



Biomass Design Standards

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The Campbell Palmer Partnership Ltd



The Campbell Palmer Partnership Ltd (CPp Ltd)

- Biomass & Renewable Energy Consultants
- Renewable Energy System Designers
- Led the development of the Biomass Boiler System Sizing Tool at the University of Strathclyde
- Lead author on the CIBSE Biomass Heating Application Manual (BHAM)
- Delivered the first comprehensive technical training on biomass design, operation and maintenance for CIBSE in October 2012



Successful Biomass Installations

Some of the key success factors:

- Be prepared to acknowledge how difficult biomass can be to get right
- Seek specialist advice from the outset
- Assess loads carefully, size the boiler accurately & incorporate a thermal store
- Good control of fossil fuel boilers, good hydraulic design
- Get the flue right
- Pay careful attention to fuel storage & delivery arrangements & ensure fuel is within specification



Recent UK Initiatives

- Carbon Trust Biomass Heat Accelerator programme
- Development of the Biomass Boiler System Sizing Tool (BBSST)
- Development of the CIBSE BHAM
- Establishment of biomass training



Biomass Heat Accelerator (BHA)

- CT worked with fuel suppliers, installers and designers to improve biomass design & implementation standards
- CT funded development of the BBSST
- CT initiated development of the CIBSE BHAM
- A BHA consultant and sat on the CT Biomass Technical Advisory Panel



Biomass Boiler System Sizing Tool

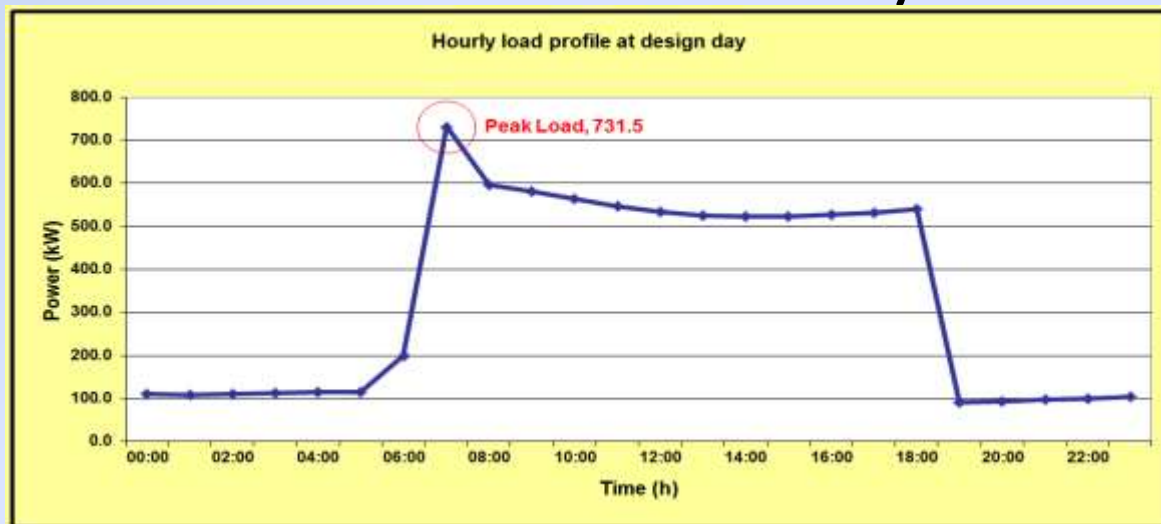
- Started life as a MSC student group project at the University of Strathclyde supervised by David Palmer
- Subsequently identified by the CT as the only significant freeware available
- Final version completed in Jan 12
- Available to download from the Carbon Trust website:
<http://www.carbontrust.com/resources/tools/biomass-decision-support-tool>



Biomass Boiler System Sizing Tool

Allows the user to:

- Produce heat load profiles
- Size boiler & buffer vessel, or boiler & thermal store
- Select type of fuel & fuel store, & to size fuel store
- Produce an overall financial analysis





CIBSE Biomass Heating Application Manual (BHAM)

- No comprehensive technical or design manual on biomass currently exists in the UK
- Biomass expertise and knowledge resides in some installation companies and a small number of consultants/designers
- 50 years experience available in continental Europe
- Covers systems from 50kW to 3MW



CIBSE BHAM

- CT sought to bring experience and knowledge together in a single publication and approached the Chartered Institute of Building Services Engineers (CIBSE) to publish the document
- First draft completed and initial CIBSE review Dec 11
- David Palmer appointed as lead author Dec 11



