

GBE  
https://GreenBuildingEncyclopaedia.uk

## Passive Performance Noise Light Heat Vent Cool Services Response

UH RIBA Part 1 Year 2 Lecture 6  
Architects & Interior Design Architects

27/11/19

This Presentation on GBE:

- Find this file on GBE website at:
- <https://GreenBuildingEncyclopaedia.uk/?P=32048>
- Go there for:
  - the latest update
  - versions presented to different audiences
  - the whole presentation all of the hidden slides
  - other file formats:
    - Handout, Show, PDF, PPTX
  - Links to other related GBE CPD and related GBE content

27/11/19 2

GBE  
https://GreenBuildingEncyclopaedia.uk

## Scope

- Quotes
- Principles
- Checklists for Task 2 submission in 6 following topics
  - Also in Task 2 Checklist file in Canvas
- Acoustics Noise/Sound
- Lighting
- Heating
- Ventilation
- Cooling
- Services Response

27/11/19 3

GBE  
https://GreenBuildingEncyclopaedia.uk

SUN PENETRATION 12 mm FLOOR HEATING  
NATURAL VENTILATION AIR COOLING  
INSULATION LIGHTING  
SUN ENERGY LANDSCAPE VIEW

27/11/19 © GBE 2019 Passive Performance 4

27/11/19

GBE  
https://GreenBuildingEncyclopaedia.uk

## Quotes

- Fabric First > Services Last
- Passive > Active > Mechanical/Artificial
- Build Tight > Ventilate Right
- Build Light > Insulate Right > Solar Tight
- Retrofit: No Insulation without Ventilation
- Convection: Hot air rises, cold air falls,
- Eddy currents: circulate to dissipate
- Conductivity: goes from hot to cold

27/11/19

GBE  
https://GreenBuildingEncyclopaedia.uk

## Principles

- Fabric First
- Make the building do all the work
  - Why make a building that needs to be heated/cooled if you don't need to
- Do not rely on energy intensive services to fix what you did not address
- Use services to only fill the gap that the building could not provide
  - See: Service Response at end

27/11/19 7

GBE  
https://GreenBuildingEncyclopaedia.uk

## Acoustics Sound/Noise

Sources, Barriers, Distribution, Reflection, Reverberation, Absorption, Dispersion, Attenuation, Shape of Space, Surfaces, Respond to Function, Quiet v Loud

27/11/19

## Purpose of Acoustic Control

- Noise is sound in the wrong place, too loud, too distracting, etc.
- Noise can get about via air or via materials, direct or indirect by flanking through air gaps in construction
- Very hard surfaces reflect sound to reverberate for long periods making speech difficult to understand
- Highly absorbent surfaces make sounds disappear and not be heard
- Sounds from adjacent spaces may flank around partitions making concentration more difficult
- Excessive noise can create stress in the listener
- Using competent construction noise and sound can be reflected, isolated, absorbed, diffused, transmitted

27/11/19 9

## Acoustics: Noise v Sound

- Consider the Sources:
    - Internal and external, inward and outward
      - External components of building:
        - solar shading, light shelves, ventilation grilles
    - Controllable v uncontrollable
      - On site or off site
    - Mitigate or Adapt?
      - Prevent v deal with consequences
      - Prevent occurrence, prevent passage v absorb noise
    - Caused by other factors:
      - External wind pressure > Air leaky construction
        - Wind whistling through door and window frames or walls
      - Internal Wind Pressure Buﬀering
        - Rattling Components: doors, furniture, ironmongery
- 1/96 External noise diagrams can apply to internal too

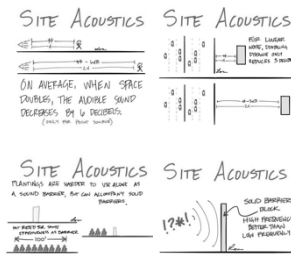
27/11/19

External noise diagrams can apply to internal too

27/11/19

© ARE USA Architects Registration Examination

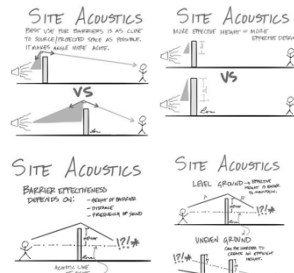
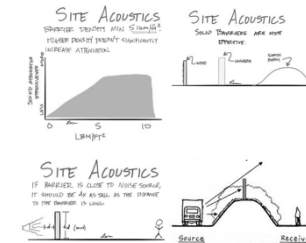
11



