



THE UNIVERSITY *of* EDINBURGH

EAUC – SUSTAINABLE CONSTRUCTION TSN

October 2020

BUILDING CAPACITY FOR LOW CARBON INNOVATION IN CONSTRUCTION AND THE BUILT ENVIRONMENT

DEAN DROBOT

C.Eng C.Env MIMECHE MIEMA

Head of Energy & Utilities
University of Edinburgh



Our Context:

- Approaching 1,000,000 m² GIA
- 6 main campuses
- 5 heat & power networks
- >500 properties
- National research computing infrastructure
- >£20M p.a. utility spend



THE UNIVERSITY *of* EDINBURGH

Zero by 2040

The University of Edinburgh has committed to 'net zero' carbon by 2040.

This includes an ambition for zero emissions from heat and power.



Energy Masterplan

'Right Size' Buildings & Services

- Evaluate space use and efficiency
- Evaluate service provision, function and risks
- Enable shared services and flexible use of space

Enable 'Deep' Energy Efficiency

- Eliminate energy waste
- Minimise heat and power demands
- Invest in appropriate dynamic HVAC control
- Enable continuous commissioning / IoT analytics
- Plan for effective building fabric upgrades
- Plan for upgraded building heat emitters

Exemplary Construction Standards

- Step change in quality and performance standards
- Certified 'Passive' new build and refurbishment
- Re-design of our process/project management guidelines
- Emphasis on digital tools (digital twins)

Low Temperature Heat Networks

- Hydraulic modelling / network digital twins / IoT analytics
- Transition away from gas fired CHP
- Next generation operating temperatures (50/30°C)
- Future proof buildings (see deep efficiency)
- Future proof energy centres (heat pump / hydrogen)
- Local heat sources (sewer / aquifers / ground / air)

Enable 'Smart Energy' Research Hubs

- Campus as a 'Living Lab' for technology and digital tools.
- Energy centres as teaching, learning and research space
- Smart local grid opportunities



What is our project about?

1. Targeting systemic challenges to achieving low carbon construction
2. Developing skills, knowledge and awareness with industry partners.
3. Piloting advanced analytics and digital tools on new and existing properties
4. Disseminate learning



Outputs

- Early engagement with construction partners outside tender / contract
- Capability and capacity improvements
- Re-prioritised objectives, design guidelines and strategies
- Improved contracting and delivery processes
- Enhanced specification for building performance monitoring
- Pilot digital tools and advanced analytics



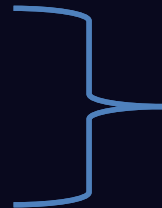
Digital Tools & Advanced Analytics

1. Dynamic Thermal Modelling

- Design Development
- Calibrated Digital Twin (In Use)

