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# 1. Document Details

## 1.1 Approvals

| | FUNCTIONAL AREA | REQUIRED APPROVER | DATE |
|---|---|---|---|
| JPL ENGINEERING LTD | Author / Originator | Print Name | 09-02-2015 |
| | | Sign Name | |
| | Engineering | Print Name | |
| | | Sign Name | |
| | N/A | Print Name | |
| | | Sign Name | |
| | N/A | Print Name | |
| | | Sign Name | |

**Table 1: Approvals**

## 1.2 Revision History

| REV | RATIONALE FOR REVISION | REV DATE |
|---|---|---|
| 1.0 | Control Philosophy | 09-02-2015 |
| | | |

**Table 2: Revision History**

## 1.3 Document Overview

This is an explanatory document to describe the KNX/Dali control philosophy for lighting controls and Emergency light monitoring.

## 1.4 Related Documents

All documentation related to this project is contained in table 3 below:

| DOC. NO | DOCUMENT TITLE | AUTHOR | REV |
|---|---|---|---|
| | | | |

**Table 3: Related Documentation**

# 2. Lighting Control System

The lighting control system is of the European KNX open protocol standard with Digital Addressable Lighting Interface (DALI).

It is proposed that the Lighting control system should be commissioned to apply a standard control philosophy to each of the working spaces provided for in the building.

1. Open Plan Office Areas
2. Non Office space (i.e. IT Store or Server room)
3. Office Space
4. Corridors and Circulations
5. Mechanical/Electrical Plant rooms.

## 2.1 Lighting Levels & PIR Time Outs

For office work, lighting levels to be maintained between 300-500 lux at the working plane.

| Type | Description | PIR Timeout (Minimum) | Lighting Levels (Maintained) |
|---|---|---|---|
| 1 | Open Plan Office Areas | 20 minutes | 300-500 lux (Office work) |
| 3 | Non Office space | 10 minutes | 300-500 lux |
| 4 | Office Space | 20 minutes | 300-500 lux (Office work) |
| 5 | Corridors | 20 minutes | 100 lux |

# 3. Control Philosophy

## 3.1 Open Plan Office Areas

The open plan area spaces will employ an Automatic (A) control philosophy using presence detection combined with CLC (Constant Light Control) for the perimeter lighting installed next to the windows.

If these spaces are occupied after hours, the notional corridors logic will be employed.

## 3.2 Meeting Rooms

Where these meeting spaces are positioned around the glazed perimeter of the building they will take advantage of CLC (Constant Light Control) and will have a Semi-Automated philosophy applied (SA).

The dimming override will disable the CLC function in the room.
If these spaces are occupied after hours, the notional corridors logic will be employed.

Installed in each office area is a two-way rocker with center off type switch and is operated as follows.

| Switch Operation | Action |
|---|---|
| Short press to the top of the switch | Triggers the lighting into CLC mode |
| Short press to the bottom of the switch | Switches the lighting off |
| No presence detected by PIR | Switches the lighting off |
| Press and hold the top of the switch | Raises lighting to the desired level – CLC disabled |
| Press and hold the bottom of the switch | Lowers lighting to the desired level – CLC disabled |

