

Procuring Better Building Performance

Keynsham Civic Centre Case Study

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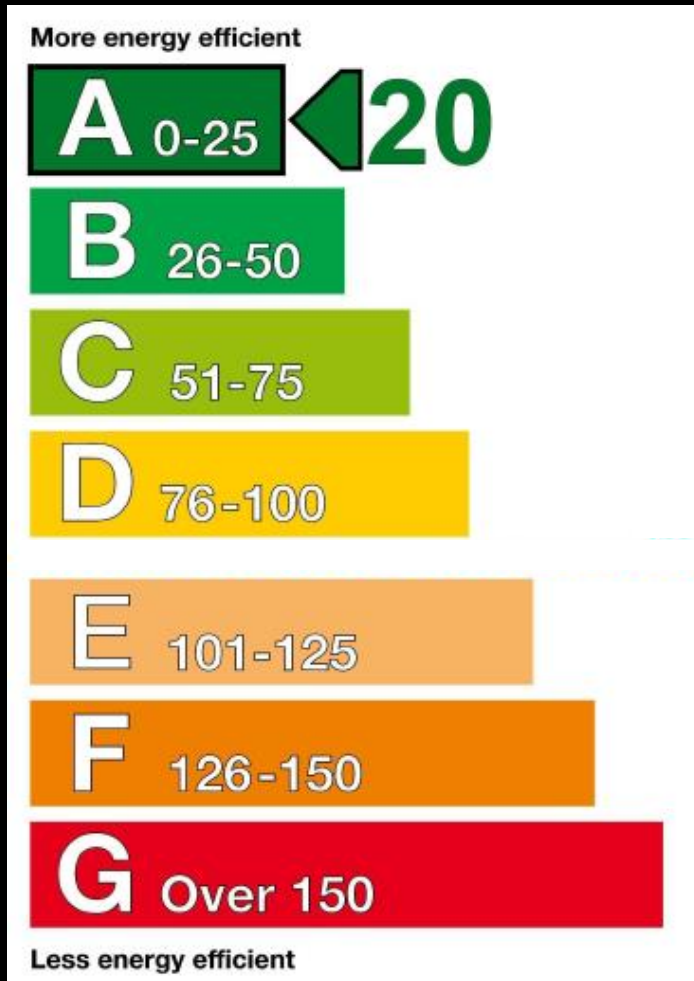
THE CLIENT'S BRIEF:

*Ultimately, the success of the building will be judged on its **operational energy use** and resultant carbon emissions. Therefore, the current aspiration is that the development should achieve a **DEC rating of A** by the end of the **second** full year of operation.*

OUR APPROACH

- Low energy design – the easy bit!
- Energy budget
- Energy risk management
- Use lessons learnt from past projects
- Manage Value Engineering
- Embed in contract
- Aftercare programme – monitoring & verification
- Lessons learnt again....

