CAN DSM WITHOUT USER ENGAGEMENT ACHIEVE ITS FULL POTENTIAL?

THE HARDWARE IS KNOWN

BUT WHAT ABOUT THE USERS WHO TRIGGER ENERGY CONSUMPTION WITH THEIR ACTION?

FACT

SENSOR BASED AUTOMATION CAN ONLY BE „A GOOD START“

FACT

„…behavior-based efficiency initiatives could unlock significant energy and cost savings…“ [1)]

Research shows…..

Findings and Recommendations [1)]

Canadian utilities could realize significant benefits from investing in behavioural programs. If cost-effectively deployed across Canada's residential sector, utilities have the potential to

KEY FINDINGS [2)]

1. People (Users) can be the solution rather than the problem
2. User preferences incorporated into development process
3. User-involvement creates sense of ownership, hence personal interest in its success
4. Energy-saving achieved as a stated project goal
5. Ability to correct user-identified faults during development increases probability of successful adoption of innovation.

…AND ANOTHER EXAMPLE

Research shows…..

3)

ENERGI

-Environmental and Energy Reduction @ Gurdon Institute-

WHAT ELSE IS GOING ON?

LIGHTING

We conducted lighting trials in the large level 3 equipment room (323).
Occupancy sensors were installed which turned lights off after 15 minutes if no movement was detected.
Data was collected for 1 month with sensors and 1 month without.

Lighting trials continue in Ahringer Lab and Piddini Lab. Both occupancy sensors and daylight harvesting controls have been installed.

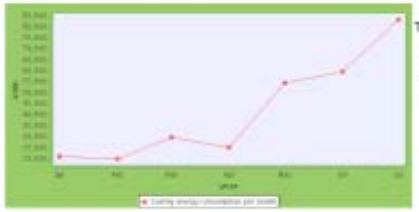
VENTILATION

A specialist ventilation and energy consultancy company have been appointed to conduct

- an audit of our ventilation plant
- a feasibility study for improvement and energy savings
- recommendations for action

'The Cube' started the project 2 September and we expect them to take 2-3 months to complete their survey and report.

Cooling has a seasonal effect.....



Total energy used for this period:

- 291,517.6 kWh
- equal to 157,711 kg CO_2
- or £ 26,236.6

ENERGI

-Environmental and Energy Reduction @ Gurdon Institute-

ELECTRICITY = MONEY

UPDATE

INCENTIVISATION SCHEME

All Departments are set an annual energy usage target. If we use less than the target – we get a refund

GURDON INSTITUTE ELECTRICITY USAGE:

2011 Target	5,076,279 kWh
2011 Actual usage	4,922,794 kWh

3.02% under target resulting in a refund of £10,613.50

2012 Target	4,984,770 kWh
2012 Actual usage forecast	4,674,458 kWh

6.23% under target

Reducing energy use
Reduces energy cost

and

potential refund in 2012 of approx £22,000

£22,000
could be spent on...

your ideas here please

HOW SHALL WE SPEND THE MONEY (responsibly) - to benefit All

Re-Furnish and Revamp the Tea room

Outdoor furniture

Standardised recycling bins

...and here

FACT

ENGAGING THE USERS WILL INCREASE YOUR PAY BACK!

BUT HOW DO YOU DO IT?

MOTIVATORS AND BARRIERS

MOTIVATORS[4)]

- Goal commitment
- Outcome expectancy
- Feedback
- Values
- Awareness, Dollars, social norms, regulatory pressure
- Gaming, competition

BARRIERS[4)]