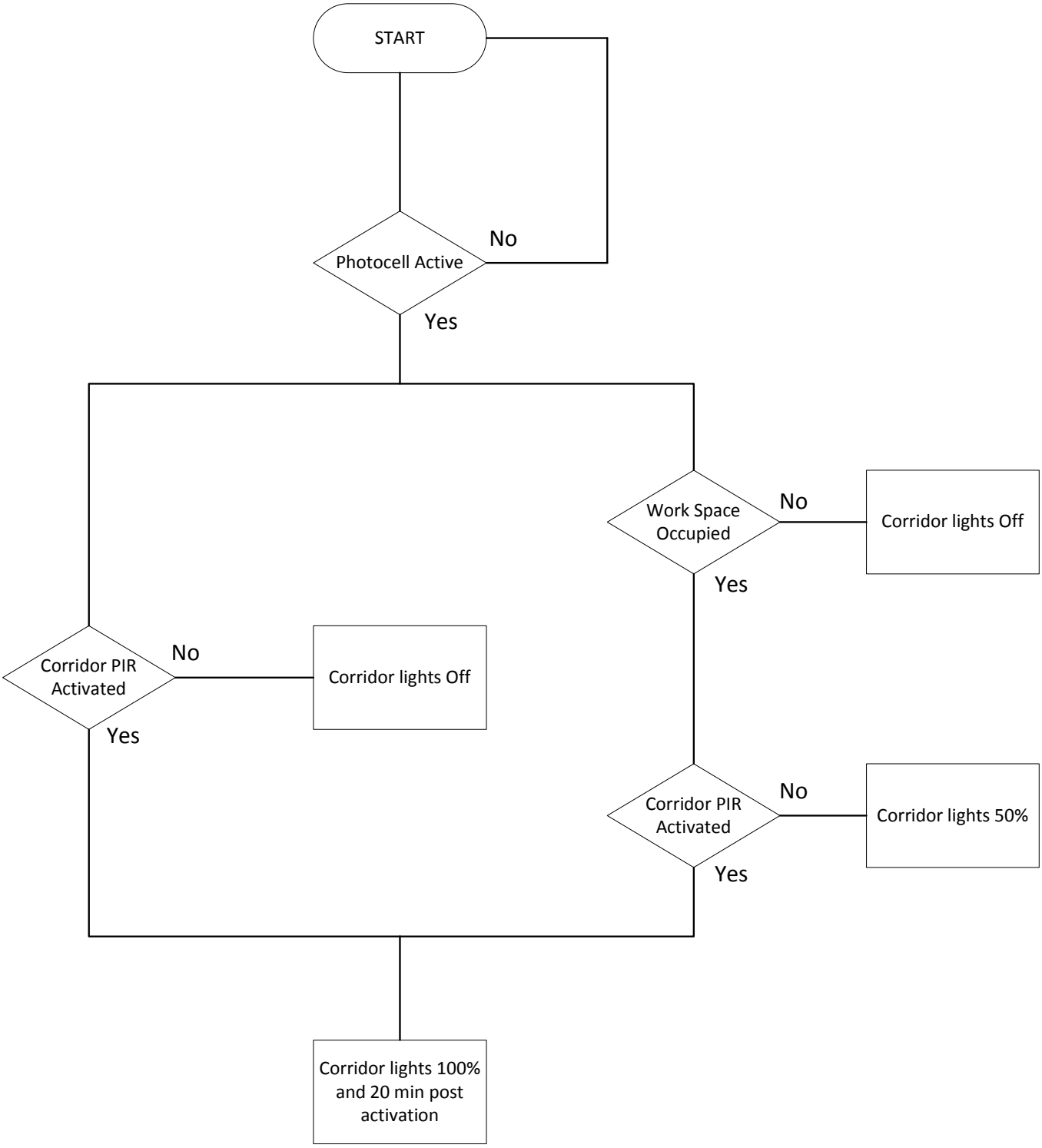
## 3.3 Non Office Space

Non Office space (i.e. Store or server room) will employ a BSP (Basic Switching Process) whereby when a person enters these rooms a switch must be activated to turn on/off the lighting in that area.

## 3.4 Notional Corridor Logic.

If any of the following working spaces are occupied during the hours of darkness: ***Open plan areas***, or ***Office Spaces*** the corridors on that level will remain at 50%. If the PIR in these corridors are activated, the corridor lighting will rise to 100%. (See Process Flow Diagram section 3).