CIBSE BHAM Contents

- Strategic decisions
- Key indicators for successful installations
- Biomass fuels, combustion & emissions
- Fuel delivery, storage & characteristics
- Biomass boiler types & characteristics
- Buffer vessels & thermal stores
- Sizing a biomass boiler & suitability of biomass
- Biomass boiler front-ends



CIBSE BHAM Contents

- Configurations of auxiliary & back-up boilers & load circuits
- Integrating front-ends with back-ends
- Flues & flueing
- Heat metering
- Proving competent operation
- Operation & maintenance
- Procurement



CIBSE BHAM - Objectives

To provide:

- Best practice guidance on biomass design, operation & maintenance
- Detailed technical information on biomass boilers and their operation
- Design guidance on all aspects of biomass system design
- Information not currently available and not published elsewhere



BHAM – What is New

Biomass boiler types and characteristics:

- Classifications by type of stoker, ignition system & fire-tube orientation
- Standard and optional features available
- Boiler control



Understanding boiler types is essential to the correct selection of a biomass boiler



BHAM – What is New

Buffer vessels & thermal stores:

- When to use them
- System operation
- Designing with them



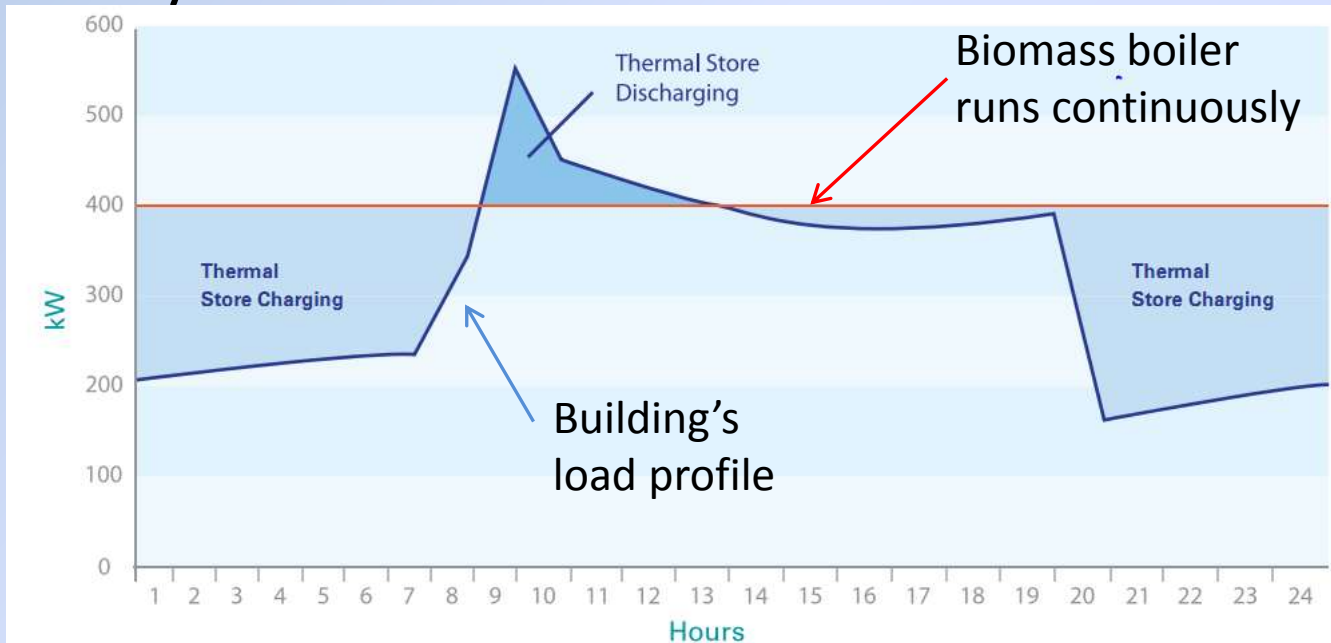
Understanding buffer vessels and thermal stores and how to design with them is critical to successful and efficient biomass systems



BHAM – What is New

Sizing biomass boilers:

- How to size systems
- Use of the BBSST as a decision support tool
- Achieving efficient system operation
- How to optimise the energy output from a biomass system



