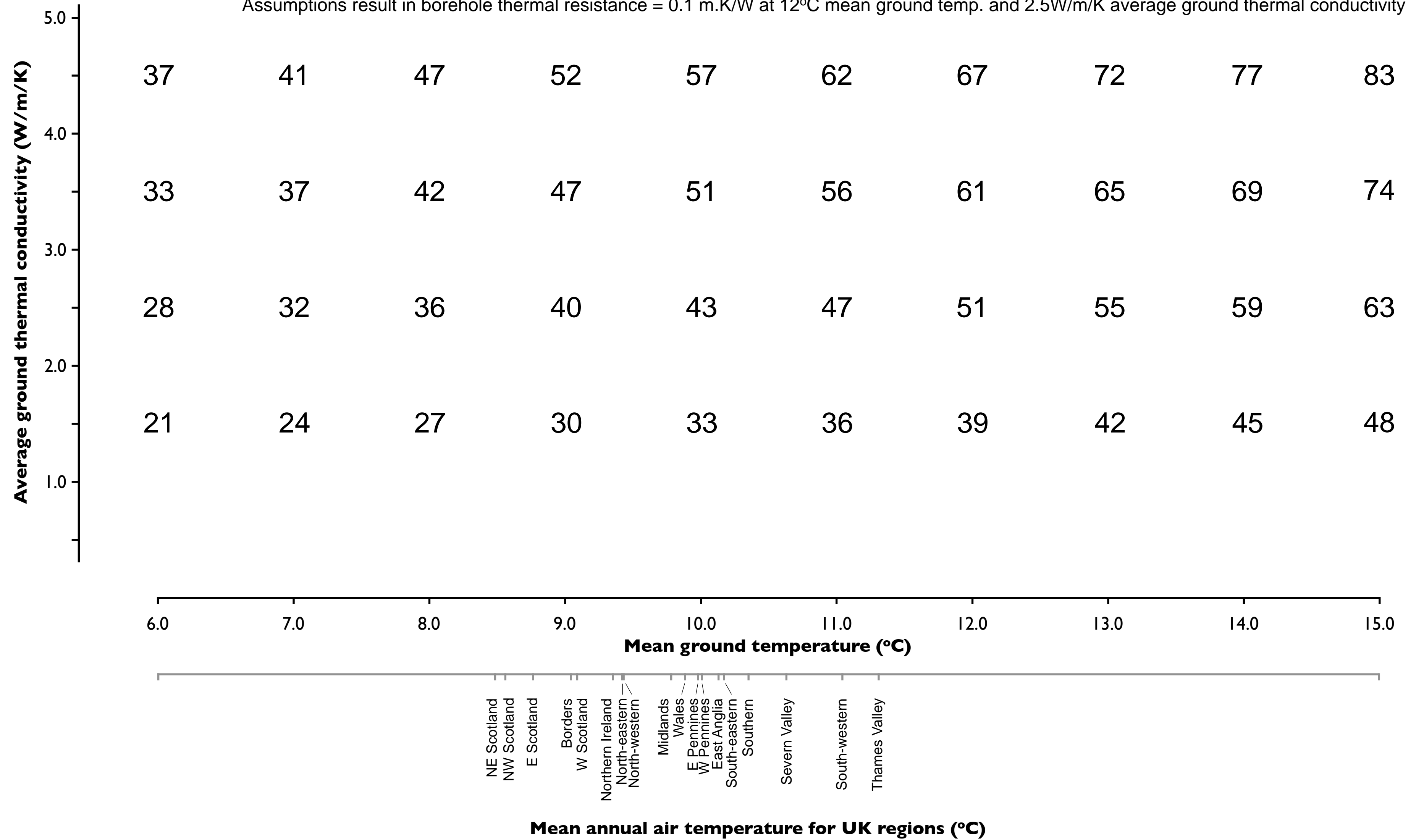
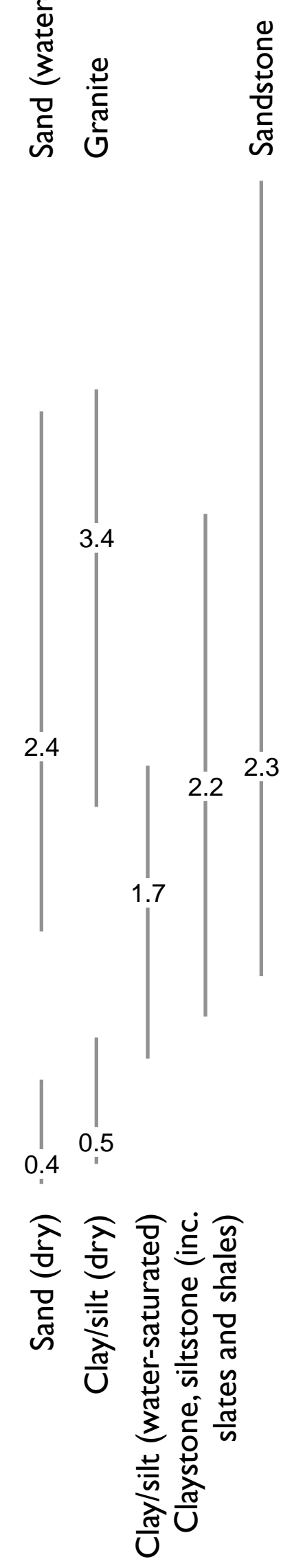
Heat extraction only (inc. hot water)

6m minimum borehole spacing. Only valid for boreholes arranged in a line; not applicable for a large number of systems in a small area

Table created assuming: 130mm borehole diameter; single U-tube; 32mm OD SDR-11, PE100 pipe with thermal conductivity = 0.420W/m/K; 52mm pipe centre-pipe centre shank spacing; 25% Mono Ethylene Glycol thermal transfer fluid; Re > 2500 in the borehole active elements; thermally enhanced grout with thermal conductivity = 2.4W/m/K