# 4. Corridor Logic



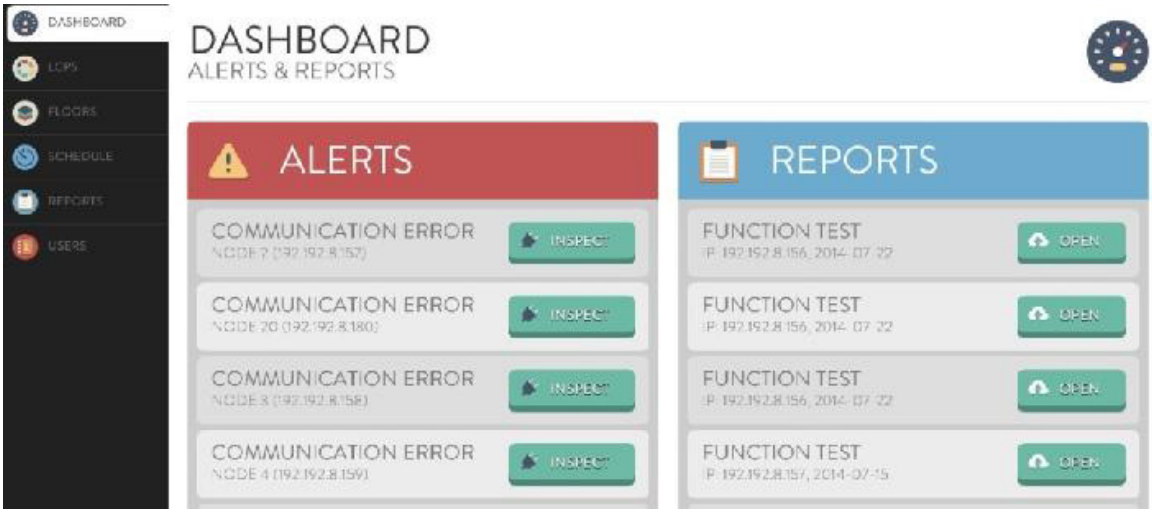
# 5. Emergency Lighting (Monitoring)

## 5.1 Emergency Lighting Front End

It is proposed that all of the emergency lighting (DALI) could be monitored using the front end PC supplied as part the system.
The DALI protocol allows for status monitoring specifically for emergency fittings compatible with a Dali system.

Each Emergency light shall be identified and shown its location relative to the layout drawings of each floor and perform automatic Function and duration tests as per schedule by the facility managers.
In turn each connected DALI emergency light shall report its current status regarding:

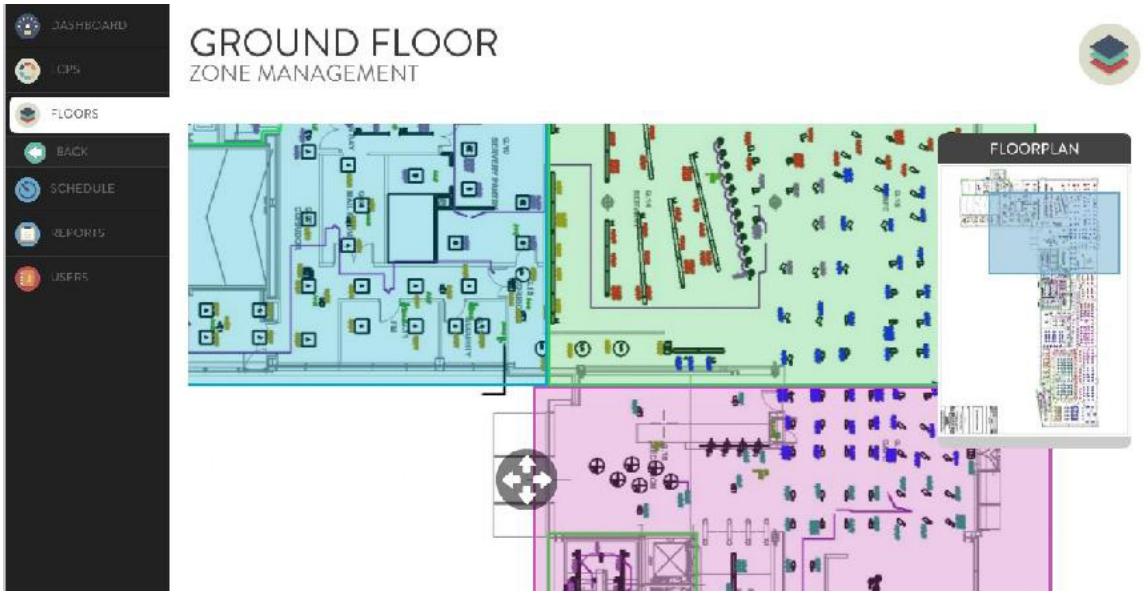
- Lamp Failure
- Battery life
- Hours (operation)
- Test status (Pass/Fail)