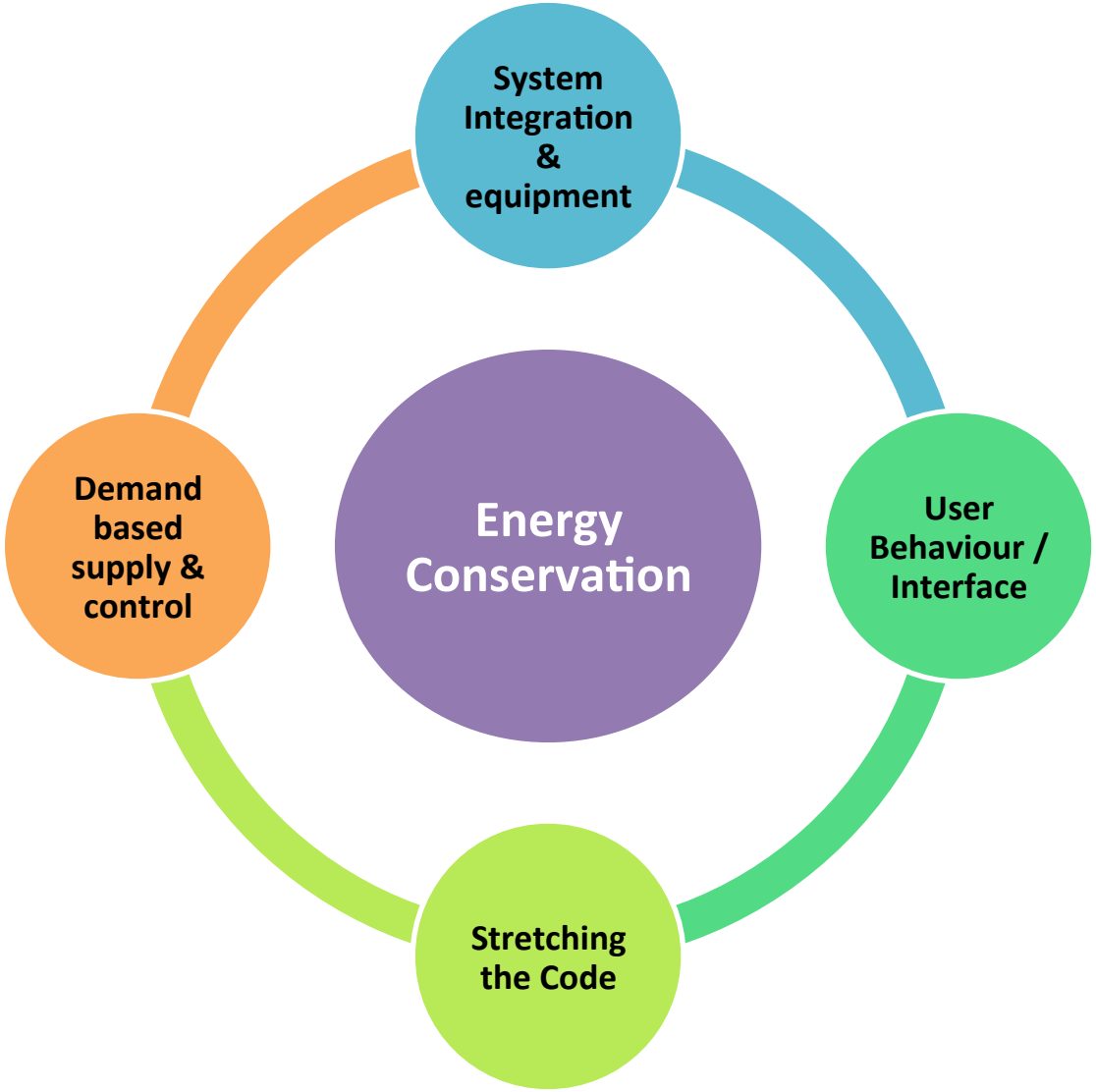
- Opportunity Cost
- Other priorities
- Inconvenience
- Habits
- Complacency
- Wrong perceptions
- Insufficient Knowledge