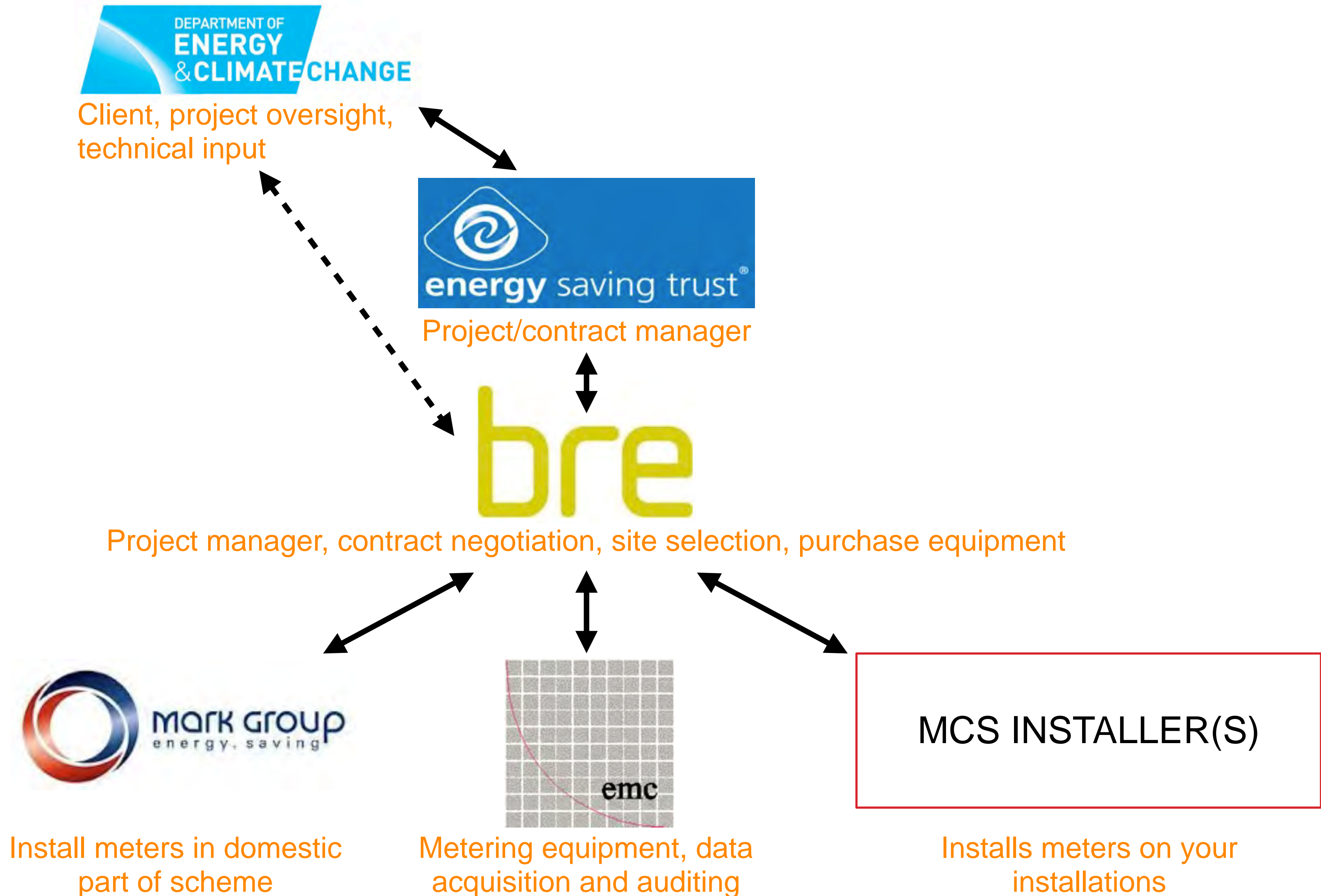
Assumptions result in borehole thermal resistance = 0.1 m.K/W at 12°C mean ground temp. and 2.5W/m/K average ground thermal conductivity

Recommended values and ranges of thermal conductivity for different rock types (W/m/K)



How are we going about it?

Who is involved?



How are we going about it?



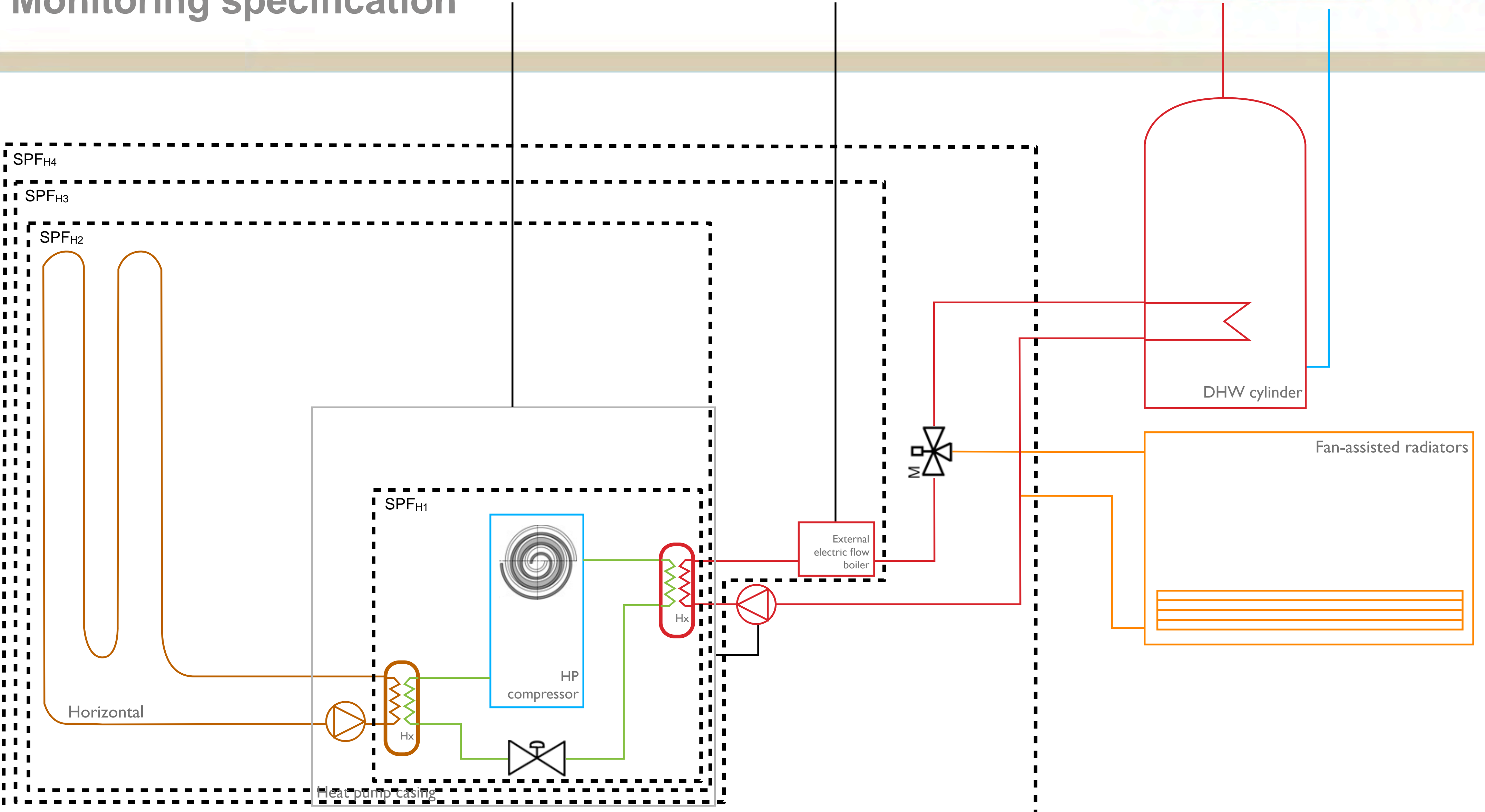
Overall programme design paradigm

- Statistically significant number of installations
- High level of automation
- Data in real-time
- UK wide
- $\pm 10\%$ error on SPF parameters
- 80% data completeness

- Supplemented by other resources?
 - ETI? UCL? BRE Trust? Strathclyde? Cardiff? Westminster?