2. Continuous Commissioning

- BMS data
- Space utilization data
- Energy data



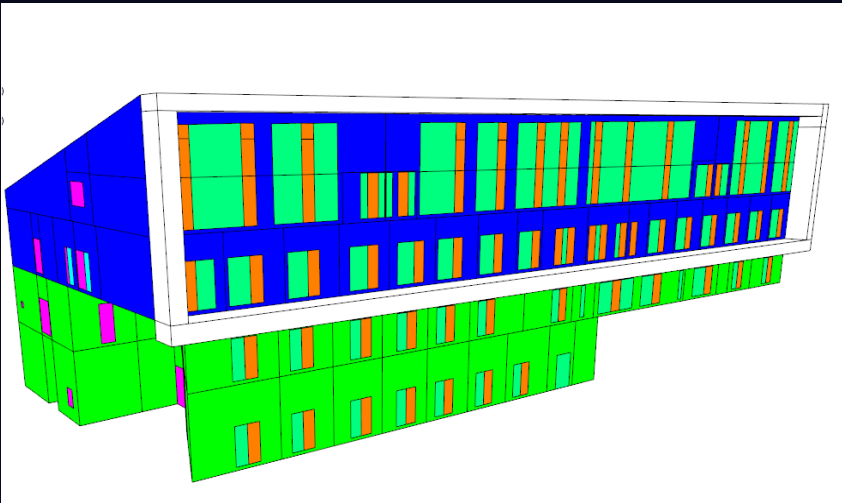
IoT / Analytics

3. Hydraulic Models of Heat Networks

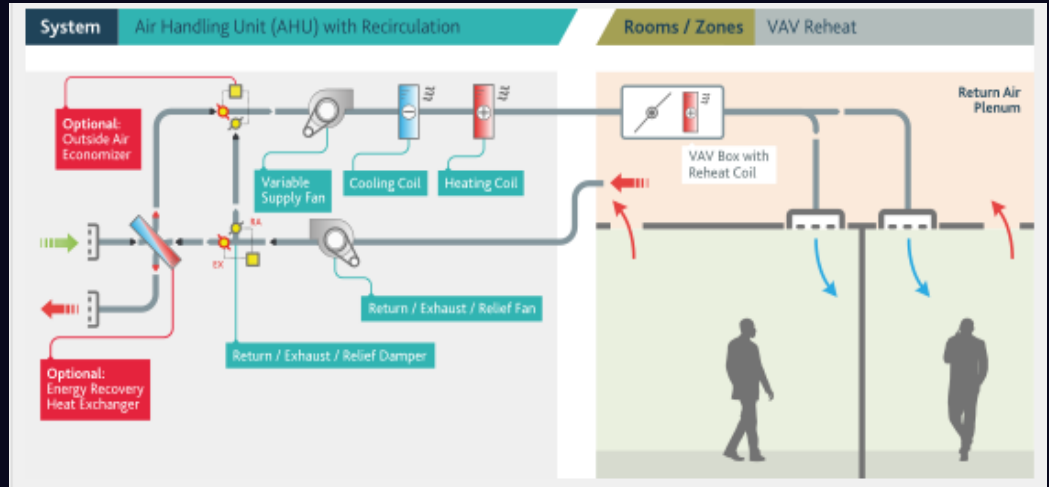