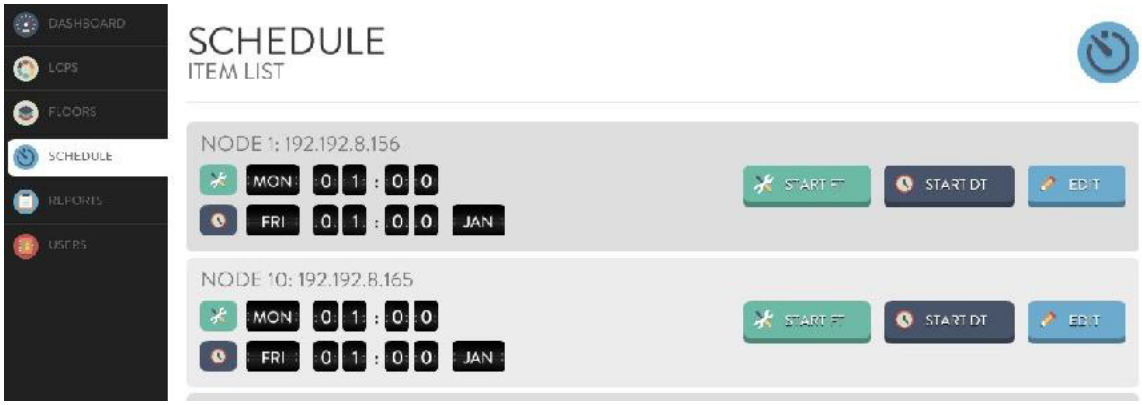
Selecting ***VIEW FLOOR*** gives the user a floor overview which is broken down into a number of zones. A radar window is visible to see where you are currently viewing that floor and by dragging the cursor by left clicking the mouse you can move around the floor. As soon as you start moving around the floor the cursor changes into a different icon with 4 arrows in each direction. Selecting that light creates a pop-up window up that gives the current values of that light.