Understanding why and how to size biomass boilers accurately is crucial



BHAM – What is New

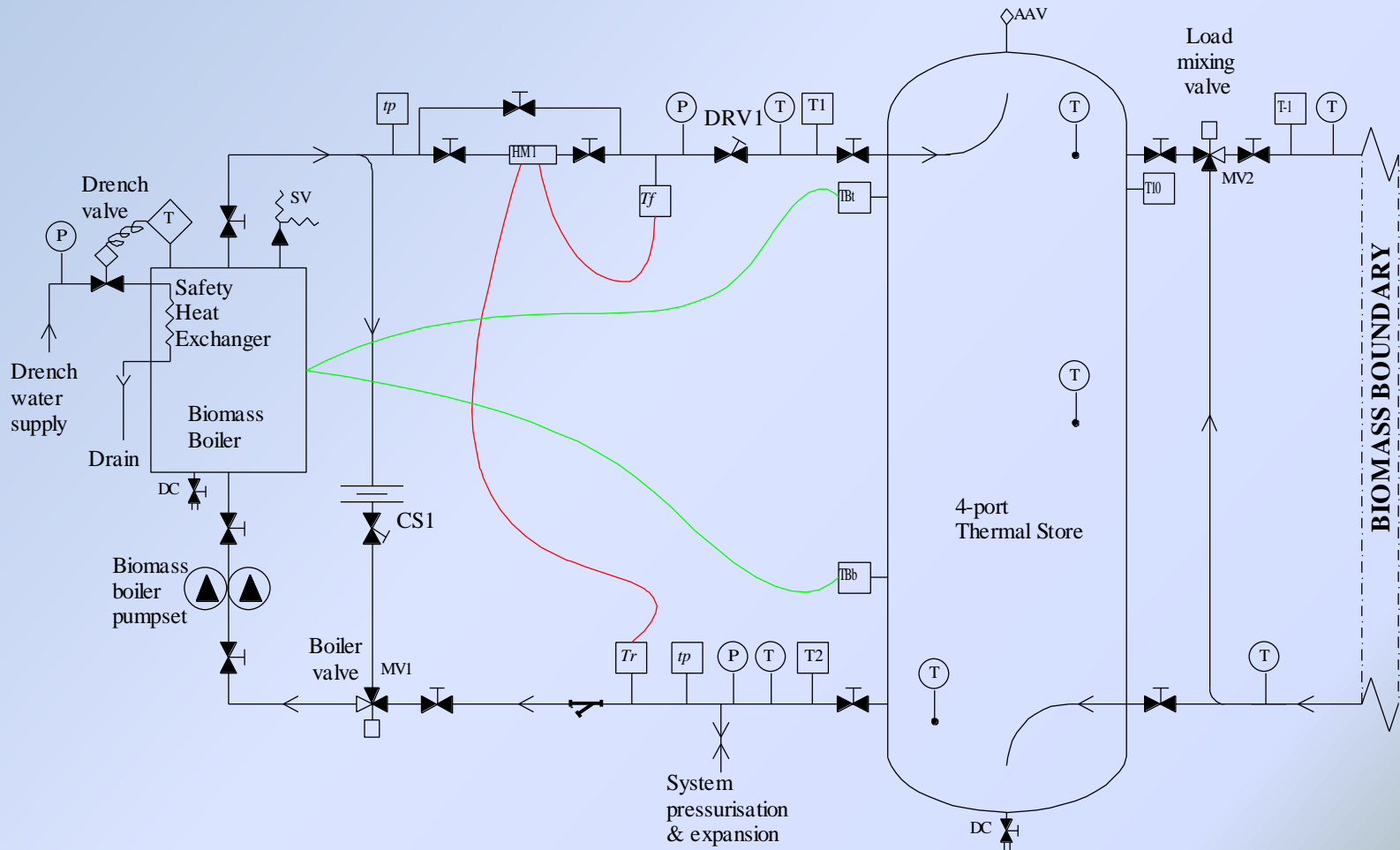
Front end & back-end configurations:

- 5 standards front-ends
- 19 standard back-ends
- Any front end can be used with any back-end
- Control descriptions integral to each module

Intention is to provide detailed configurations which are known to work and perform well