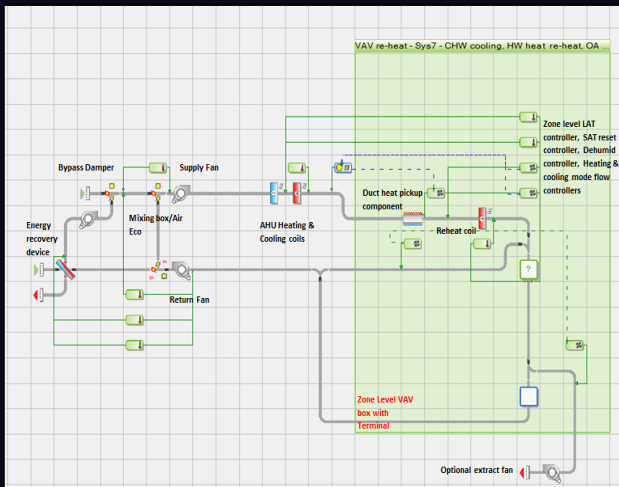
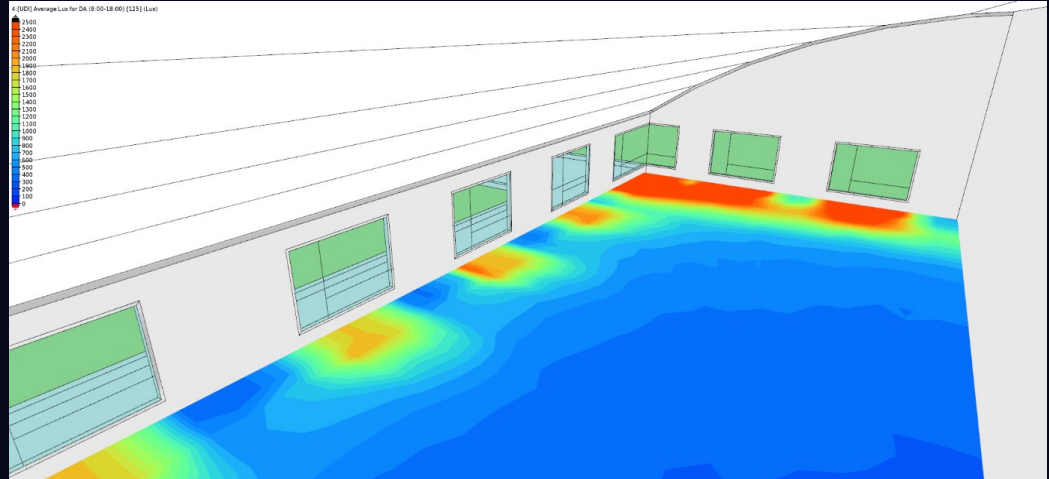
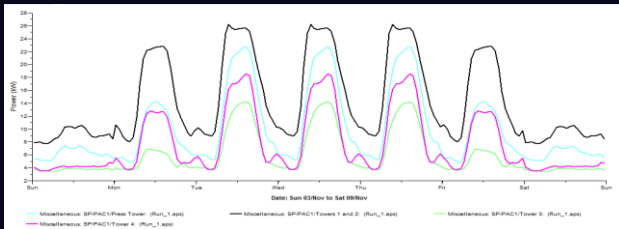
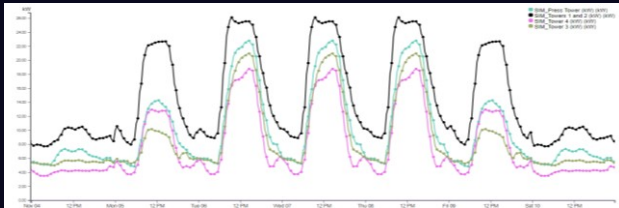
- Design Optimization
- Calibrated Digital Twin
- Continuous Commissioning / IoT analytics