THE INGREDIENTS

SCARLET

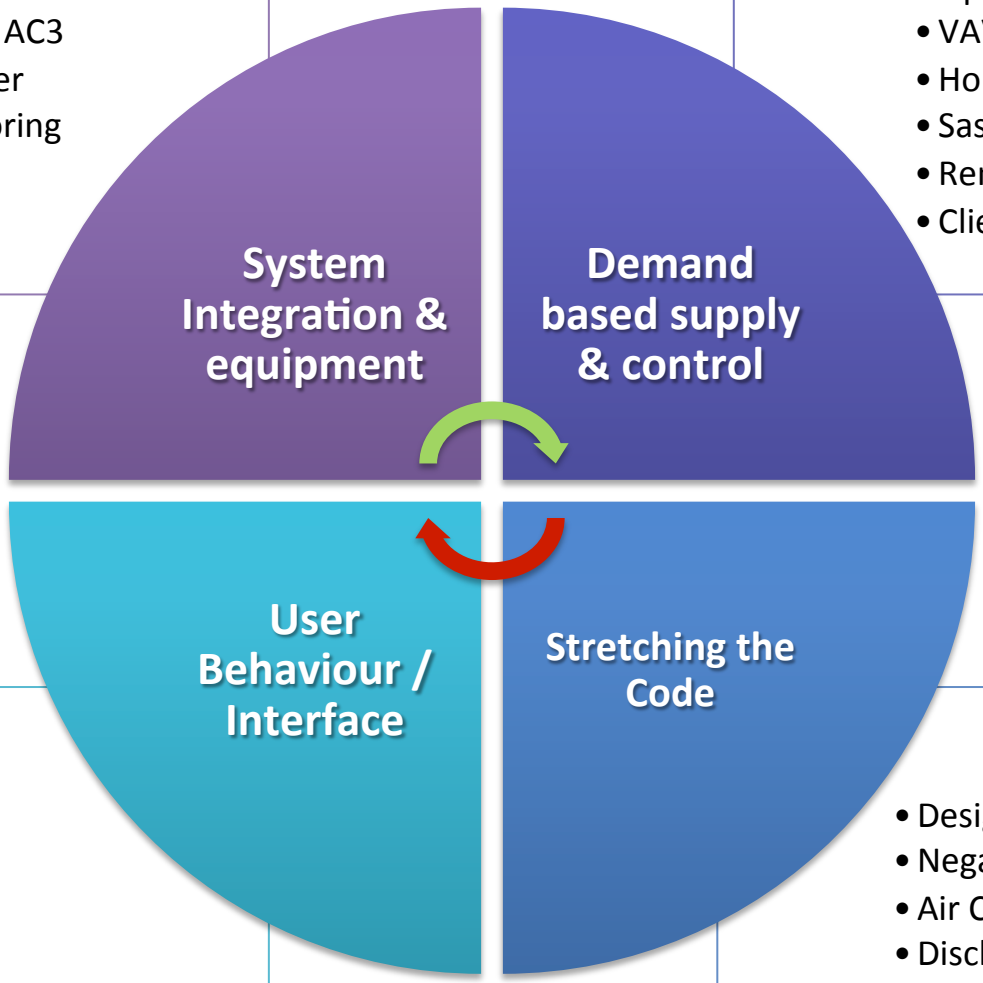
Saving **C**arbon **A**nd **R**eaching **L**aboratory **E**nergy **T**argets

Laboratory Energy Management


System Integration & equipment
User Behaviour / Interface
Stretching the Code
Demand based supply & control
Energy Conservation

- Low flow F/C
- F/C Controller, AC3
- Room Controller
- On Site Monitoring
- Room Balance
- Lab in a box

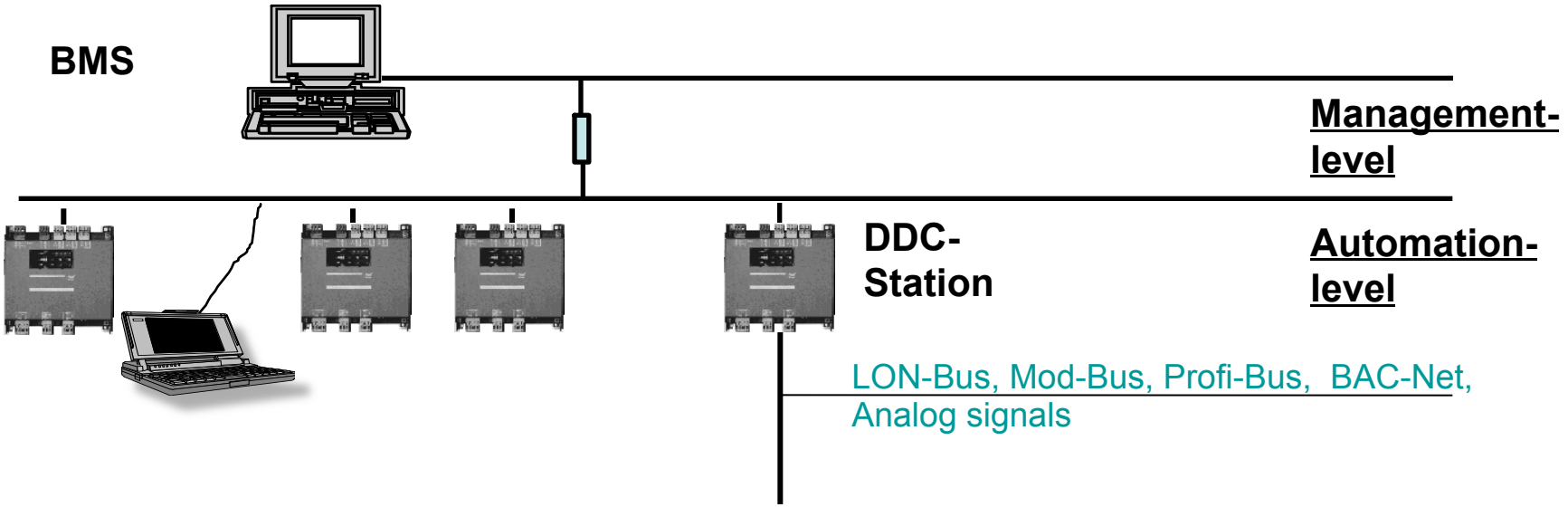
- OptiNet
- VAV Systems
- Horizontal Sash
- Sash Controller
- RemoteMC
- Client Server