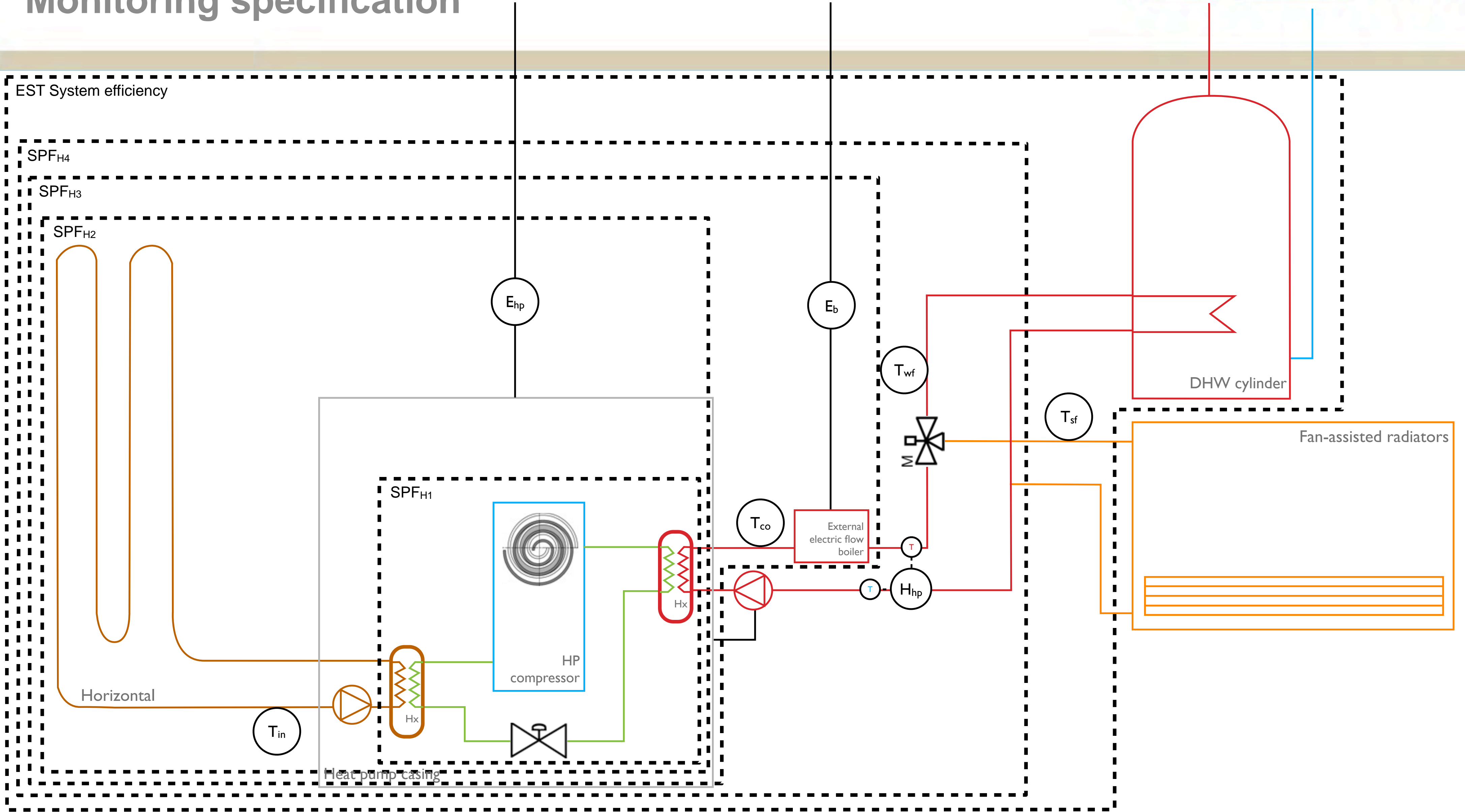
How are we going about it?

Monitoring specification



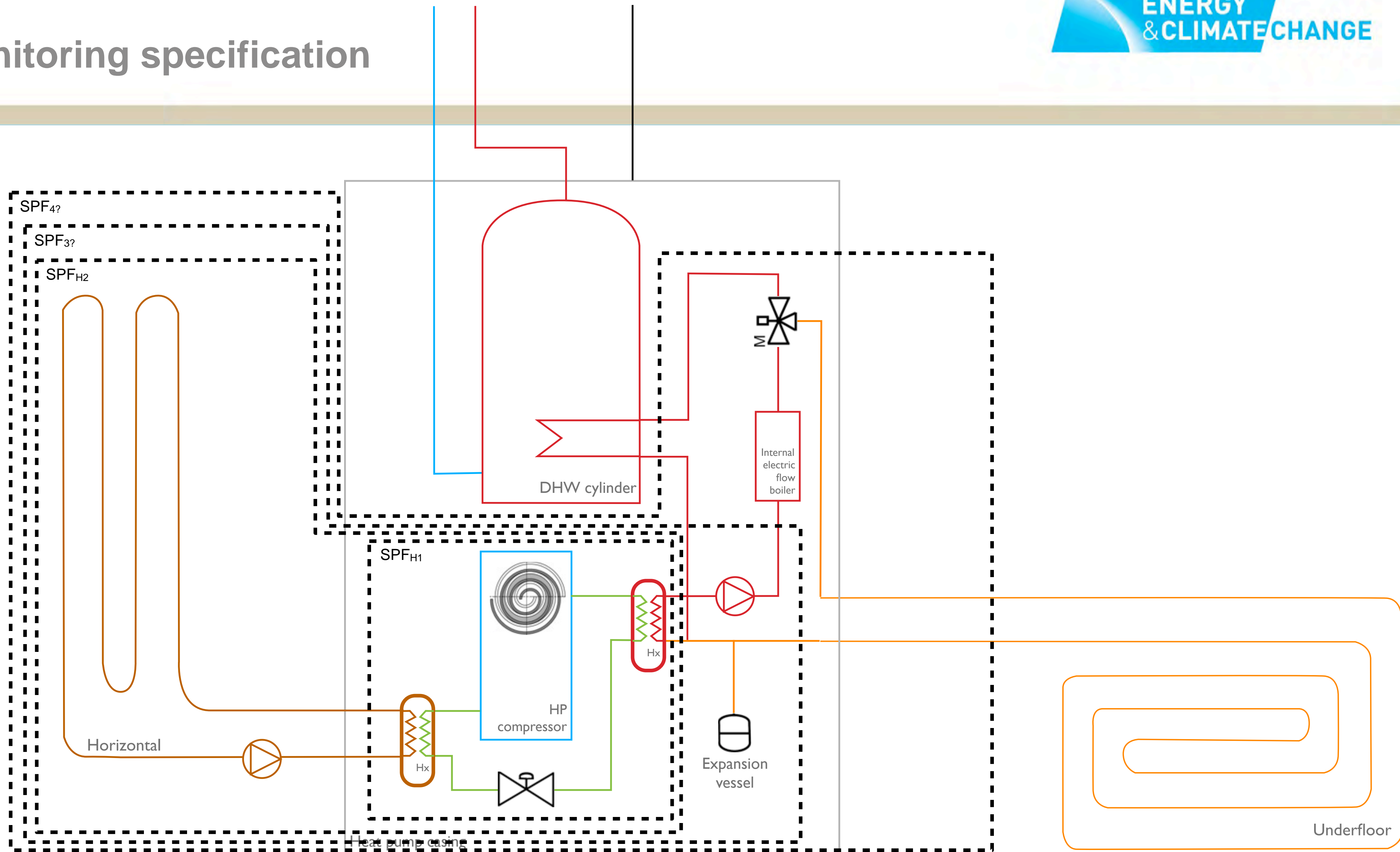
How are we going about it?