THE UNIVERSITY *of* EDINBURGH

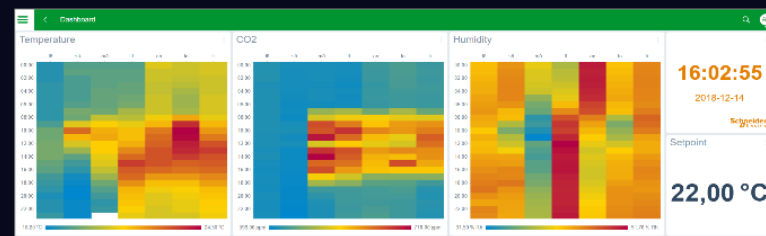
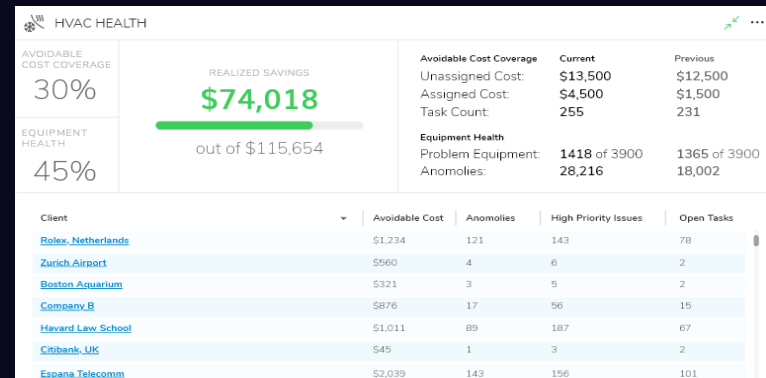
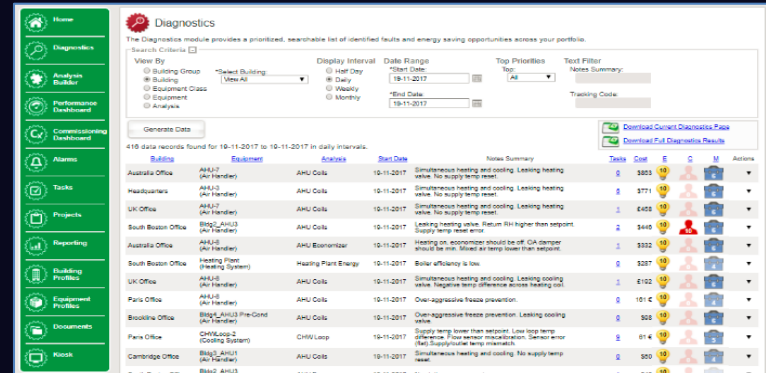
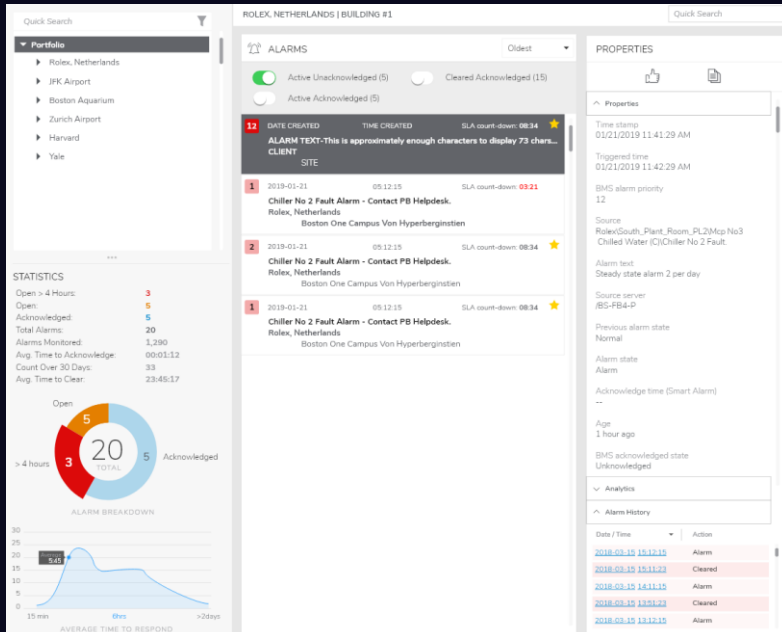