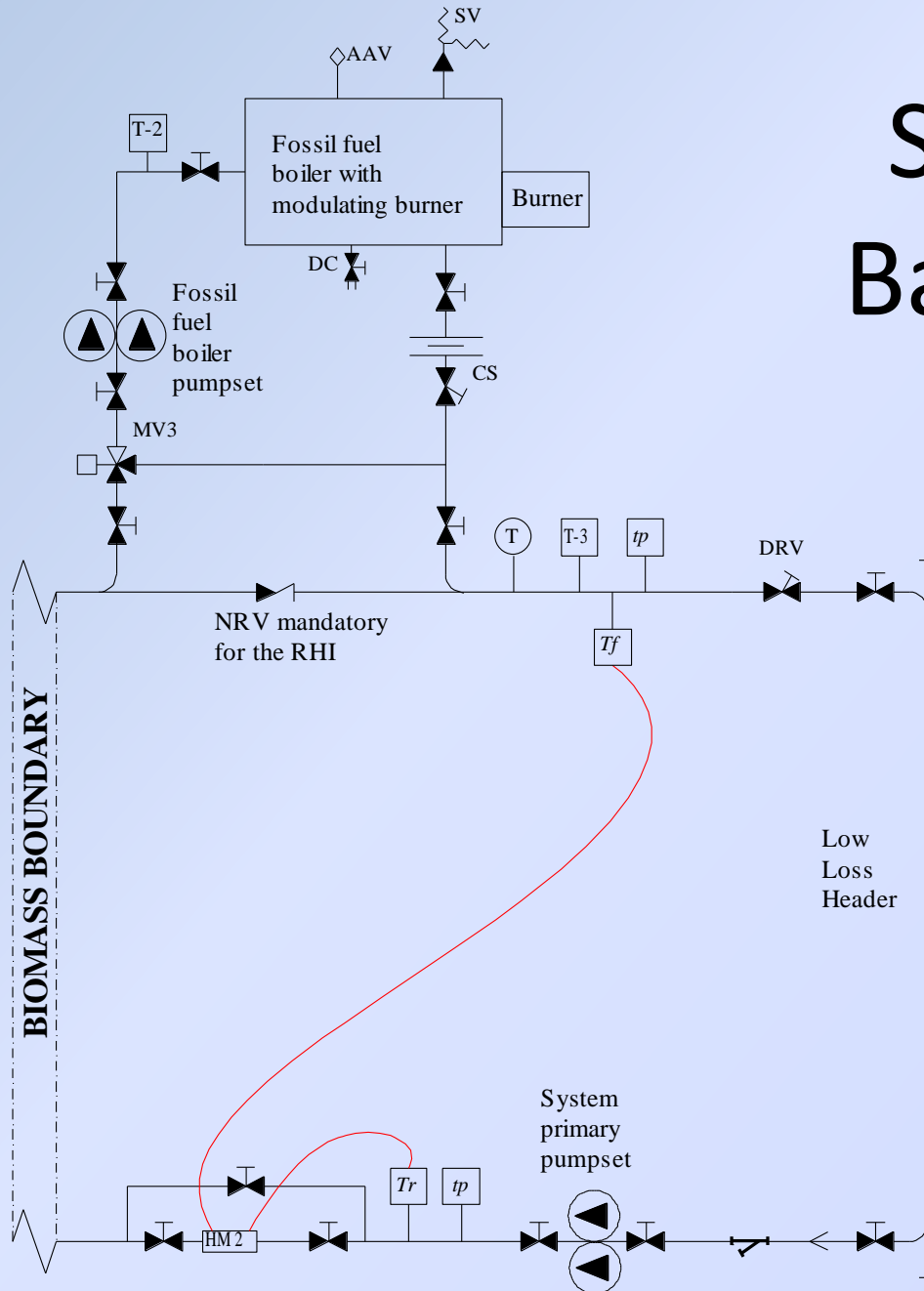


Sample Front-End





Sample Back-End





BHAM – What is New

System integration:

- Selection of the correct control strategy
- System pressurisation
- System isolation
- Low loss headers

Biomass systems present particular challenges in these areas



BHAM – What is New

Flues & flueing:

- Why biomass flues are different
- Particular biomass issues related to flueing
- Guide to biomass flue design

**There is currently NO
PUBLISHED
GUIDANCE on the design of
biomass flues in the UK**





BHAM – What is New

Heat metering:

- Heat metering for the Renewable Heat incentive
- Detailed guidance on heat meter selection & installation
- Heat metering for fossil fuel boiler control





BHAM – What is New

- Proving competent operation
- Safe boiler operation
- Maintenance regimes
- The extended timescale & detail of biomass system procurement



BHAM – Health & Safety

Health & Safety rules throughout the BHAM including:

- Hazardous emissions
- Explosion risk and Carbon Monoxide hazard in pellet stores
- Fungal growth in woodchip stores
- Use of fuel which is too wet for a boiler
- Flashover risk of opening a fire-door when a boiler is slumbering
- A flue able to evacuate the boiler in the event of an electrical power failure



QUESTIONS?

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