

## Lecture: Future Systems: Services

Advanced Technology  
 Module Leader: Ilona Hay  
 Module Coordinator: Kenny Fitzmaurice  
 Technology Champion: Brian Murphy

Lecturer: Brian Murphy

Created: 22nd February 2019  
 Updated: 18th March 2019  
 Presented: Not

## Lecture: Future Systems: Services

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Created: 22nd February 20219  
 Updated: 21st November 2019  
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## Quotes for the Day

- **Insulation Insulation Insulation:**
  - Fabric First, Eco Bling last (Renewable Energy)
- **Future Proofing**
  - Enable additions of (RE) Technology later
- **Airtightness:**
  - Build Tight (Services Penetrations), Ventilate Right (MVHR)
  - No insulation, without ventilation (PAS 2035)

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## &gt;40 years into 1 Hour won't go

- So I am providing links to other information if you want to know more
- Question Everything
  - Use what you know, join up your thinking, keep learning and refining what you know
- Don't assume that I know everything
  - (I know a lot but not everything)
- Don't assume I have cherry picked the best bits
  - (new stuff keeps appearing)
- Don't assume what your being told is the whole story
  - Some will hide what they don't want you to know
  - And tell greenwash poricles
- Do your best with what you know
- When you know better
- Do better

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## This Presentation on GBE:

- Find this file on GBE website at:
- <https://GreenBuildingEncyclopaedia.uk/?P=17699>
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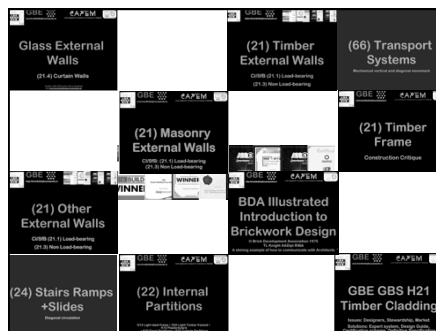
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UoH Part 1 Year 2 Schedule		GBE	
Green Building Encyclopaedia		<a href="https://greenbuildingencyclopaedia.uk/?P=17699">https://greenbuildingencyclopaedia.uk/?P=17699</a>	
1	Introduction to Green Building	1	Introduction to Green Building
2	Green Building Principles	2	Green Building Principles
3	Green Building Design	3	Green Building Design
4	Green Building Construction	4	Green Building Construction
5	Green Building Operation	5	Green Building Operation
6	Green Building Maintenance	6	Green Building Maintenance
7	Green Building Decommissioning	7	Green Building Decommissioning
8	Green Building Certification	8	Green Building Certification
9	Green Building Innovation	9	Green Building Innovation
10	Green Building Research	10	Green Building Research
11	Green Building Education	11	Green Building Education
12	Green Building Policy	12	Green Building Policy
13	Green Building Standards	13	Green Building Standards
14	Green Building Codes	14	Green Building Codes
15	Green Building Regulations	15	Green Building Regulations
16	Green Building Guidelines	16	Green Building Guidelines
17	Green Building Best Practice	17	Green Building Best Practice
18	Green Building Case Studies	18	Green Building Case Studies
19	Green Building Examples	19	Green Building Examples
20	Green Building Inspiration	20	Green Building Inspiration

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## Today's Lecture

- Future Systems: M&E Services



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## "Future Systems: Services"

- Human Intervention v Passive, Active, Mechanical/Official
- Ownership of Controls
- Water saving plumbing and sanitaryware
- RWV Rainwater Harvesting & Reusing
- Pressurised Irrigation Efficiency
- WWHR Waste Water Heat Recovery
- WWHR Waste Water Heat Recovery
- Wired v Wireless v Smart
- IoT Internet of Things
- Internet of Tanks
- ERS Electro-magnetic Radiation Screening
- BLU Blue Living Roads
- GLW Green Living Walls
- SMHR Smart Metering Remote Reading/Control
- WHC Whole House Controls
- IMC In-situ Monitoring Controls
- SEPOBE Smart Electrical Power Lighting
- Comm Security and Entertainment
- OWA Controls With Altitude
- SPHQA Smart Phone Home Control App
- BI Smart Inventory
- Decarbonising the energy mix v Halving Demand, Doubling Efficiency, halving the carbon, getting pupils to run building
- RE Renewable Energy
- WT Wind Turbines
- VAWT HAWT Vertical and Horizontal Axis Wind Turbines
- ST Solar Thermal
- PV Photo Voltaic
- PVT Photo Voltaic Thermal
- BIRE Building Integrated Renewable Energy or not Integrated
- BHW Solar Hot Water Cylinders
- Ground/Air/Heat Source Heat Pumps (GBHP ASHP WSWP)
- BWHR BIPASB Mechanical Ventilation with Heat Recovery, Summer Bypass and Boost Button
- SLK Smart Lift/Escalators
- Centralised Vacuum Cleaning

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**Human intervention v Passive,  
Active, Mechanical/Artificial**

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**Ownership of Controls**

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**Water saving plumbing and  
sanitaryware**

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**RWH Rainwater Harvesting &  
Reusing**