27/11/19

© ARE USA Architects Registration Examination

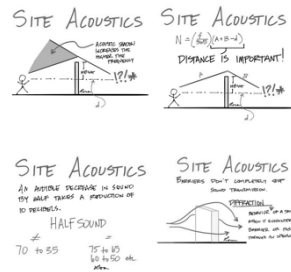
12



27/11/19

© ARE USA Architects Registration Examination

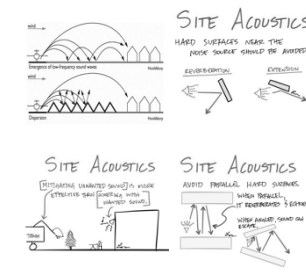
13



27/11/19

© ARE USA Architects Registration Examination

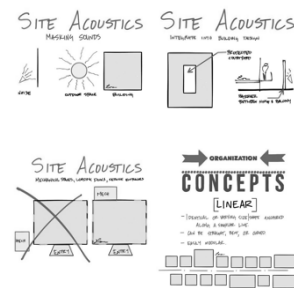
14



27/11/19

© ARE USA Architects Registration Examination

15



27/11/19

© ARE USA Architects Registration Examination

16

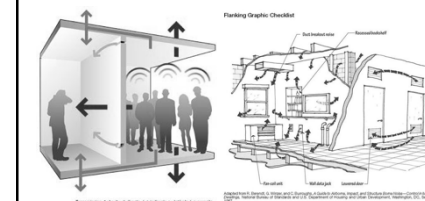
## Respond to the Function

- Reading rooms need quiet concentration and contemplation
- Entrance Halls are places of arrival, disrobing, surveillance, orientation, rendezvous,
  - requires conversation: meeting, greeting, questions and answers
  - It will be a noisy space that can be accepted