ACHIEVING DEC A

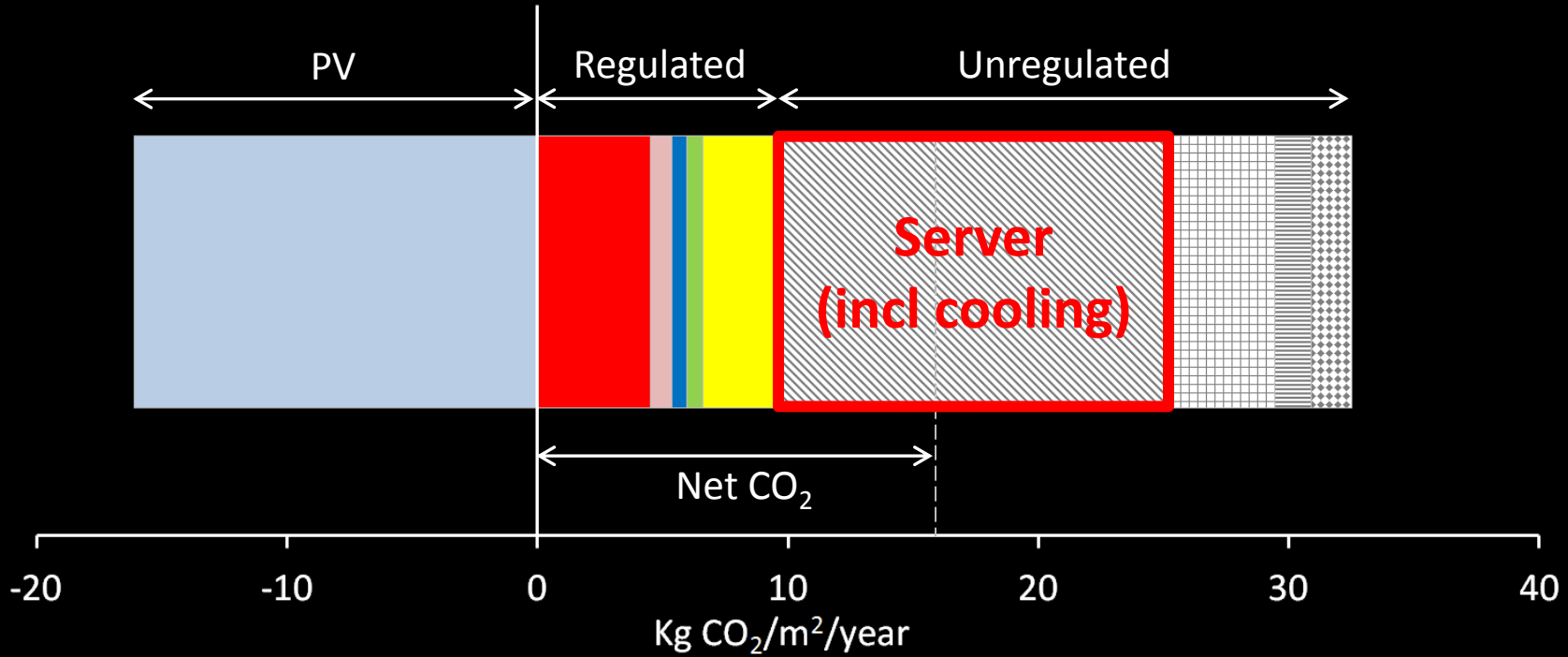


LOW ENERGY DESIGN (the easy bit!)



ACTUAL OPERATIONAL ENERGY

ENERGY BUDGET



- Heating
- Hot water
- Refrigeration and heat rejection
- Pumps
- Lighting
- Server (inc cooling)
- Small power (inc ICT)
- Catering and vending
- Other
- PV