Monitoring specification



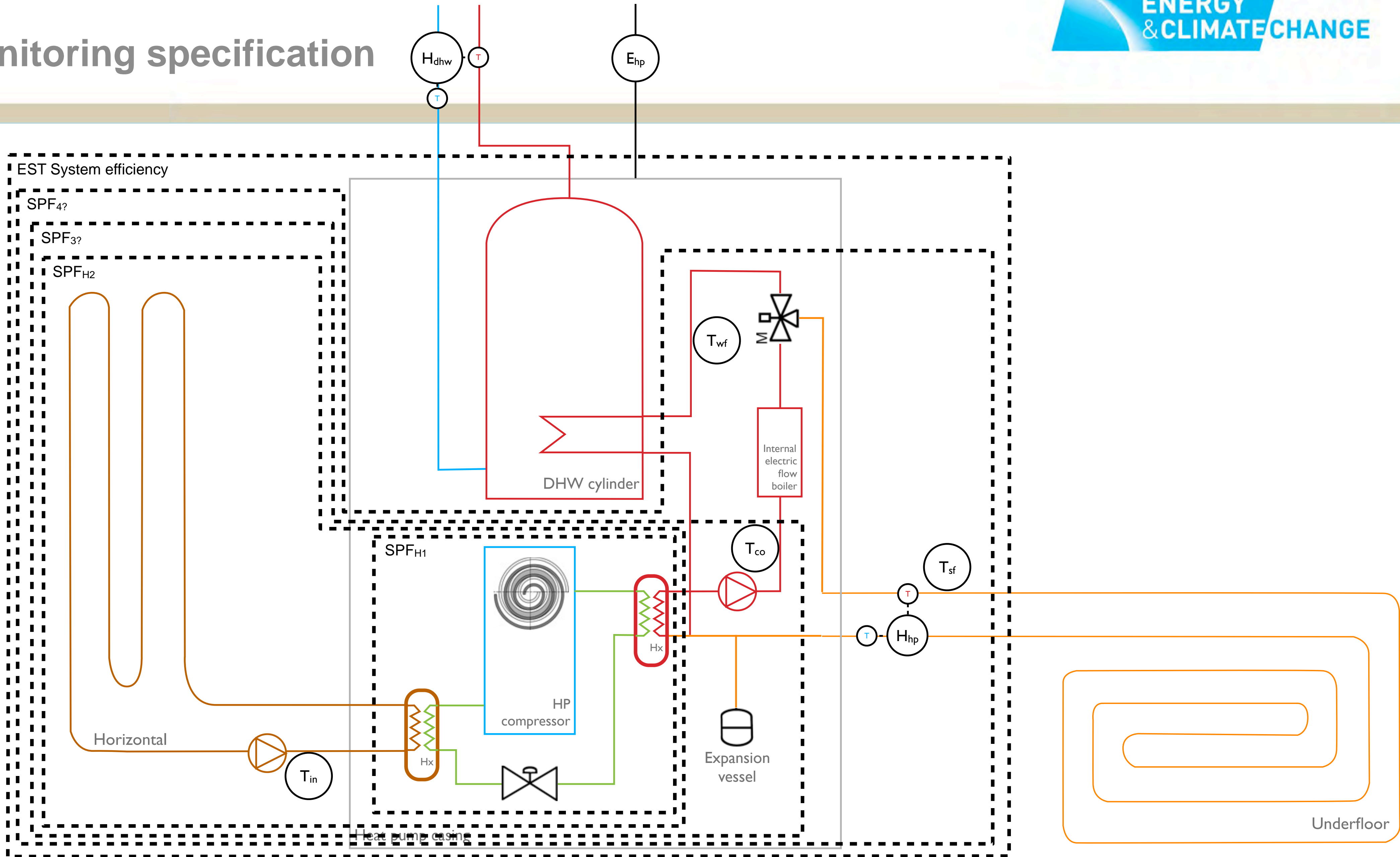
How are we going about it?

Monitoring specification



How are we going about it?

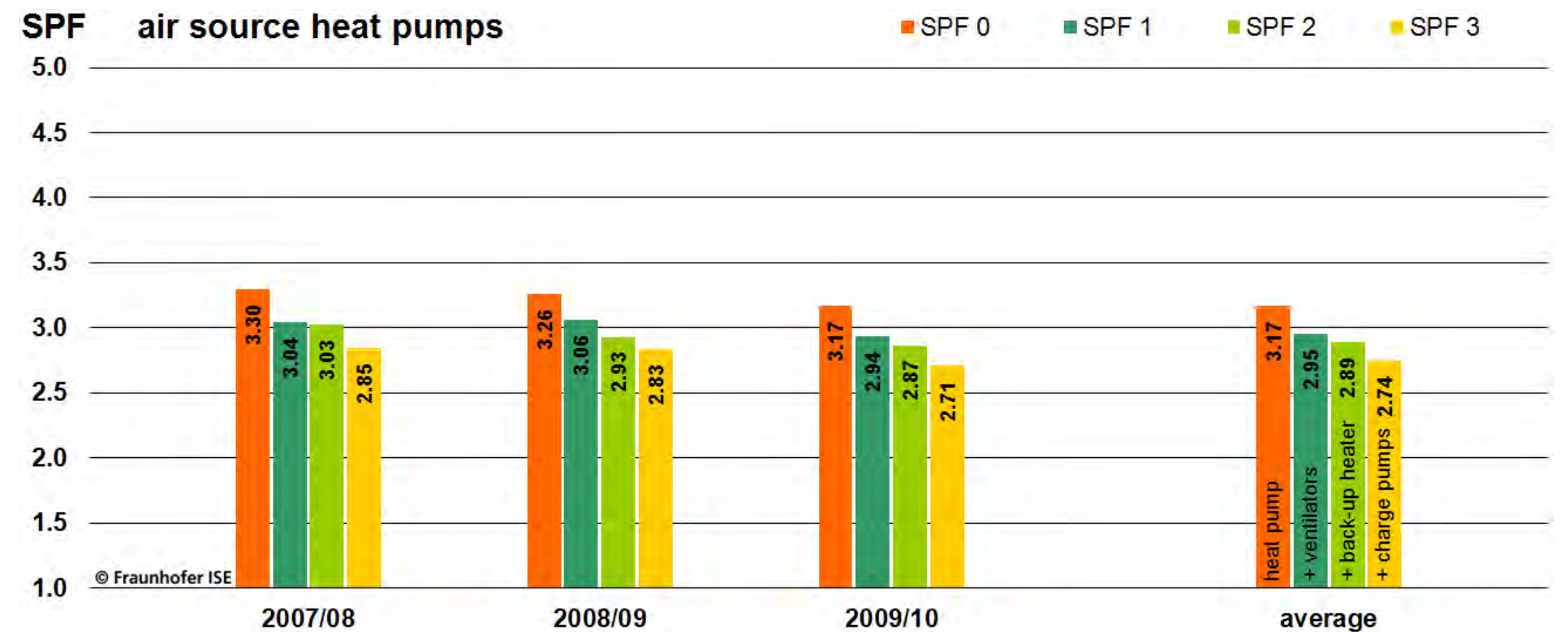
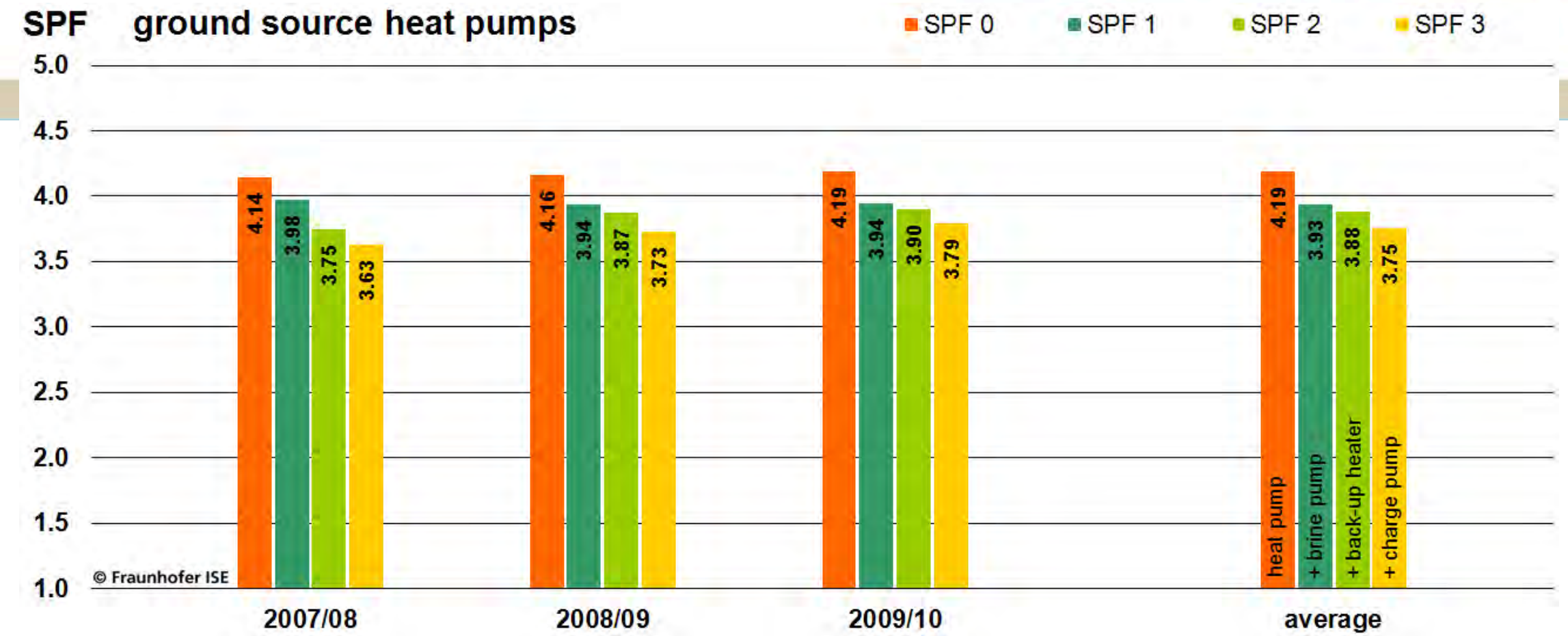
Monitoring specification