27/11/19

17

**Internal Acoustics**  
**Source > Route > Problem**

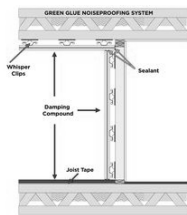


27/11/19

ex Pinterest

18

### Internal Acoustics Source > Problem > Solution

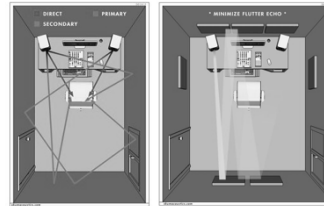


27/11/19

ex Pinterest

19

### Internal Acoustics Source > Problem > Solution

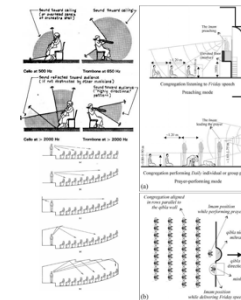


27/11/19

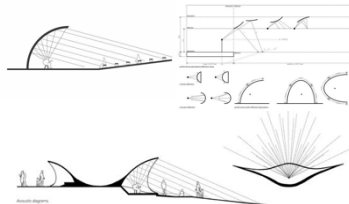
ex Pinterest

20

### Source of Sound or Noise



### Acoustics of Shaped Spaces

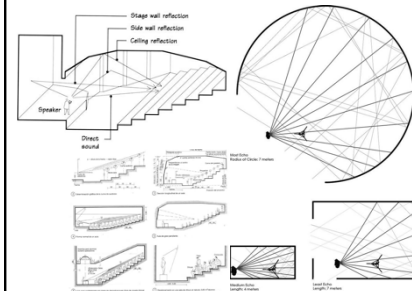


27/11/19

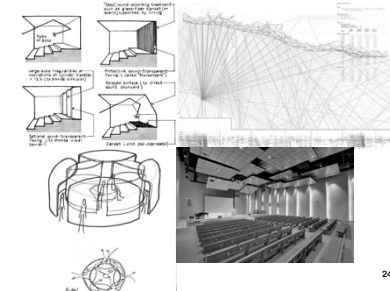
ex Pinterest

22

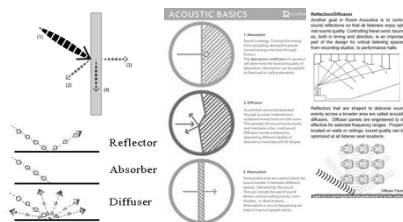
### Acoustics of Shaped Spaces



### Modifying Acoustics of Spaces



### Reflection Absorption Diffusion Attenuation



27/11/19

ex Pinterest

25

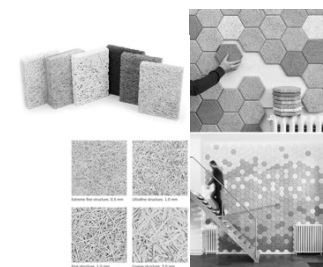
### Reverberation

- Joe Cilia of FIS demonstrating
- Reverberation room (hard surfaces) Long Reverberation time
- <https://twitter.com/AisJoe/status/1130952798856712192>
- Anechoic chamber (absorbent surfaces) Zero reverberation time
- <https://twitter.com/AisJoe/status/1130952152531316737>

27/11/19

26

### Acoustic materials



27/11/19

ex Pinterest

27

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Acoustics Assessment

- Regional/Local map and scales essential
- External noise sources: Airports, Roads, Plant
- Plans of whole (site or building) and indicate part
- Building Profile: Section of whole and part
- Source of external and internal noises, volume, distance, topography of route to site,
- Analysis: Plans Sections Elevations:
- Analysis of existing ventilation to be aware of
- Acoustic Analysis and your response
- Any internal enclosure and glazing
- Any interventions by you to provide Acoustic control
  - Background or task acoustics or both

27/11/19 28

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Light/Dark

Sunlight, Daylight, Moonlight, Artificial light, UV degradation, Dark, Black out, Control, Solar Control, Light Shelves, Reflection, Concentration, Refraction,

27/11/19 29

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Purpose of Light Control

- Excessive sunlight light contrasting with shade can lead to eye strain and headaches
- Sunlight brings heat which may be undesirable,
  - Receptions in sunlit atria can lead to excess sun tanning, sun-stroke, un-wellness
- Glare: can be distracting, temporary blinding, cause accidents, cause headaches/migraines
- Lights on at night does not mean the place is occupied, it means you did not turn lights off
- Ground floor security is all that is needed upper floors are secure
- Flood lighting helps burglars not deter them
- Store cupboards need to automatically actuate light controls because full hands might not be able to reach the switch
- Cleaner's Contracts must require the to turn the lights off when they leave the floor
- Security Staff reactivate lights, controls need to turn them back off quickly

27/11/19 30

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Sunlight Daylight

- Sunlight Daylight Overcast Moonlight
  - Directional v Diffused v Filtered v Reflected
- Sunlight v Shade v Dark:
  - In spaces, on walls, floors; Outside: facades, paving
  - Surrounding objects: Buildings Trees
  - Sunlight with heat: E>S>W (Northern Hemisphere)
  - Daylight without heat: N (ditto)
- Sundial Effect: Rising Panning Falling
- Shifting Angles: Winter Equinox Summer
- Sunrise/set Timing:
  - Equator 6 am - 6 pm
  - Poles: 24 Hr night or day
- Colours:
  - Red: sunrise sunset, White: Daylight, Grey: Overcast, Blue: Sky
- Heat: Coolest in morning, Hot midday, Warm Evening, Cool night
- Ultra Violet Light degradation of materials
- Concentration: Walkie Scorchie, Concave curved glass/mirror glass

27/11/19 31

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Glare

- Glare can be by reflections off metallic surfaces, on monitors (CRT in particular) reflective glass worse than matt glass
- Reflective surfaces can be used to advantage in light shelves to disperse light
- Glare can be from light fittings, through windows or solar shading, in peripheral vision
- Excessive light glare can lead to distraction potentially accidents and migraine

27/11/19 © GBE 2019 Passive Performance 32

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Ultra violet light

- Ultra violet light can degrade plastics/rubber materials, fading of synthetic colours
- UV filtration can prevent this in laminated glazing PVB interlayers, and surrounds in light fittings
- UV absorbent surfaces remove UV from sunlight on each bounce

27/11/19 © GBE 2019 Passive Performance 33

**GBE**  
https://greenbuildinginspiredirect.co.uk

## Energy saving light

- Good daylight can avoid need for artificial light
- Control of artificial light saves energy,
- Artificial light may not needed closest to windows except late afternoon evening
- Light off if no people present, proximity actuation, individual light controls
- Lights off in daylight, on at night time, only if people present
- Use of sunpipes to bring sun/day/moon light deep into the building (+Vent option)