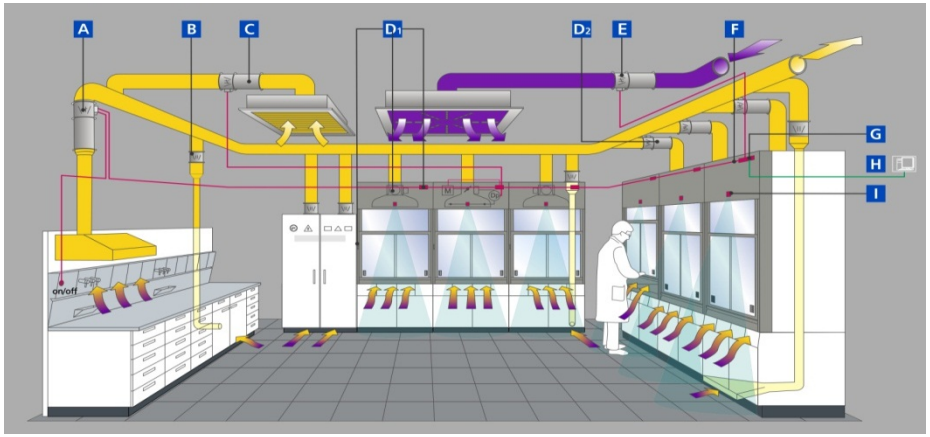


- LabTI
- GoToYourFC
- LabEM

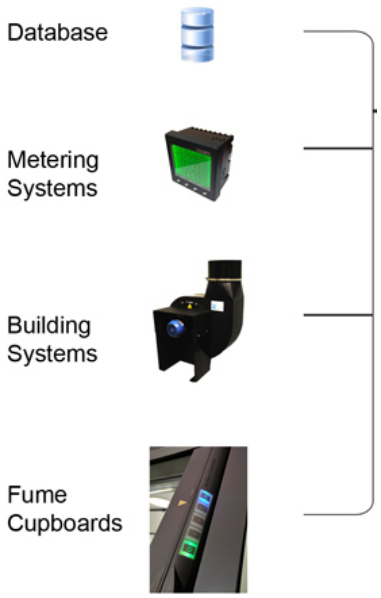
- Design Criteria
- Negative Pressure
- Air Changes
- Discharge Velocity
- F/C Extract Volume