## 5.2 Emergency Light Zones



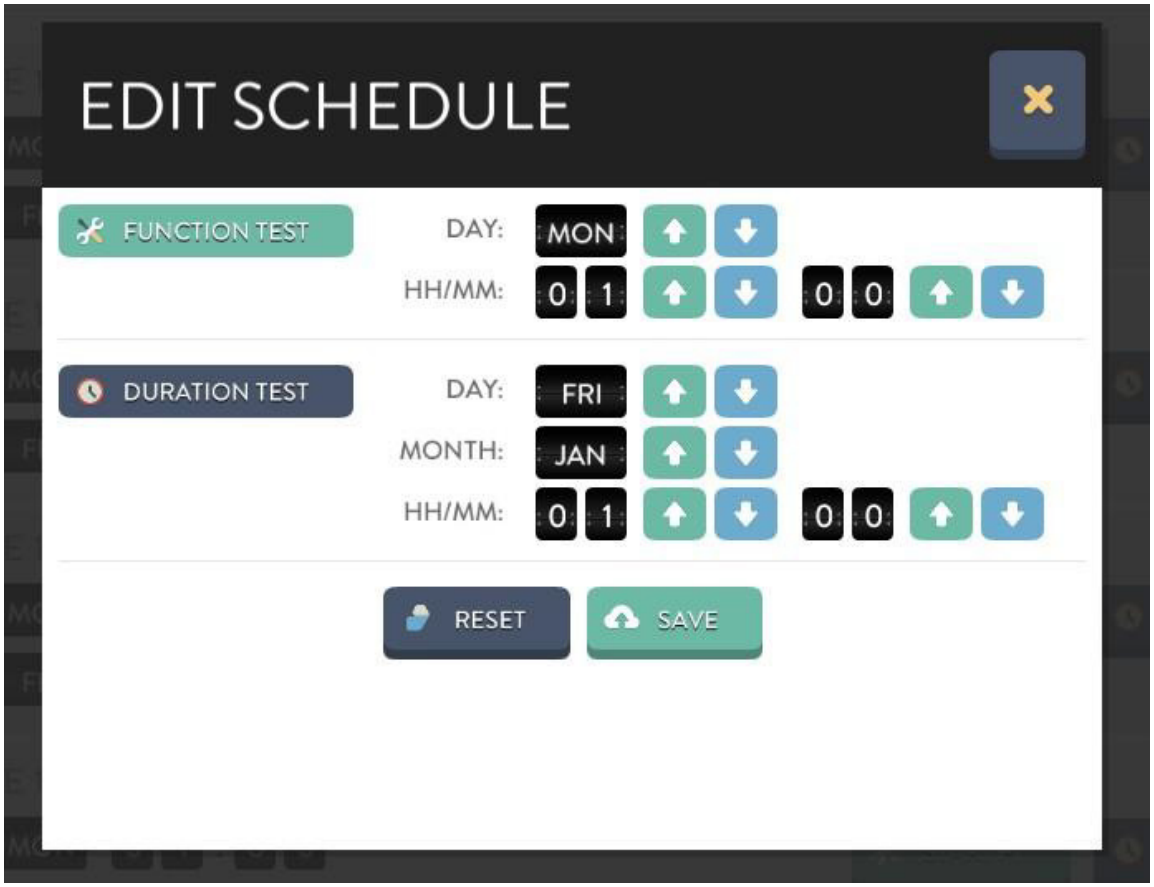

Once moving to the selected part of the building the user can select the zone. That zone will then be shown where the emergency lights are visible. Again by simply clicking and moving the user can move round that zone to find the required light.

## 5.3 Schedules (Emergency Light Tests)




Each Lighting Control Panel has its own unique schedule for performing function and duration tests. On selecting the menu all LCPs are listed including the values that have been pre-set.

The top time of each LCP is the Monthly Function test. This is performed on the first “DAY selected” of every month. E.g. in the example below Monday at 1am. Pressing the Start FT or Start DT will start the respective test for that LCP as a manual test. To perform individual tests return back to the floor and zone and start an individual light to go into test. The next report generated after the next scheduled test time will log the results. The Edit button allows the user with sufficient privileges to edit the time of the test.