ENERGY RISK MANAGEMENT



ENERGY RISK REGISTER

Risk factor	Description	Mitigation measures:				
		Briefing	Design	Construction & commissioning	Handover	Operation
Procurement route	Risk of shifting emphasis away from the energy target. Procurement method affects degree of risk.Design and Build is higher risk.	Client to note implications of procurement options on energy target.]	a. Design Team (DT) to ensure energy performance requirements are written robustly into ERs. b. ERs to require contractor to demonstrate compliance with energy parameters.	Contractor to demonstrate clearly that chosen equipment meets the energy parameters of spec.		
Value engineering	Financial pressures may lead to changes in specified equipment or strategy that can compromise the overall energy strategy.		a. Highlight what performance parameters must be adhered to. b. Identify aspects of the design critical to energy performance. State in ER to be protected from VE.	Contractor to demonstrate alternative solutions meet the energy performance requirements.		
User behaviour	The way the building is used has a large impact on its energy performance. Clear explanations and feedback are critical to motivating change. Understand expectations - align aspirations.	a. Arrange workshop to collate previous experience, eg from Lewis House. b. Client to identify Change Champions.	a. Building User Guide to be developed, with feedback from Change Champions. b. Mechanisms for energy monitoring and feedback to be provided. c. Feedback strategy to be developed in association with Change Champions.		Occupant briefing sessions to be led by Change Champions (see detail below).	Feedback strategy to be implemented by Change Champions.
Occupancy	Increased occupant density and/or occupied hours leads to increased energy use (and reduced comfort).		Agree design parameters, quantify and highlight consequences of exceeding these.			Monitor and record occupancy in relation to energy performance and DEC rating.
Usability and Controls	Systems and controls must be tailored to suit users.The FM team need to understand the design intent to operate the building effectively. Risk that the FM team and building users may not understand how the building works (BMS and local controls).		a. Design controls interfaces for usability and simplicity. b. Involve FM and users in design and review. c. Conduct design reviews from operational perspective on key items with FM. d. Develop building log book.	a. Involve Facilities Manager in development of interface and commissioning.	a. Provide Building Log Book and brief FM team on design intent. b. Develop online user guide. c. Provide adequate training for FM staff.	Provide follow-up training later in the first year.
Commissioning	Poor commissioning can lead to substantial problems with the operation of the building. A particular risk is the compression of the commissioning period at the end of the contract.		a. Design simple systems to reduce commissioning. b. Prepare commissioning plan. c. Include commission engineer at design stage to review design (write into ERs).	a. Protect the commissioning period within the build programme. b. Commissioning engineer to report to client / main contractor c. Do not grant PC without commissioning fully complete.		Carry out seasonal commissioning once building is operational.
Controls optimisation	To achieve optimum building performance, it is essential to fine-tune the controls.		a. Contract to require controls engineer to remain engaged during first year of operation to fine-tune controls under guidance from M&E consultant. b. Discuss remote BMS link with IT manager to identify and resolve barriers.	a. Contractor to demonstrate strategy for fine-tuning controls. b. Ensure remote link to BMS is set up.	FM to set up appropriate plant operation schedules.	a. Controls engineer to fine-tune controls over first year under guidance from M&E consultant. b. FM to keep a log of controls issues to support diagnosis. c. FM to review operating schedules and update as required.