27/11/19 34

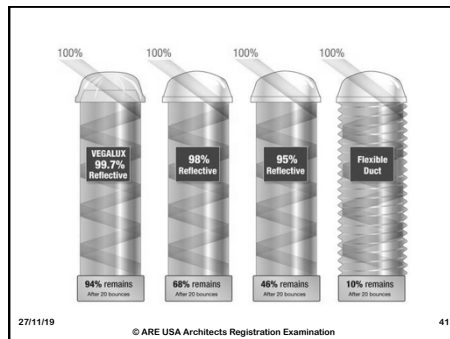
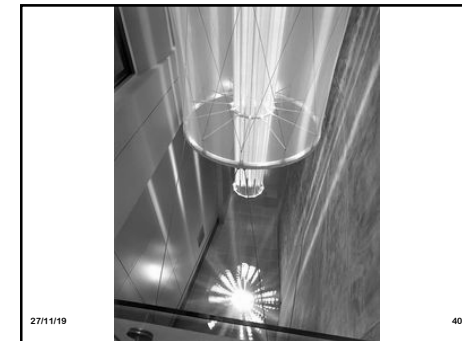
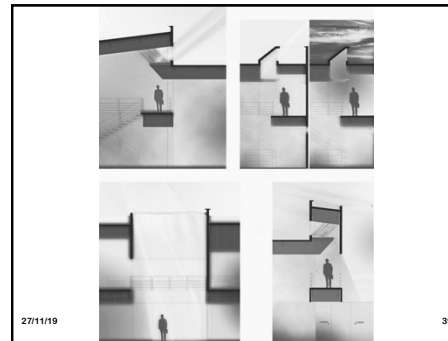
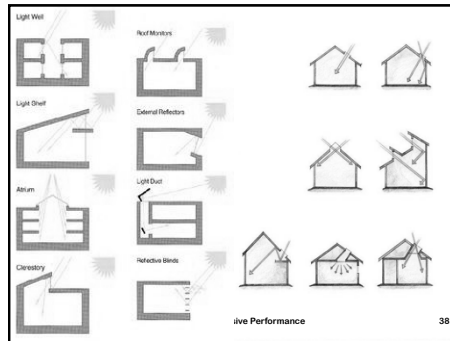
**GBE**  
https://greenbuildinginspiredirect.co.uk

CLARABOIAS

27/11/19 © GBE 2019 Passive Performance 35

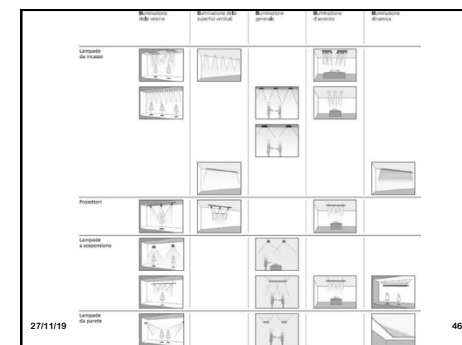
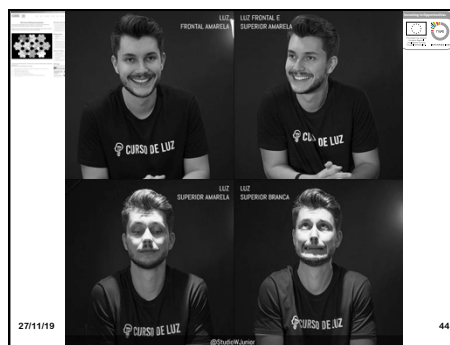
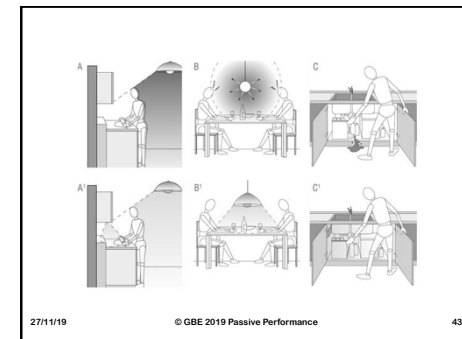
27/11/19 36