Influencing the world since 1583





THE UNIVERSITY of EDINBURGH

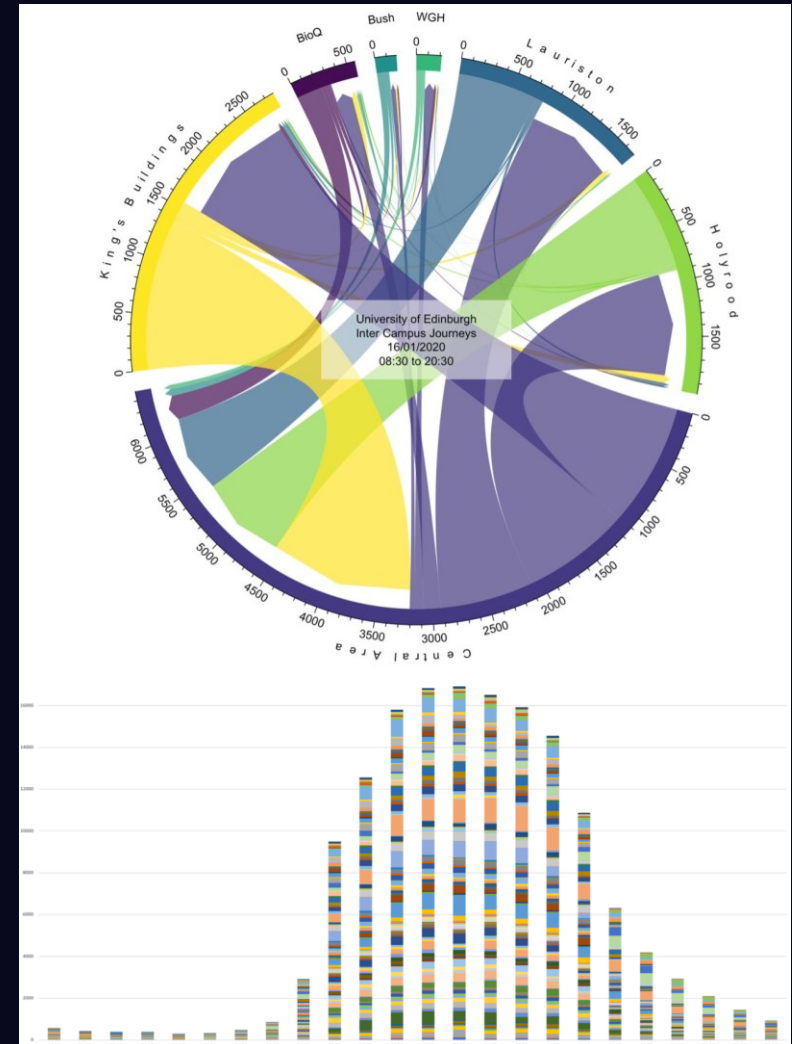
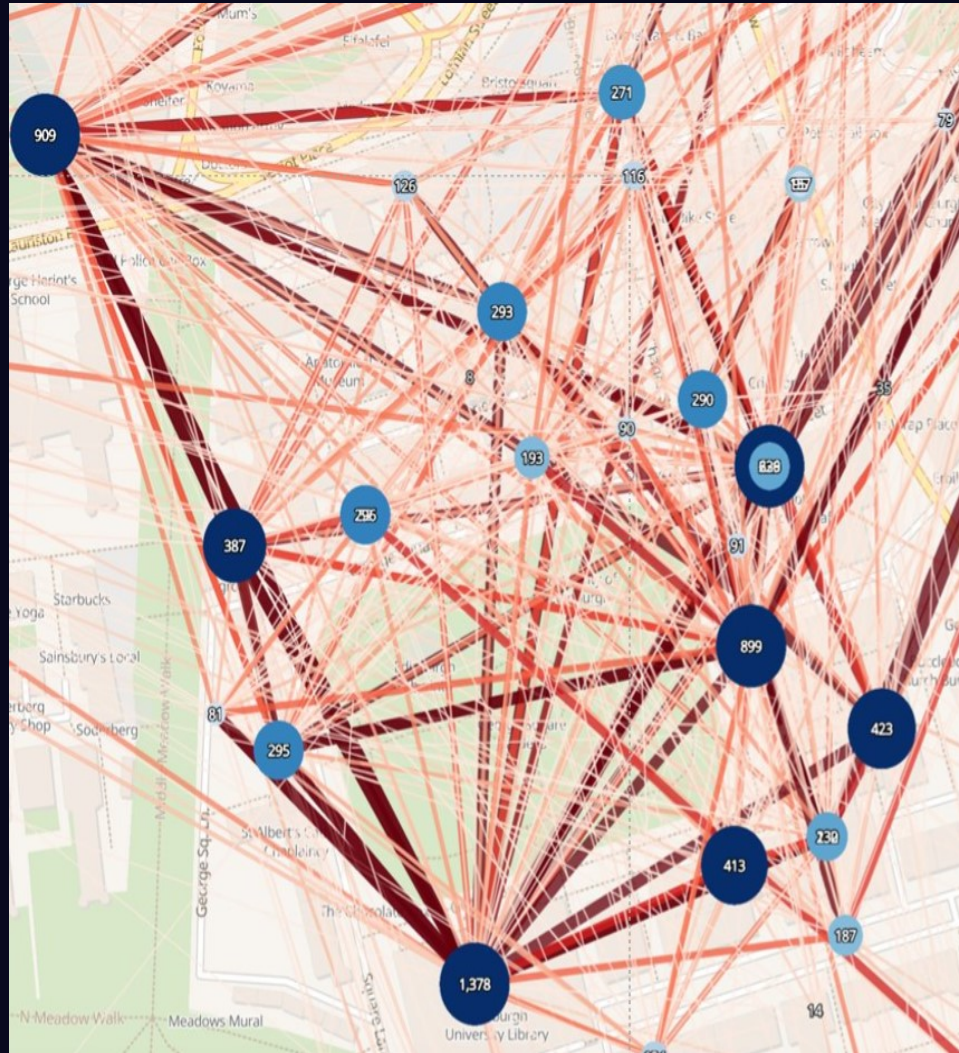