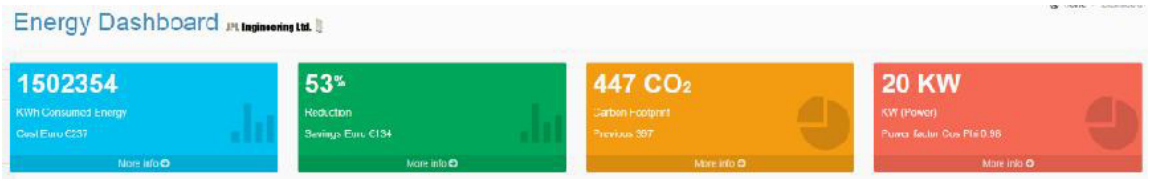


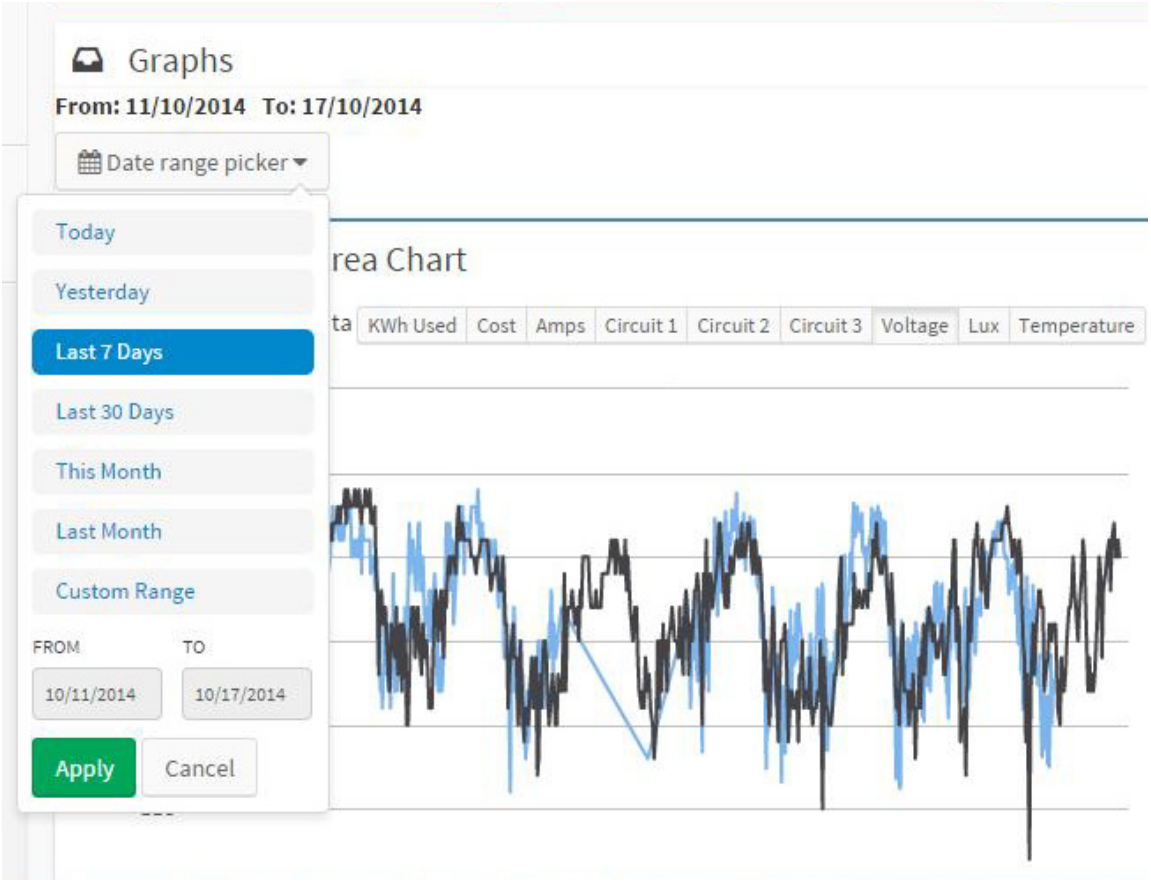
# 6. Energy Monitoring System Description (Optional)

The Energy Monitoring System shall be installed with an intuitive web based interface for each and shall be accessible via PC, Tablet or smart phone.
The system will collect and verify the lighting energy based an analysis of usage.
This will allow an opportunity to further optimise the lighting control to potentially increase efficiency in the lighting system.

Each user shall be granted access to view the energy consumption via intelligent web application that will show the following metrics.

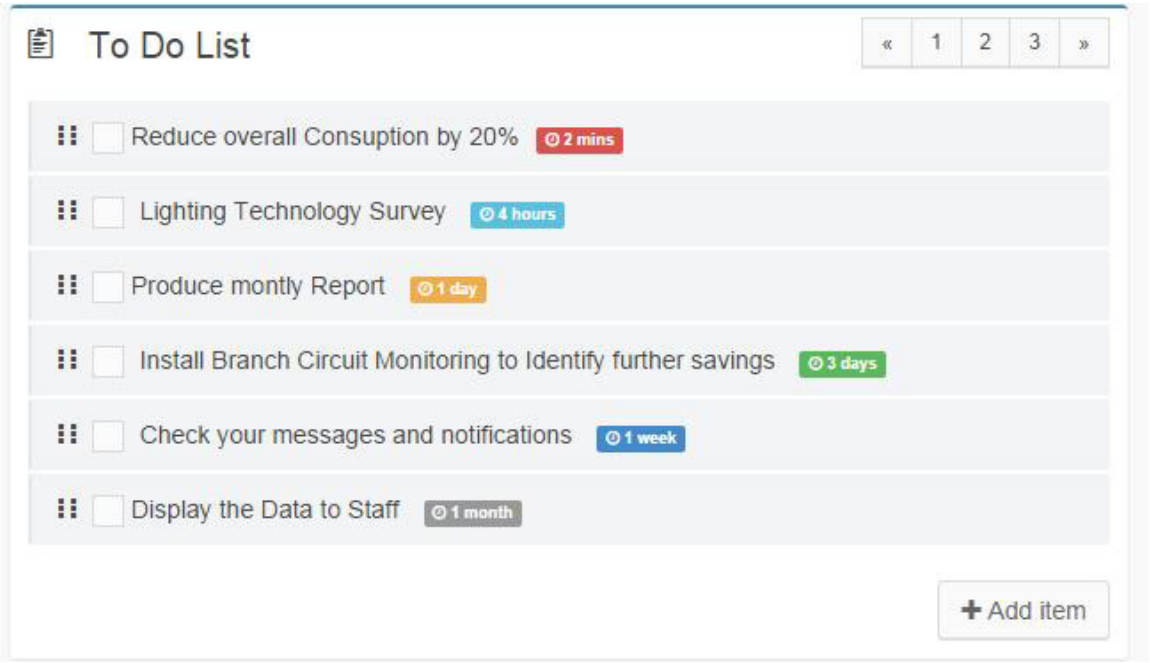
- Cost present value and % value increase/decrease from previous month
- Kwh
- CO2 present value and % value increase/decrease from previous month
- KW Value.
- Power Factor.