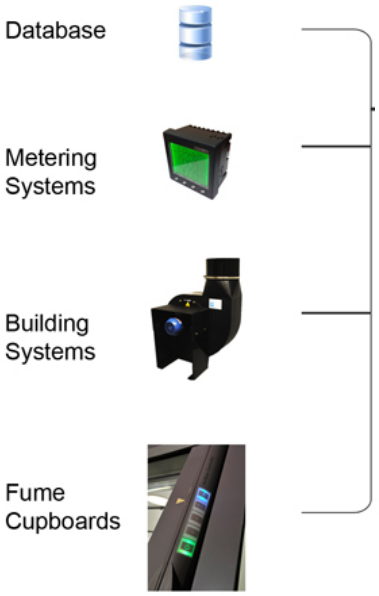
Integration into the BMS System

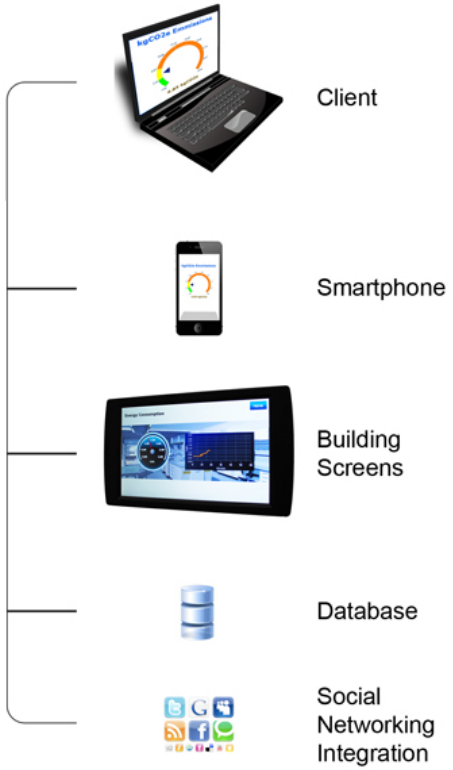


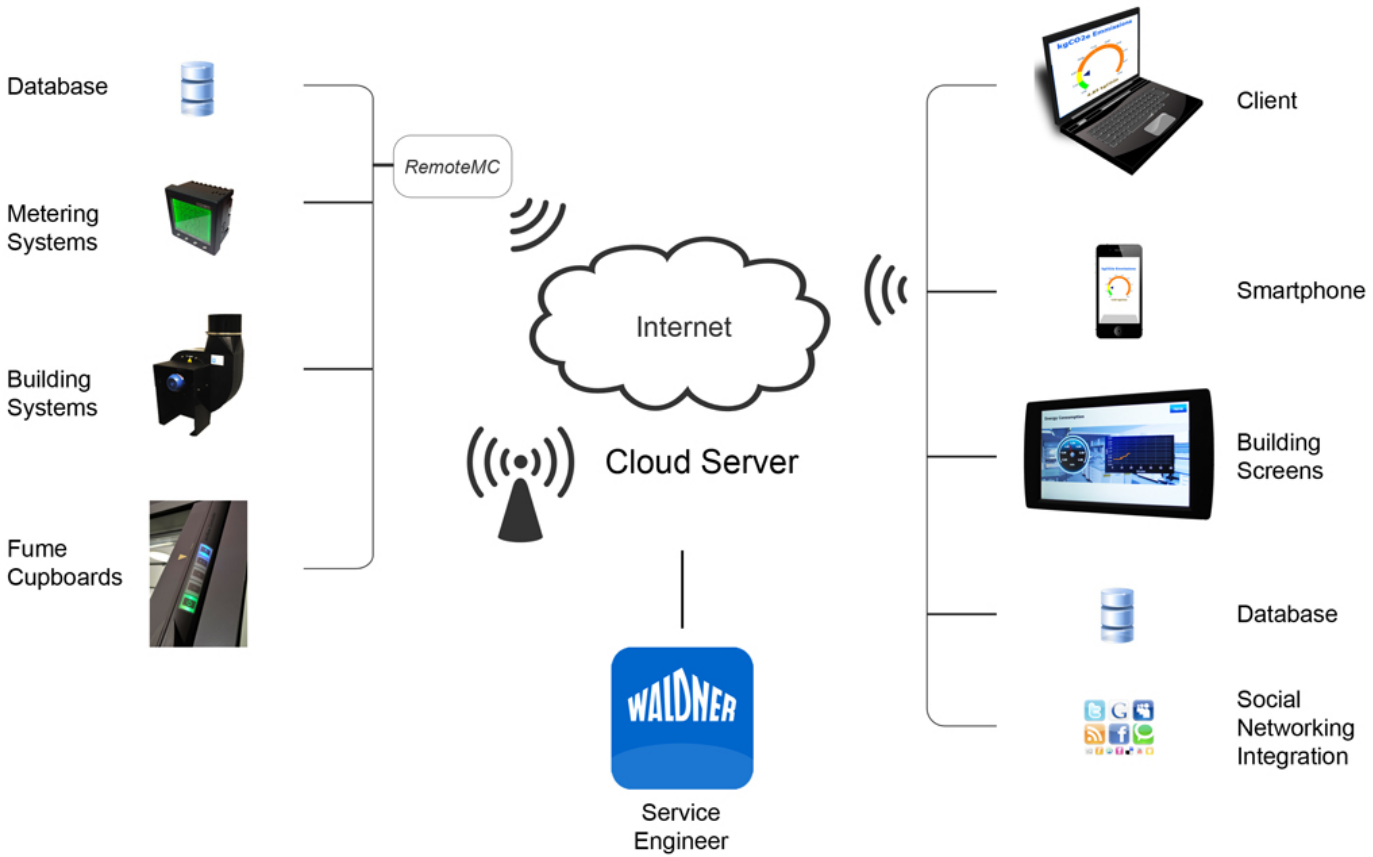


Field-level


Database
Metering Systems
Building Systems
Fume Cupboards


Database
Metering Systems
Building Systems
Fume Cupboards


Client
Smartphone
Building Screens
Database
Social Networking Integration


Database
Metering Systems
Building Systems
Fume Cupboards
RemoteMC
Internet
Cloud Server
WALDNER
Service Engineer
Client
Smartphone
Building Screens
Database
Social Networking Integration