How are we going about it?

Monitoring specification

- SEPEMO system boundaries
- EST's system efficiency parameter
- Monitoring specification set up so that all SPF parameters and the system efficiency can be obtained by measurement, observation and algorithm



= efficient (given finite resource)

How are we going about it?

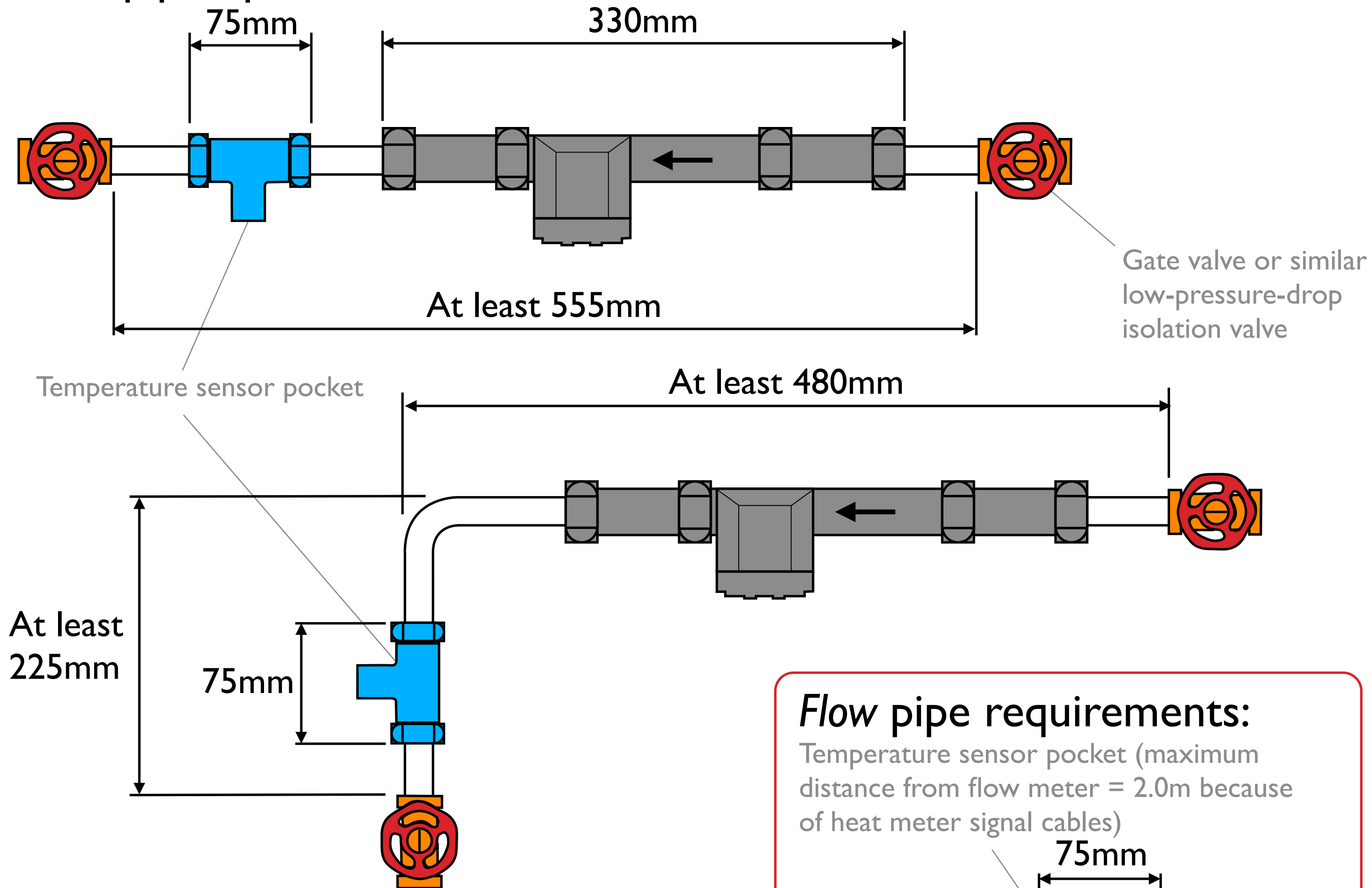
Data frequency and resolution

- 2-minute monitoring time period (faster than EST field trial)
- 1 pulse per Wh on heat meters (greater than EST field trial)
- 1 pulse per litre on flow meter (greater than EST field trial)
- 1 pulse per Wh on electricity meters
- Sontex heat meter for short-duration DHW draw-offs.



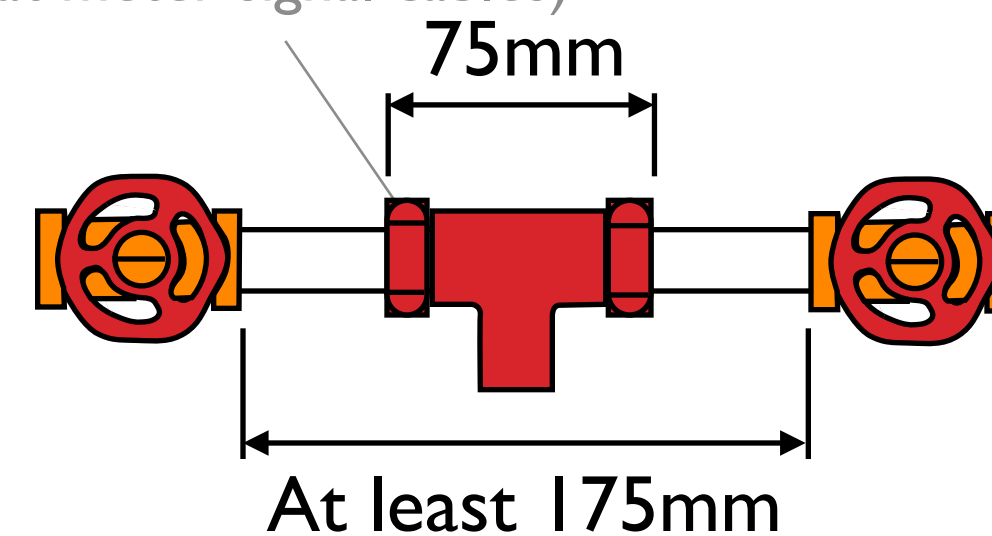
Figure 1: Space requirements for Superstatic 440 heat meter qp 2.5m³/h

Return pipe options:

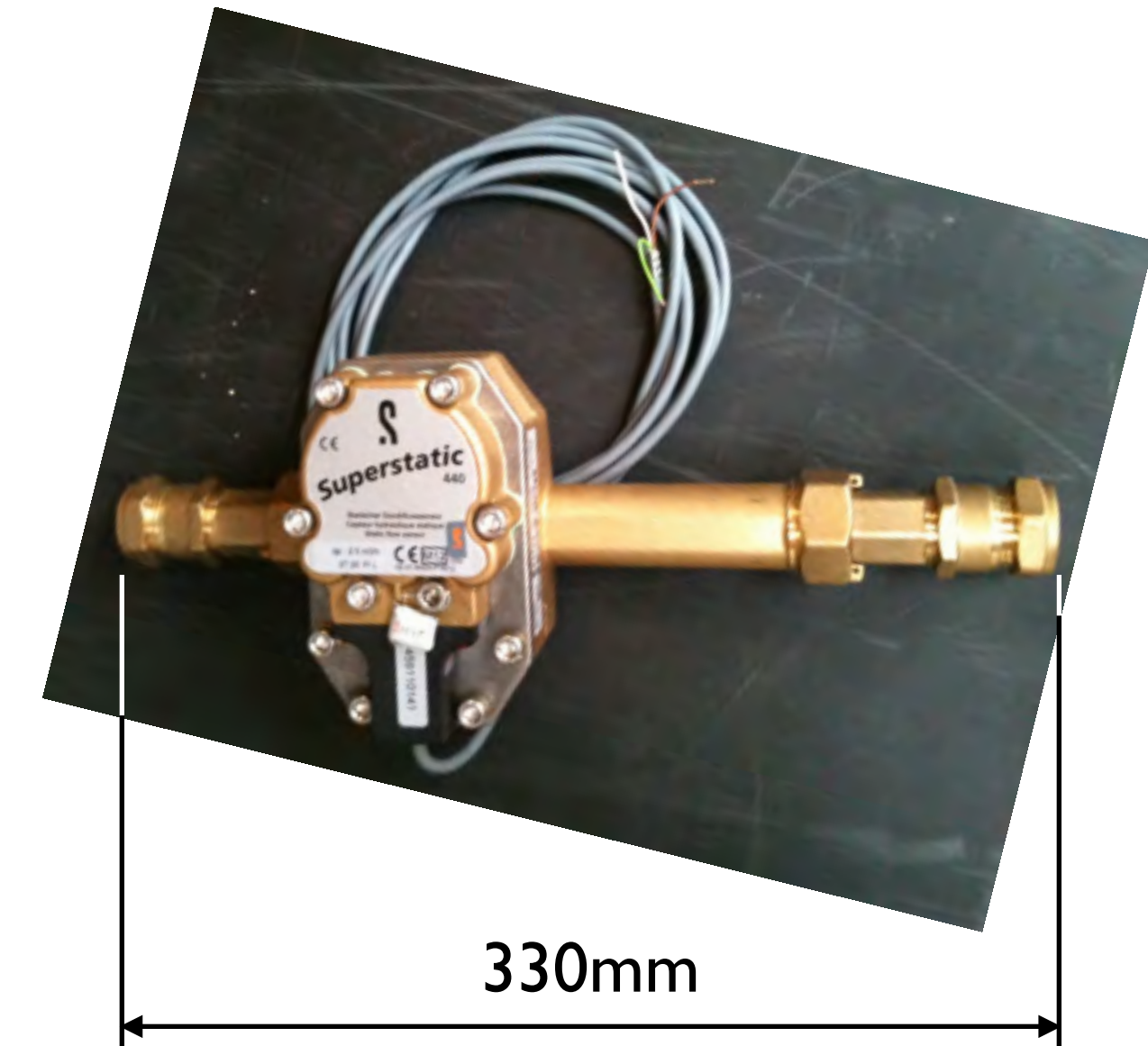


Flow pipe requirements:

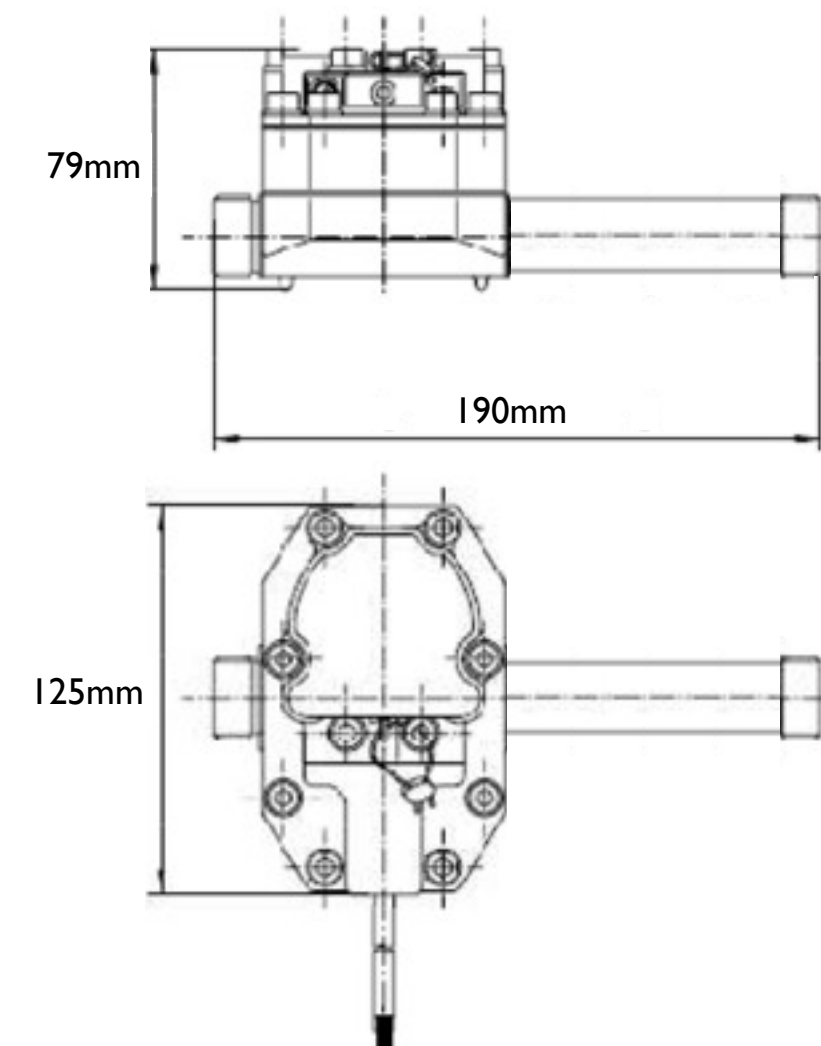
Temperature sensor pocket (maximum distance from flow meter = 2.0m because of heat meter signal cables)



Flow meter assembly:



Flow meter:

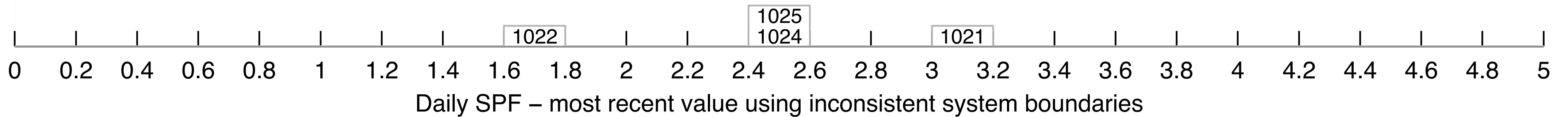


Drawings are plan views. Not to scale!
 The flow meter can be installed in any orientation except with the "Superstatic" label shown in the picture pointing towards the sky or ground.