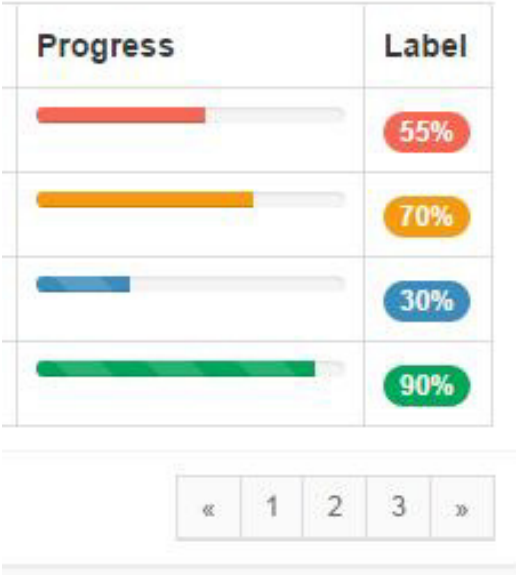



## 6.1 Target Setting and Performance Indicators

Within the Energy Dashboard is a target setting application and performance indicator. This can be used to track energy saving tasks that may be assigned to a team member or simply to inform a user that the predicted energy consumption is on/off target.

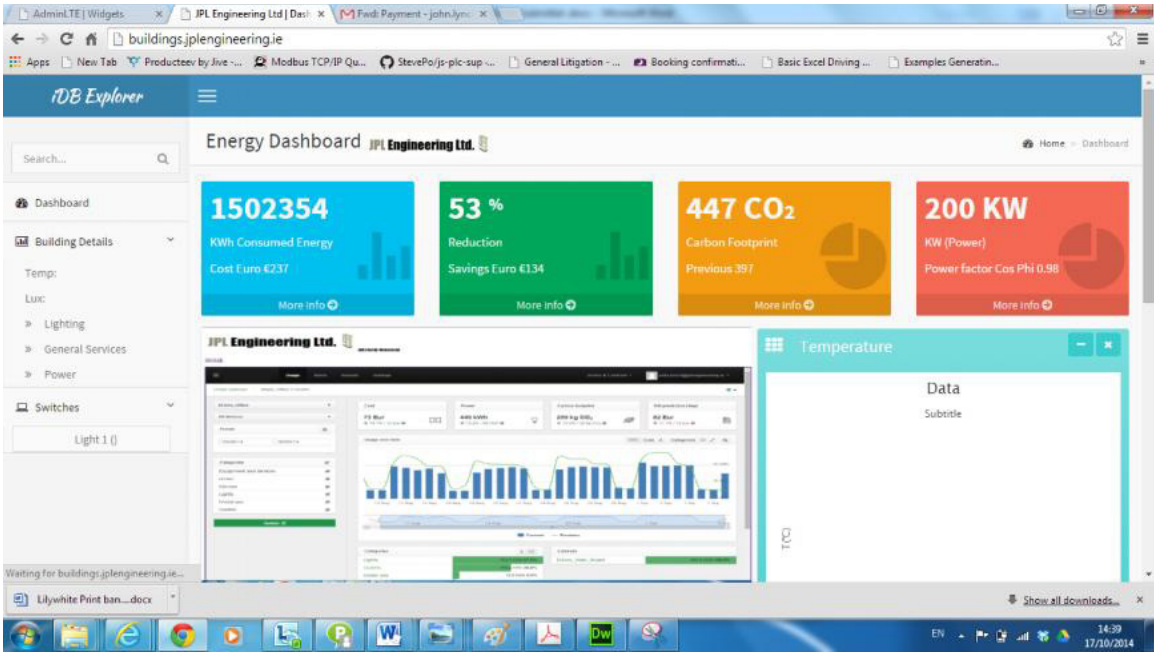



All the tasks can be linked to the real data being collected and progress can be displayed on the Energy dash board.