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**Pressurised Irrigation Efficiency v  
Gravity Inconsistency Inefficiency**

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**WWHR Waste Water Heat Recovery**

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**Wired v Wireless v Smart**

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**IoT Internet of Things**

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**Internet of Tanks**

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**ERS Electro-magnetic Radiation  
Screening**

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**BLR Blue Living Roofs**

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**GLW Green Living Walls**

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**SMRR/C Smart Metering Remote  
Reading/Control**

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**WHC Whole House Controls**

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**MMC Monitoring Metering Controls**

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**SEPCSE Smart Electrical Power  
Lighting Comms Security and  
Entertainment**

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**CWA Controls With Attitude**

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**SPHCA Smart Phone Home Control  
App**

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### SI Smart Ironmongery

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### Decarbonising the energy mix

- **✓ Halving Demand,**
- **Doubling Efficiency,**
- **halving the carbon,**
- **getting pupils to run building**

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### RE Renewable Energy

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### WT Wind Turbines

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### VAWT HAWT Vertical and Horizontal Axis Wind Turbines

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### ST Solar Thermal

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### PV Photo Voltaic

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### PVT Photo Voltaic Thermal

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### BIRE Building Integrated Renewable Energy or not integrated

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## SHWC Solar Hot Water Cylinders

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## Ground/Air/Water Source Heat Pumps (GSHP ASHP WSHP)

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## MVHR SBP&amp;BB Mechanical Ventilation with Heat Recovery, Summer Bypass and Boost Button

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## SLX Smart Lifts/Escalators

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## Centralised Vacuum Cleaning

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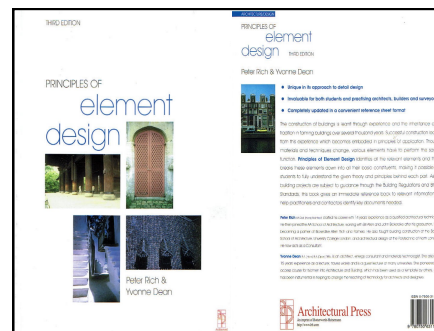
## Design &amp; Detail Guidance

- Building Regulations (legal minimum)
- Zero Carbon Hub/The Buildings Hub
  - Briefing Design & Detailing Failures/ Guidance (including services)
- Tom Dollard Book: Design to Perform an illustrated guide to delivering Energy Efficient homes (including services)

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Key Building Regulations	
Legal minimum > But 'the Performance Gap' suggests we don't meet this minimum very often	
The Building Regulations 2010 <b>Fire safety</b> <b>APPROVED DOCUMENT B</b> VOLUME 1 - DWELLINGHOUSES B1 Means of warning and escape B2 Internal fire spread (structure) B3 Internal fire spread (contents)	The Building Regulations 2010 <b>Site preparation and resistance to contaminants and moisture</b> <b>APPROVED DOCUMENT C</b> C1 Site preparation and resistance to contaminants C2 Resistance to moisture
The Building Regulations 2010 The Building Approved Inspection and Regulations 2010 <b>Resistance to the passage of sound</b> <b>APPROVED DOCUMENT E</b> E1 Partitions separating dwellings from other parts of the building and E2 Partitions separating dwellings from other parts of the building and	The Building Regulations 2010 <b>Conservation of fuel and power</b> <b>APPROVED DOCUMENT L1A</b> L1A Conservation of fuel and power



## Zero Carbon Hub ZCH/ The Buildings Hub TBH

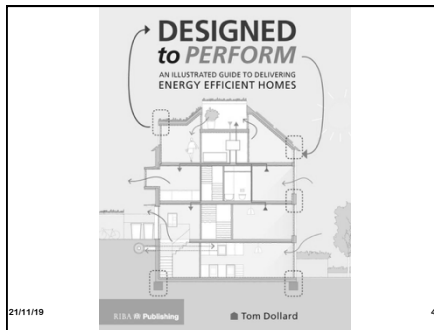
- Performance Gap and Overheating
  - 10 years of Gov. funding: surveys and guidance
  - But never really understood the main cause of overheating
  - Briefing Design & Detailing Failures/Guidance
- Free to download PDFs
  - ZCH Builders' Book
  - ZCH Thermal Bridge Guide
  - ZCH Services Guide
  - ZCH SAP untangled
  - ZCH Ventilation in New Homes
  - TBH Designer's Handbook
- [www.zerocarbonhub.org](http://www.zerocarbonhub.org)
- [www.thebuildingshub.org](http://www.thebuildingshub.org)

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**Tom Dollard Book:**

- **Design to Perform** an illustrated guide to delivering Energy Efficient Homes
  - RIBA Publishing
  - ISBN 978-1-8946-996-5
- Brian Murphy proof read early draft
- Builds on the work of ZCH
- The Performance Gap: how to reduce it
- How to Detail thermally efficient envelopes
- Addresses services failures too