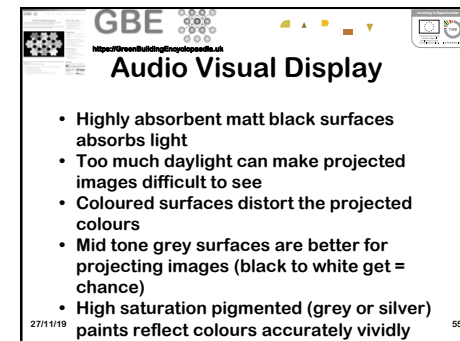
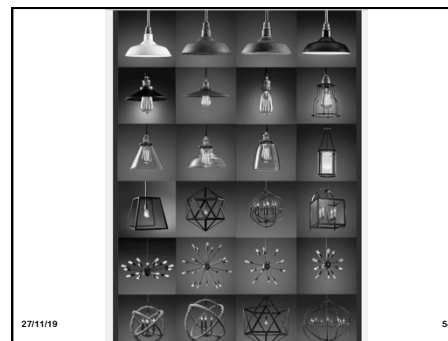
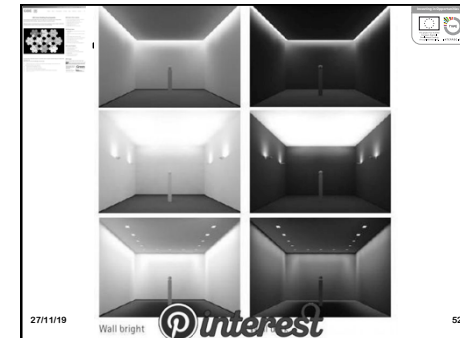
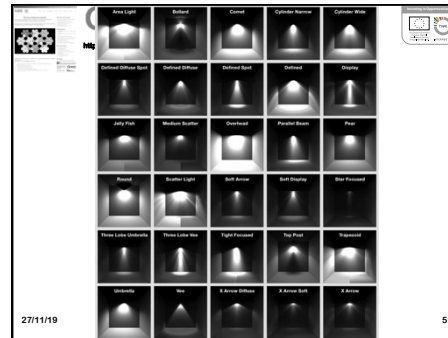
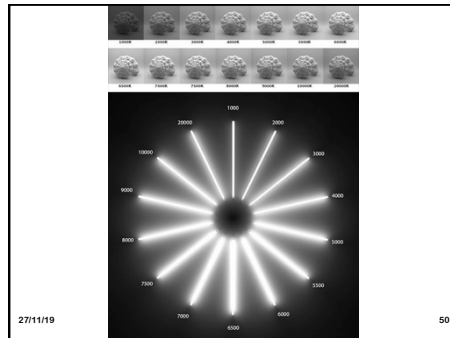
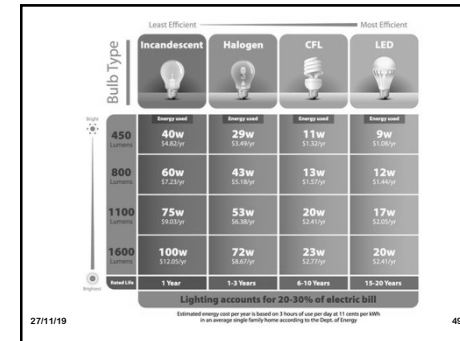
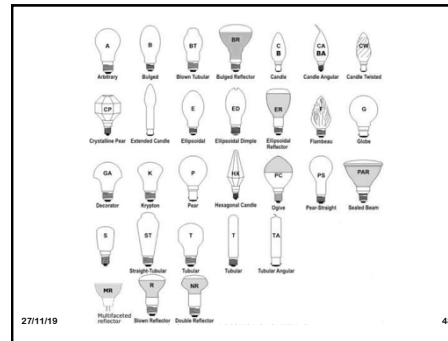
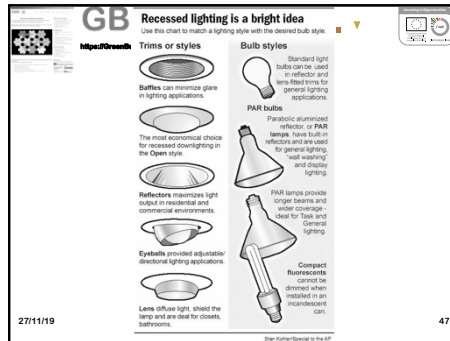