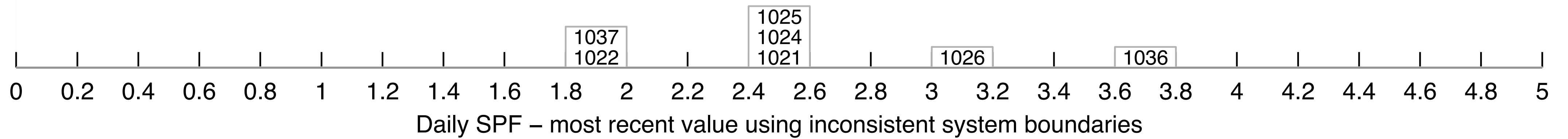
Progress to date

A long time ago...

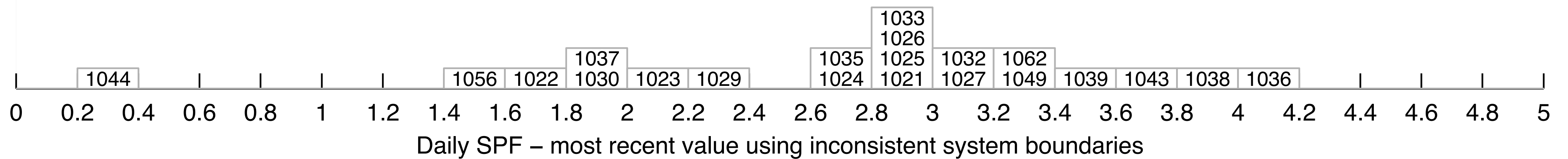
Combination of air-source and ground-source