USER INTERFACE

Home | Alarms | Trend Data | kWh / CO2e

Laboratory in: FC - OFF

Extract Fan: 0.30 kW

Supply Fan: 0.00 kW

Chiller: 0.01 kW

Lighting: 0.42 kW

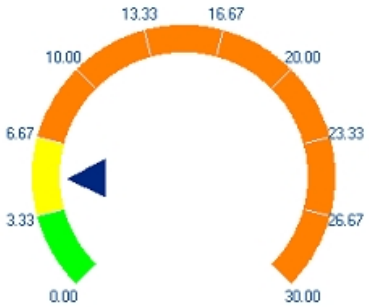
Sockets: 9.90 kW

Controls: 0.30 kW

Diesel Fuel: 162 Litre

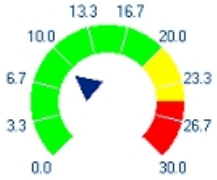
Fuel Emmissions: 432.1 kgCO2e

kgCO2e Emmissions



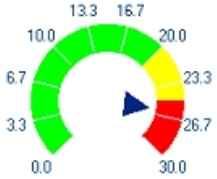
4.85 kgCO2e

Electricity



9.22 kW

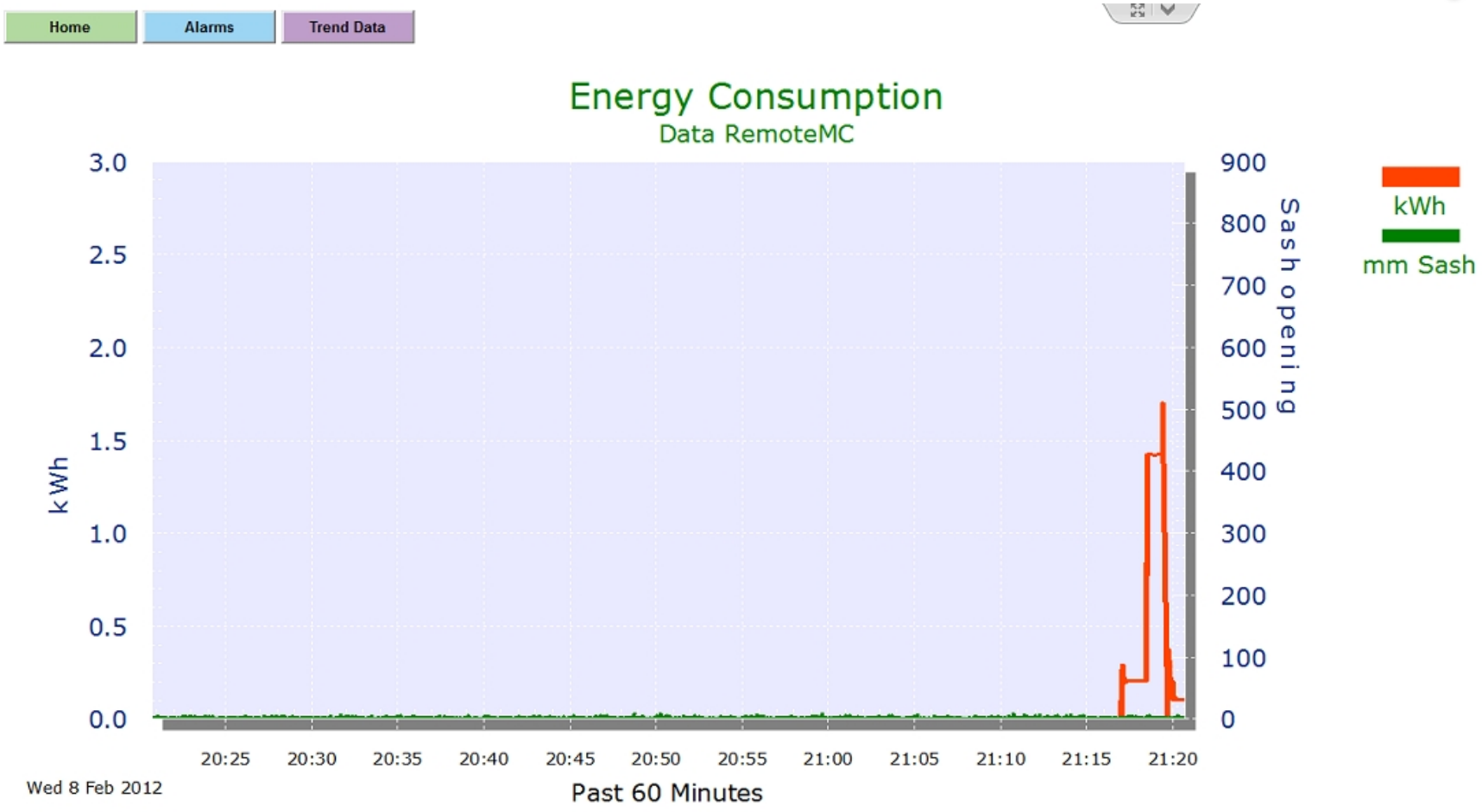
Gas



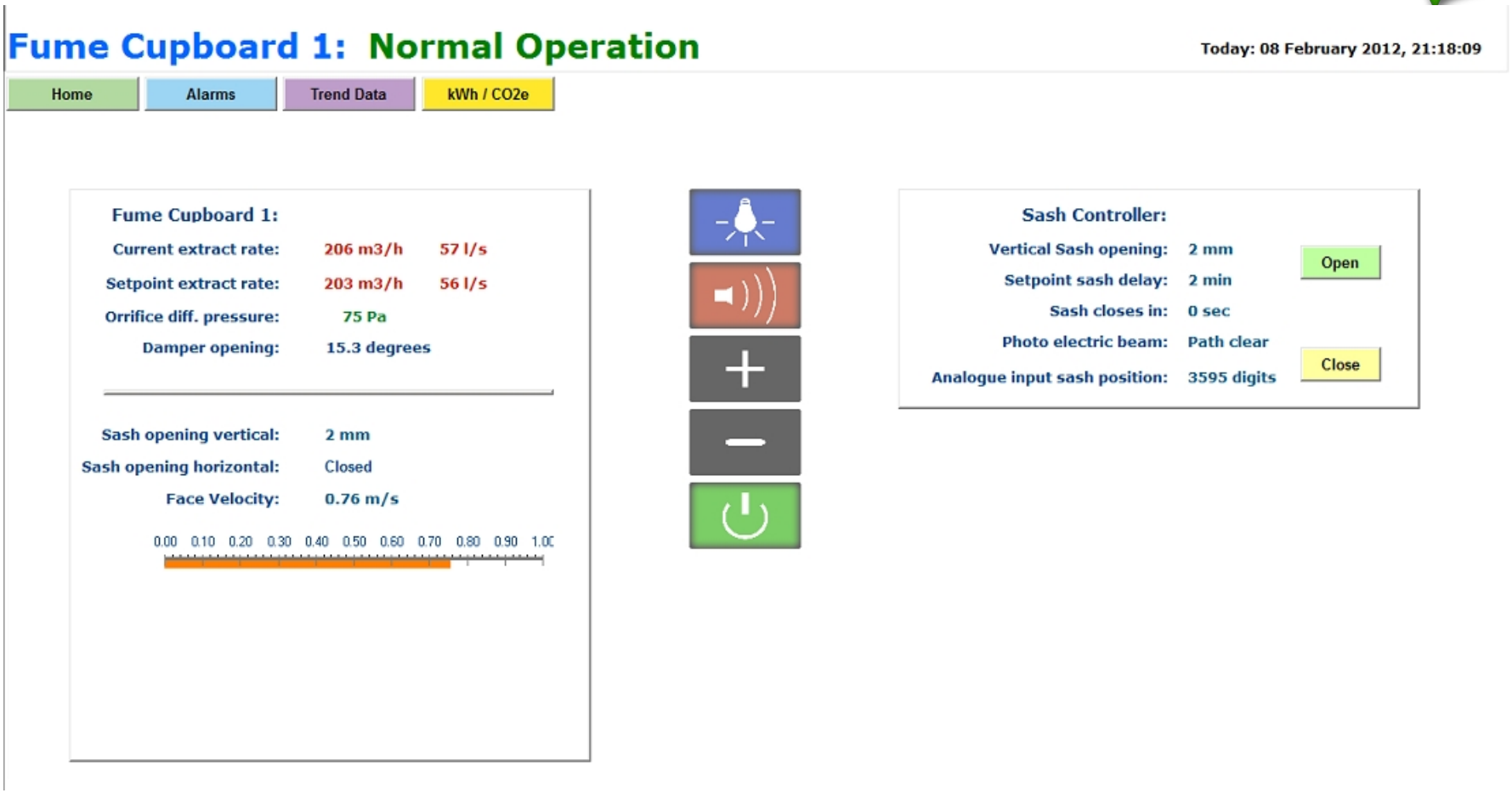
26.00 kW

Water

16.23 m3


Home
Alarms
Trend Data
Energy Consumption
Data RemoteMC
kWh
mm Sash
kWh
Sash opening
3.0
2.5
2.0
1.5
1.0
0.5
0.0
900
800
700
600
500
400
300
200
100
0
20:25
20:30
20:35
20:40
20:45
20:50
20:55
21:00
21:05
21:10
21:15
21:20
Wed 8 Feb 2012
Past 60 Minutes


FC_Timer
HOME
Time: 09:35:26
Daymode
Nightmode
Day Mode
Night Mode
Monday: 08:00 18:00 Active
Tuesday: 08:00 18:00 Active