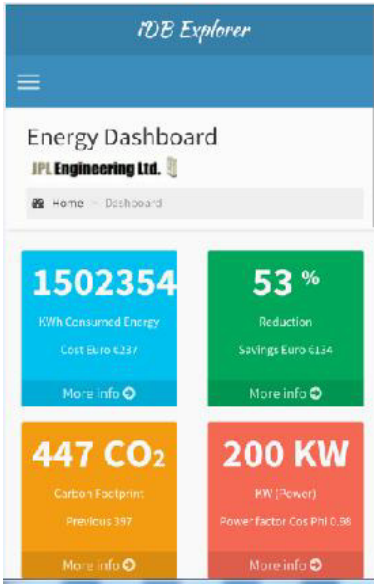


## 6.2 Screen Shots

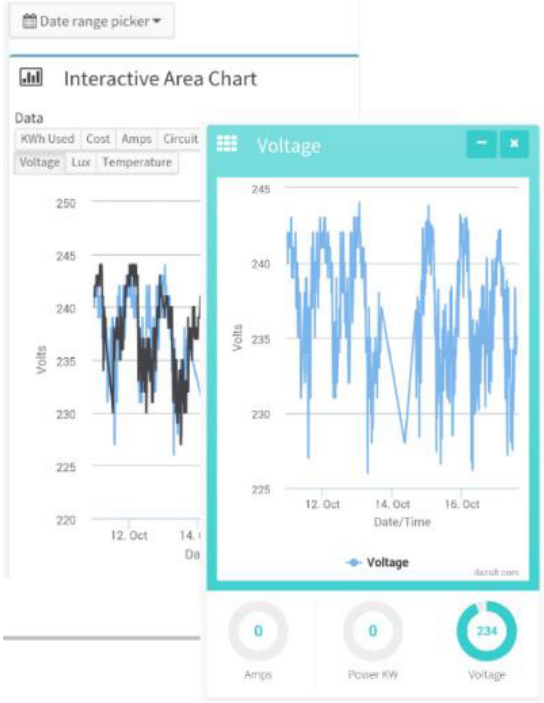
## Screen for PC




## Screen Shots For Smart Phone







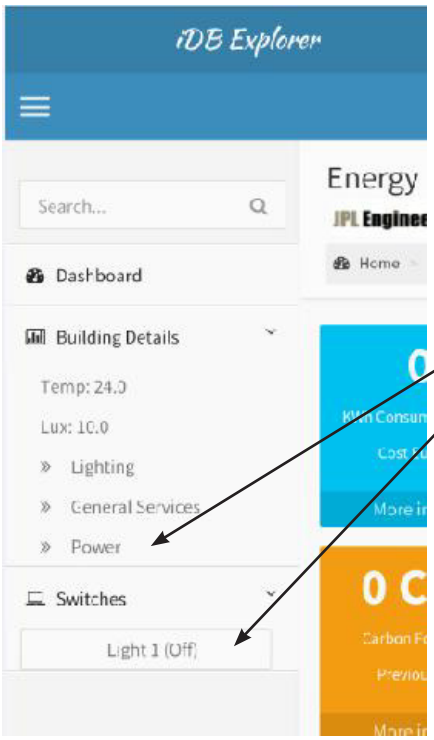
## 6.3 Reporting

Each of the areas will be capable of automatically producing reports by selecting the appropriate dates.
A report will be produced based just on the data for that particular area.

## 6.4 Additional Functionality:

In areas where greater granularity is required to more accurately view how energy is being used it is possible to install branch circuit monitoring (not included with Q1031). This will allow a user have more transparency as to where potential savings can be gained. By adjusting behavior's that will display an immediate visual and measured result on the system.

Integration into the BMS system where temperature, brightness values can be used to further evaluate usage.
Water, fuel and mission critical monitoring of IT rooms and switchgear can be incorporated into the facilities management tool.




Changing of set point temperature or switching of loads is possible using this technology