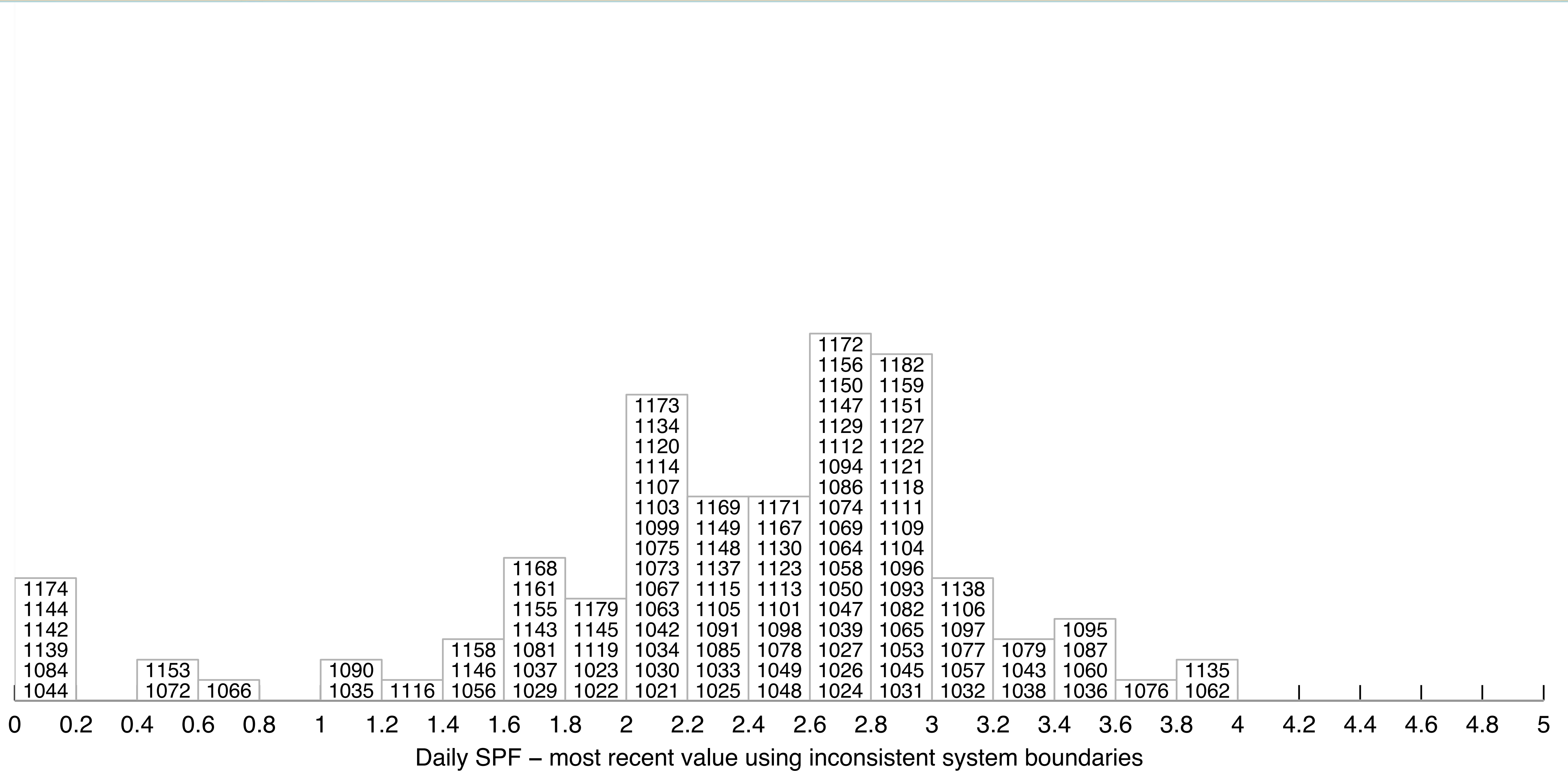
Progress to date



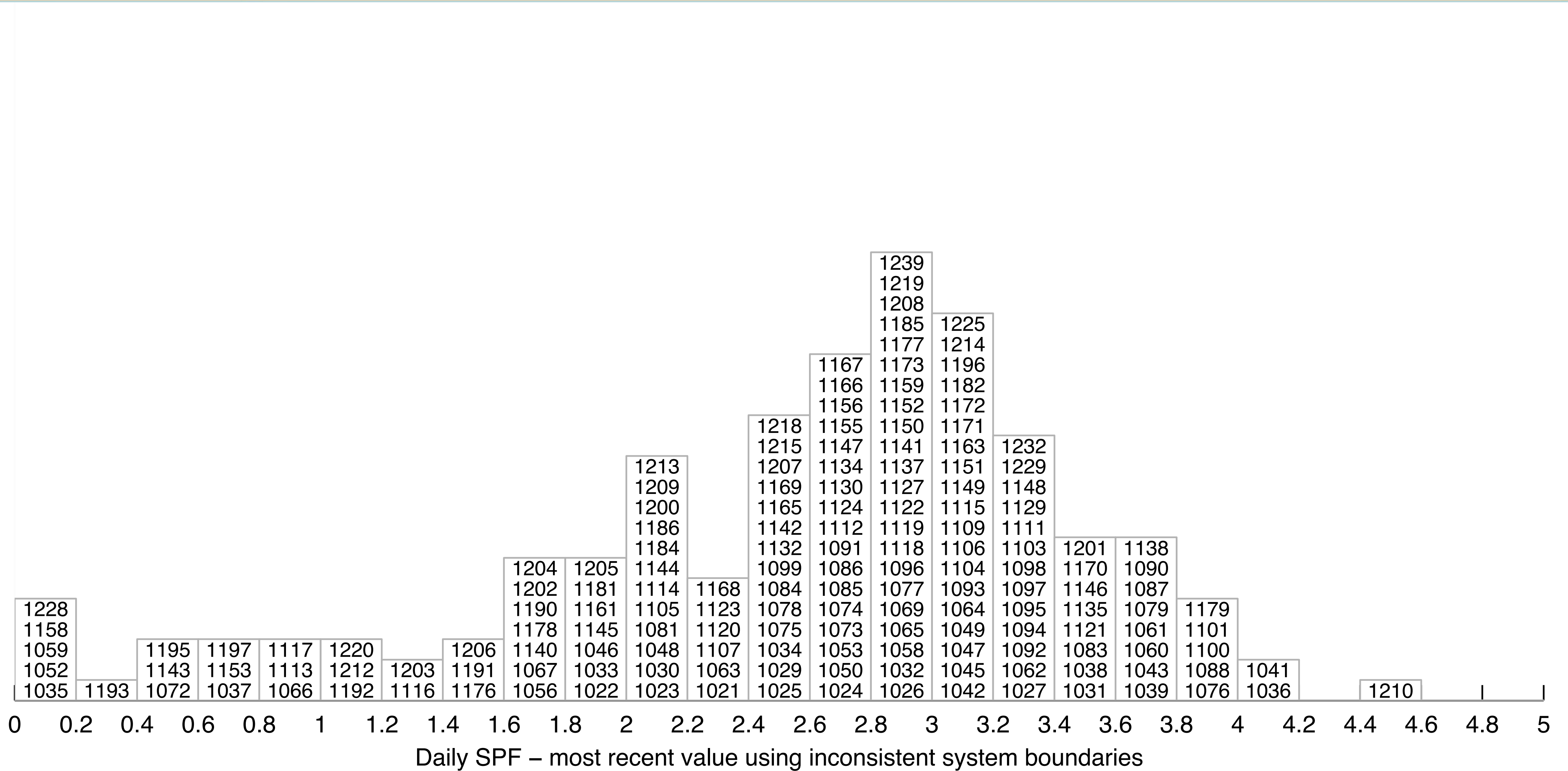
Progress to date



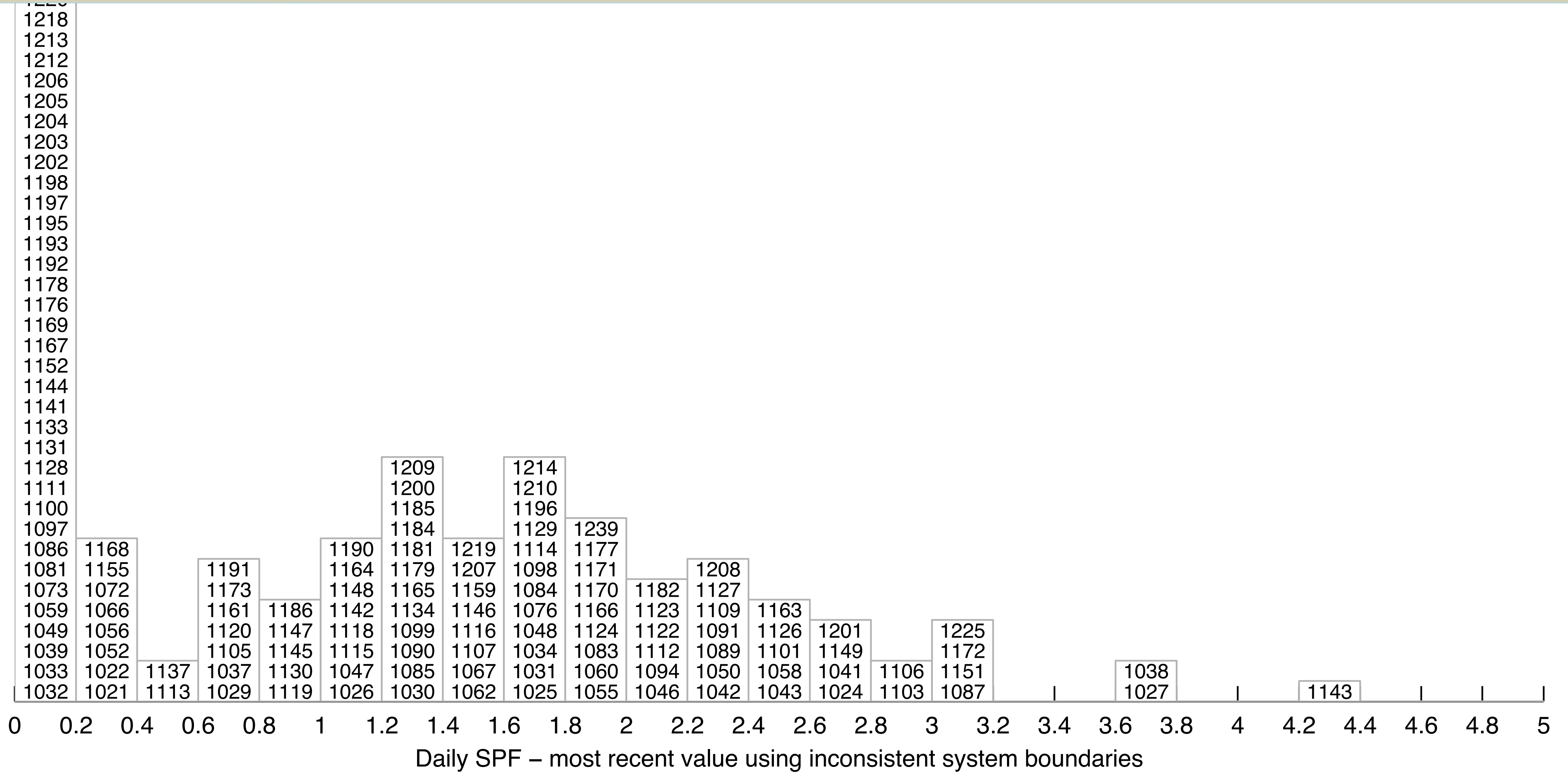
Progress to date



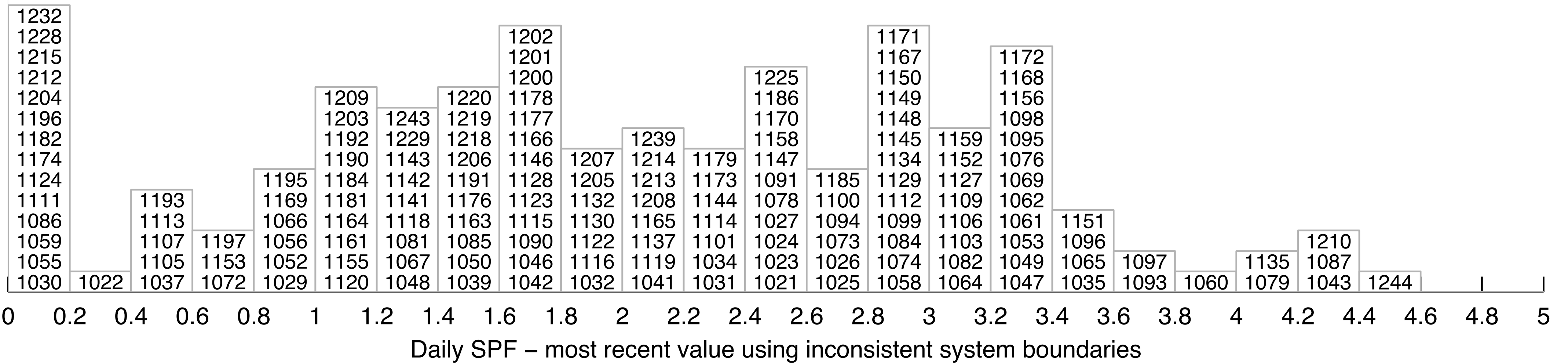
Progress to date



Progress to date



Progress to date



What happens next?



- BRE are creating a training course
- ~40 MCS installers need to be trained
- Equipment is free-issued to installers in time to install it during heat pump installation
- The first installation a trained installer does will be audited
- Payment is available for labour (amount TBC by BRE)
- Superior customer experience

- We are recruiting an engineer to analyse this data with me
- We are looking into different ways of disseminating it
 - To householders
 - Installers
 - Manufacturers
 - ...
 - We want it to be used constructively to improve skills

Any questions on RHPP?



- Getting involved in RHPP metering
- RHPP 'installer checklist'
- RHPP social landlord competition