Wednesday: 08:00 18:00 Active
Thursday: 08:00 18:00 Active
Friday: 08:00 14:30 Active
Saturday: 09:00 13:00 Active
Sunday: 09:00 13:00 Active
Save


Fume Cupboard 1: Normal Operation
Today: 08 February 2012, 21:18:09
Home
Alarms
Trend Data
kWh / CO2e
Fume Cupboard 1:
Current extract rate: 206 m3/h 57 l/s
Setpoint extract rate: 203 m3/h 56 l/s
Orrifice diff. pressure: 75 Pa
Damper opening: 15.3 degrees
Sash opening vertical: 2 mm
Sash opening horizontal: Closed
Face Velocity: 0.76 m/s
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
Sash Controller:
Vertical Sash opening: 2 mm
Setpoint sash delay: 2 min
Sash closes in: 0 sec
Photo electric beam: Path clear
Analogue input sash position: 3595 digits
Open
Close

WALDNER
www.GoToYourFC.com

LabTI - Laboratory Touch Interface V1.0.0
Today: 08 February 2012, 21:20:10

Home | Alarms | Trend Data | kWh / CO2e

Energy Consumption: 2.10 kWh

Energy Consumption is GOOD

Laboratory is:

Zzzzz... Unoccupied

Change Laboratory Status

WALDNER
www.GoToYourFC.com

LabTI - Laboratory Touch Interface V1.0.0
Today: 08 February 2012, 21:15:46

Home | Alarms | Trend Data | kWh / CO2e

Laboratory is:

System OFF

Change Laboratory Status

Energy Consumption: 2.00 kWh

WELL DONE! See you soon!

Thank you for listening!

REFERENCES

1) „Unlocking the Potential of Behavioural Eneregy Efficiency“, Opower, White Paper, Arlington, USA, 2014

2) M Batey, R Bull, M Sepponen, „Living Lab: Successful Engagement on Energy Efficiency Through Participatory Innovation“; IREEN Project, De Montfort University, Leicester

3) „Introducing Behavioural Change Towards Energy Use“; Gurdon Institute; University of Cambridge; Energy and Carbon Reduction Project, September 2012

4) Pulse energy; „Motivators and Barriers: Helping Commercial Customers become more energy efficient“; January 24, 2014