LIGHTING



RISK

INADEQUATE CONTROLS INSTALLATION AND/OR COMMISSIONING

USERS DON'T UNDERSTAND CONTROLS OR FIND INCONVENIENT

USE OUTSIDE CORE HOURS NOT ALLOWED FOR, EG FOR CLEANERS

MITIGATION

SIMPLIFY CONTROL STRATEGY

ENGAGE WITH USERS DURING DESIGN

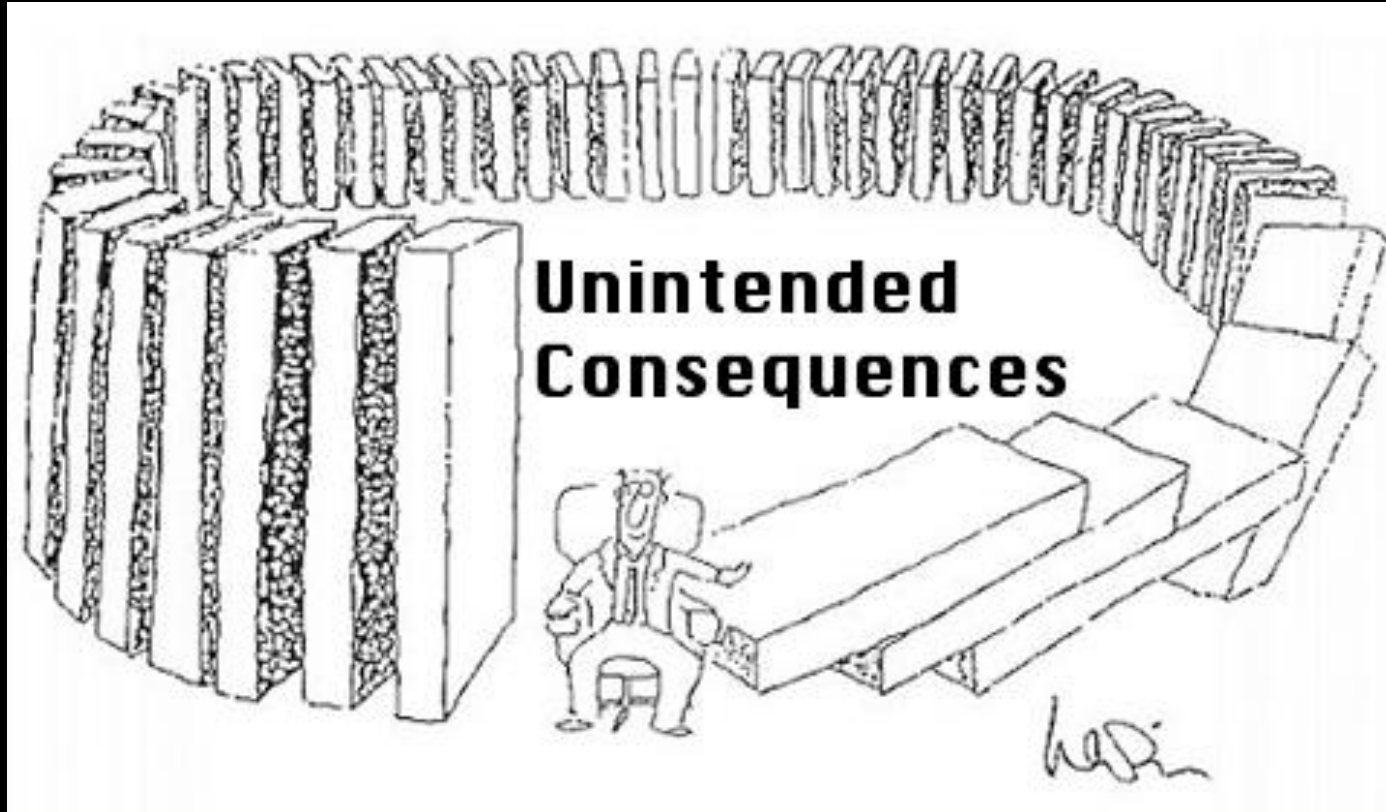
CALCS TO CONSIDER OUT-OF-HOURS USE

MONITOR COMMISSIONING

REVIEW PERFORMANCE POST OCCUPANCY AND FINE-TUNE

MANAGE VALUE ENGINEERING