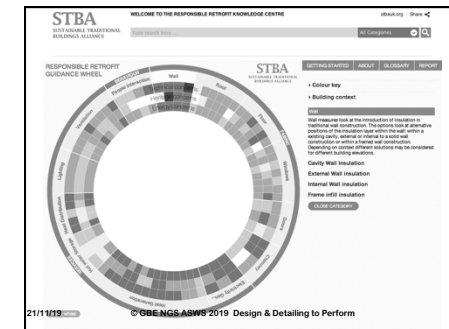
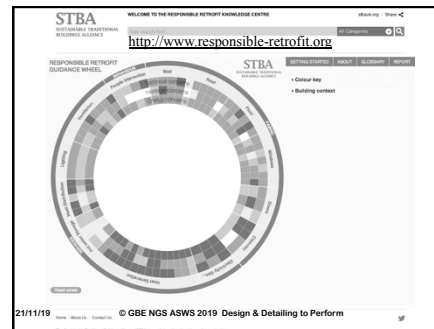
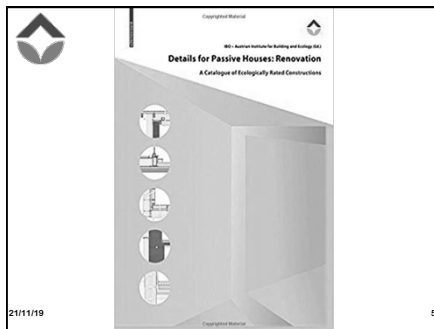


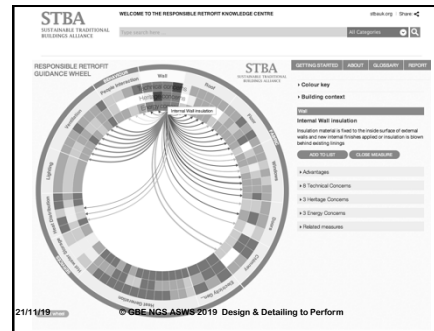
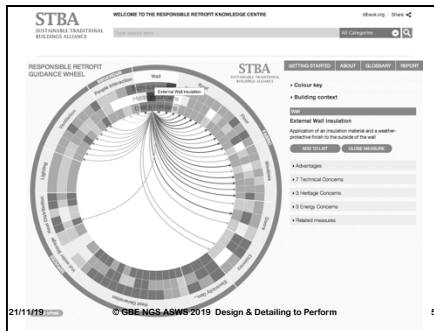
**Energy and related design standards**

- Building Regulations Approved Document L
  - Will eventually meet carbon targets but not now
  - Most new buildings will need to be retrofitted by 2030-2050
- Energy (exceeding Building Regulations)
  - AECB Bronze, Silver, Gold and Platinum Standard
  - Super E (Canadian; means to sell their softwood)
  - Passivhaus (German) PHPP Software
    - Indoor Air Quality and Thermal Comfort conditions driven
    - Minimise air leakage, minimise thermal bridges
    - EnerPHit (Passivhaus Retrofit)
  - Minergie (Swiss)
  - Carbon Lite (UK AECB)
    - Passivhaus interpretation for UK climate and energy mix
    - Carbon Lite Retrofit (CLR)

**Retrofit Design & Detailing**

- TSB Retrofit for the Future:
  - Targeted 60 buildings 50% Carbon reduction 17kgCO2/m2/year
  - EnerPHit Standard Passivhaus Retrofit
  - Website with case studies and EST 2 years of monitoring
  - Residential Retrofit Book 20 Case studies Martin Baul
- Sustainable Traditional Building Alliance (STBA)
  - STBA Guidance Wheel
  - No insulation, without ventilation (PAS 2035)
- Trustmark, Quality Mark, Guarantee scheme
- Risk Assessment: 3 approaches, 3 levels of risk
  - BS 5250 Condensation risk Assessment (Static: inadequate)
  - BS 7913 Historic Significance Assessment
- Publicly Available Specification
  - PAS 2030:2019: Installation (publication imminent)
  - PAS 2035:2019: Design (publication imminent)





## Whole House Plan

- **Don't set out to refurbish in stages**
  - and then find something you did early has to be undone and redone
  - Boilers and radiators first
    - **Take them off again**
    - **then add internal insulation**
    - **and rehang the boiler and the radiators**

## Trigger points:

- **If you are re-rendering apply insulated rendering in one go**
- **If you are repairing a bathroom leak change the sanitaryware to low water consumptions and insulate the external wall**

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## Phased/room by room refurbishment

- **Plan the final layout**
- **Plan the room temporary functions**
- **Plan the decanting of one room to enable the refurbishment of it**
- **Plan the temporary storage of possessions**
- **Plan the reinstatement of possessions into a smaller room**

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## Future proofing:

- **Allow for Renewable energy to be fitted later by making provision for it at an early stage**

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## Plan the Journey

- **Know your destination**
- **Then your meanderings all lead to the same destination**
- **Without detours and dead ends**
- **Without going round in circles**
- **Without treading the same path twice**

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## Whole House Plan

- **Showing the final insulation regime**
- **Modify the services installations with the final insulation regime in mind**
- **Avoid servicing > undoing services > insulating > re-servicing**
- **Or avoid services and insulation in the same place or insulate first**
- **Radiators not on the external wall**
- **Insulate in patches then services**
- **Insulate wall then boiler**
- **Insulated underfloor heating and no radiators**

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