Influencing the world since 1583

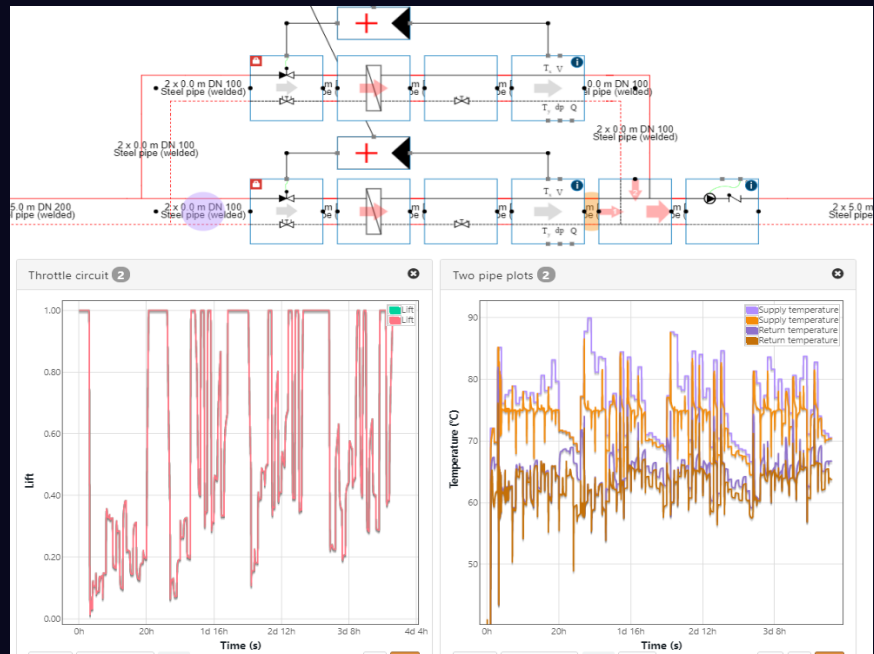
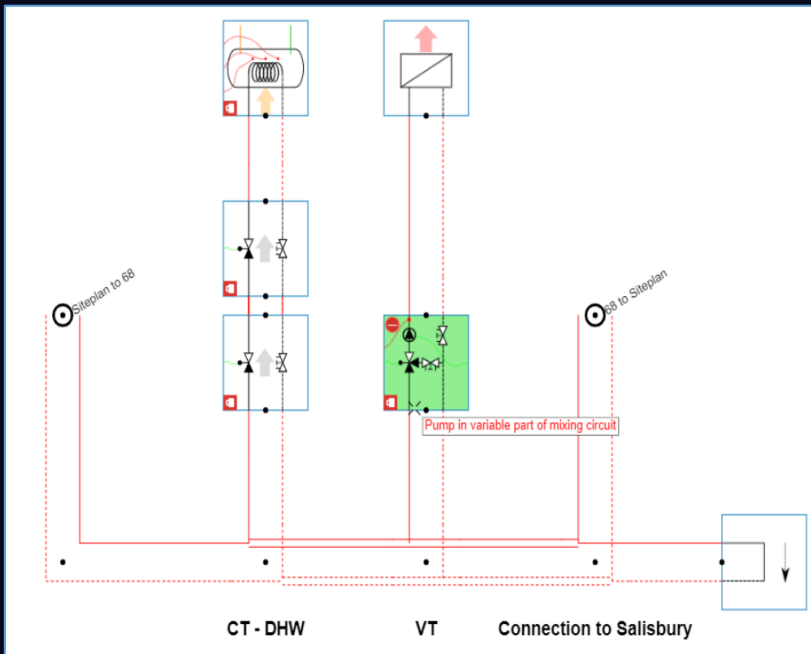
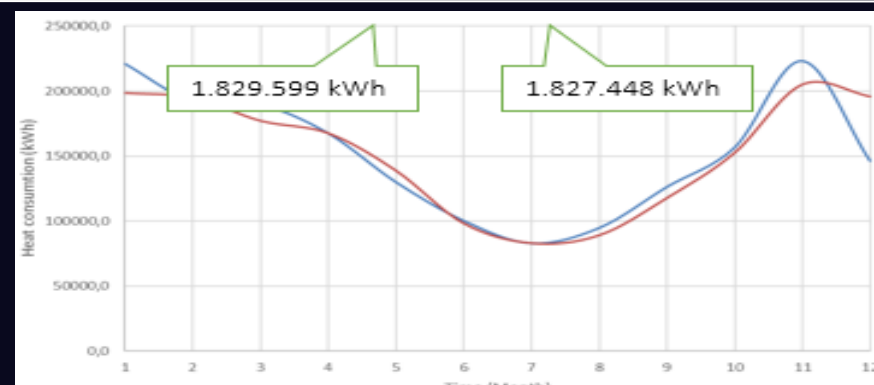
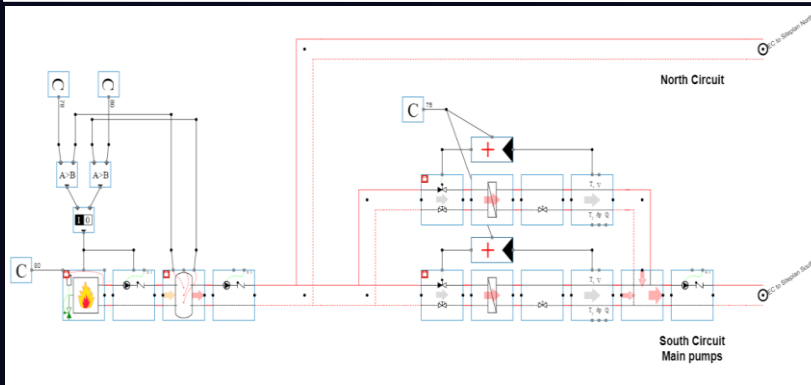




THE UNIVERSITY of EDINBURGH



Influencing the world since 1583





THE UNIVERSITY *of* EDINBURGH

DEAN DROBOT

Head of Energy & Utilities Management
The University of Edinburgh
dean.drobot@ed.ac.uk