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REFINE THE ENERGY BUDGET

Evaluating operational energy performance of buildings at the design stage



TM54: 2013



CIBSE TM 54

Agree operating conditions which achieve the energy budget

= Energy Baseline

Understand that reality will be different!

EMBEDDING THE ENERGY BUDGET IN THE CONTRACT

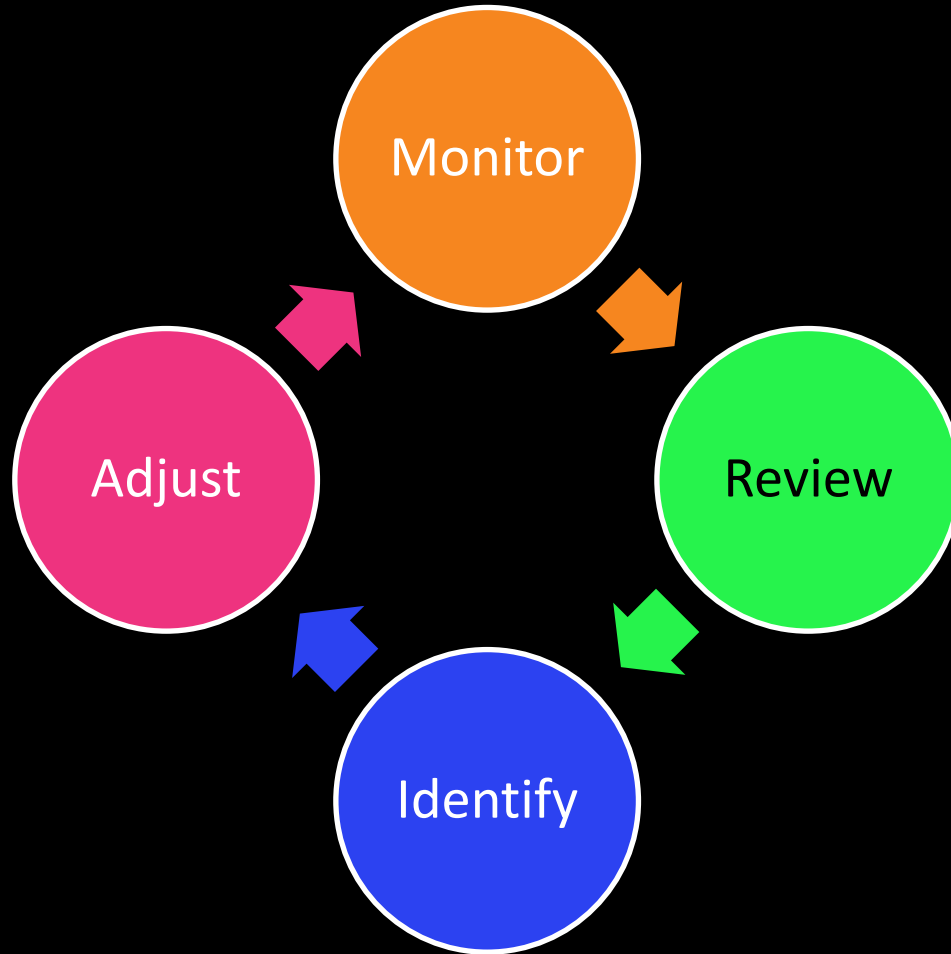
Assumptions:



ENERGY BUDGET IN CONTRACT

Control of Contractor	Assumptions Outside Control of Contractor	Annual Energy & Carbon Budget
<p>Working as per design</p> <p>Specified lux levels:</p> <p>2.6W/m²</p> <p>2.1W/m²</p> <p>1.5 W/m²</p> <p>Max 2.5W/m²</p> <p>Max 4.0W/m²</p> <p>lux – 6.0W/m²</p>	<p>Manually operated lights.</p> <p>Actual Load to achieve:</p> <p>On desks 500lux – Max 7.0W/m²</p> <p>Hours of Operation:</p> <p>Average daylight factor in main office spaces = 2.5%.</p> <p>Lighting on for an average of 40% of the working day (9am-6pm) = 900 Hrs /yr.</p>	<p><u>Energy Consumed</u></p> <p>31,640 kWh</p> <p><u>Carbon emissions</u></p> <p>(kgCO₂ kgCO₂/m²)</p> <p>16,360 2.6</p>

AFTERCARE: MONITORING & VERIFICATION



AFTERCARE: MONITORING & VERIFICATION

Bath & North East
Somerset Council

energylogix™

Dashboard

Sites

Energy Costs

Meters

Alarms

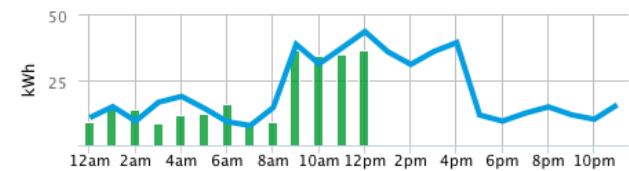
Reports

Keynsham Town Hall

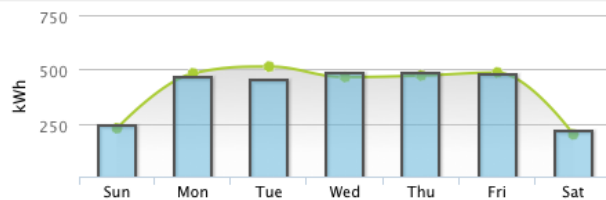
System Total Today

Total Cost:	£ 26.70
Electricity Consumed:	267.03 kWh
CO ₂ Emitted:	144.19 kgCO ₂

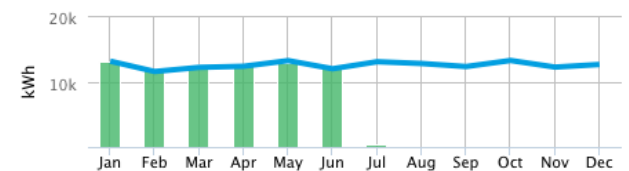
Daily



Weekly



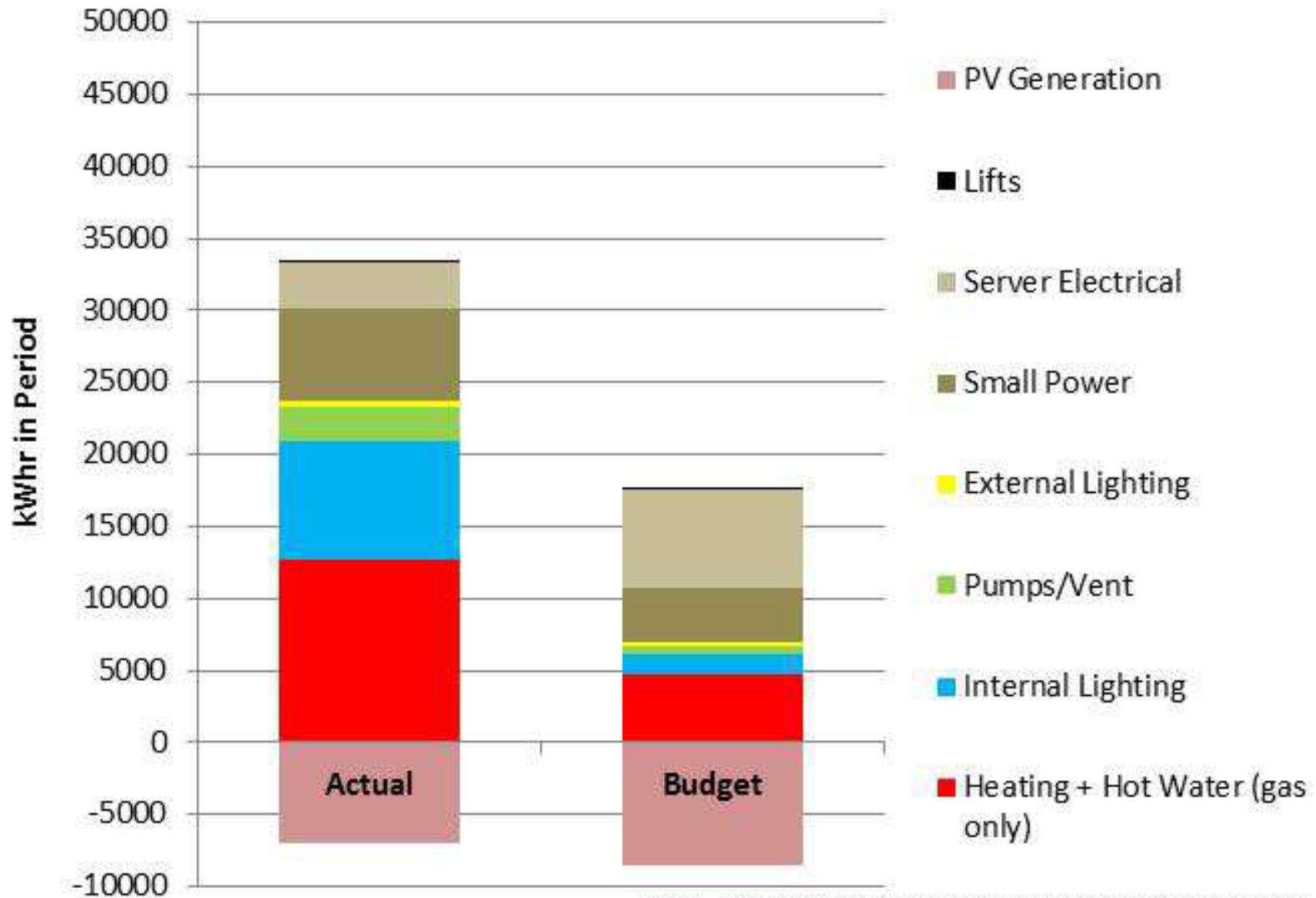
Annual



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Keynsham Offices - Energy Budget/DEC

23rd Feb-5th March 2015



Note - heat pump & chiller usage excluded (not operational)

LESSONS LEARNT FROM KEYNSHAM

- **The value of the independent commissioning manager**
- **The importance of selecting the right M&E contractor**
 - **The client team must evaluate the M&E tender**
 - **Tender must enable evaluation on quality, not just price. Clear quality criteria must be set.**
 - **M&E priced on design, not an allowance**

THANK YOU

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13th April 2016

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