## Artificial Light

- Choosing lights:
  - Room function: Office, Ladies powder room, Kitchen, Theatre Dressing room/makeup, showroom, gallery, Shop, food counter,
- Lighting layout: Reflected ceiling plan, light position, orientation direction,
- Lighting function: Nightlight, Background, Task, Wall-wash, Up-light, Down-light, Floodlight, Uniform office light level, decoration, route, emergency, decoration
  - Luminaire: profile and diffusion dictate polar diagram
    - Polar diagrams: indicate direction, reach, spread and concentration
- Lighting Position: ceiling, coving, skirting, floor, wall,
- Lighting scenarios: mood setting
- White Light: Colour temperature
- Coloured light: White light, Daylight,
- Wattage/Efficiency: High, Low, Mid, Dimming,
- Coloured luminaire: Glass, light, reflector,
- Lamp geometry: Bulb: spherical, LED, Directional, Fluorescent: Linear
- Luminaire geometry: Recessed, Flush, Surface mounted, pendant, Chandelier
- Style: Retro, Modern, Futurist, Scandinavian, Natural,
- Controls: wall switch, dimmer, proximity actuation, timer, scenarios, smartphone





**GBE**  
https://www.buildingintegrity.co.uk

## Light Assessment

- North Point and scales essential
- Northern or Southern Hemisphere?
- Plans of whole (site or building) and indicate part
- Building Profile: Section of whole and part
- Existing glazing positions, sized
- Window treatments if any (inside or out)
- Analysis: Plans Sections Elevations: sundial paths
- Shadow analysis: floors and walls, inside and out
- Your response to shadow analysis
- Any internal enclosure and glazing
- Analysis of existing light to be exploited
- Any interventions by you to provide light
  - Background or task lighting or both

27/11/19 56

**GBE**  
https://www.buildingintegrity.co.uk

## Heat

Sun paths, Solar Control: internal/external, Sunlight, Sun paths, Shadow, Solar access, Solar heat gain, Surface Thermal Mass, cyclical storage, overnight ventilation purging, Phase Change materials,

27/11/19

**GBE**  
https://www.buildingintegrity.co.uk

## Purpose of Heat Control

- Source: Internal or External,
- Movement: sideways, upwards, inwards or outwards
- Excessive heat can kill, 2003 heat wave
  - Sahara temperatures across Europe,
  - 20,000 people died in France,
  - 100s in UK
- 20% of UK homes overheat
  - Higher percentage of new homes overheat
  - MMC homes will choose wrong materials for insulation and overheat
  - Top floors overheat (LRC overheats)
  - District heating overheats corridors and flats/rooms
  - Significantly better insulation needed on all heat pipes
  - Solar Heat gain in glazed staircases over heats flats via corridors
- 80% of UK conservatories are heated squandering energy
- Phase Change Materials are rarely used effectively
- Save energy, save carbon, save costs

27/11/19

**GBE**  
https://www.buildingintegrity.co.uk

## Passive Heat

- Sunlight:
  - Sunlight with heat: E>S>W (N Hemisphere)
  - Daylight without heat: N (ditto)
- Directional v Diffused v Filtered v Reflected
- Sunlight v Shade v Dark:
  - In spaces, on walls, floors; outside: facades, paving
- Sundial Effect: Rising Panning Falling
- Shifting: Winter Equinox Summer
- Timing: Equator 6am-6pm Poles: 24hr night or day
- Colours: Red White Grey Blue
- Heat:
  - Light coloured roofs are used for albedo effect for solar reflection and avoidance of solar absorption (effective all the way down to equator)
  - Dark Colours (near poles) absorb some heat

27/11/19

**GBE**  
https://www.buildingintegrity.co.uk

## SOLAR ORIENTATION

CLIMATE

SUN ALTITUDE

NORTHERN HEMISPHERE

SOUTHERN HEMISPHERE

CLIMATE

SUN PATH

NORTHERN HEMISPHERE

SOUTHERN HEMISPHERE

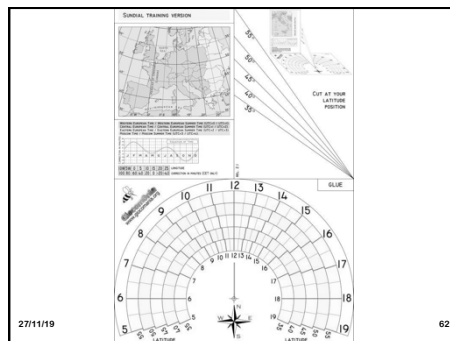
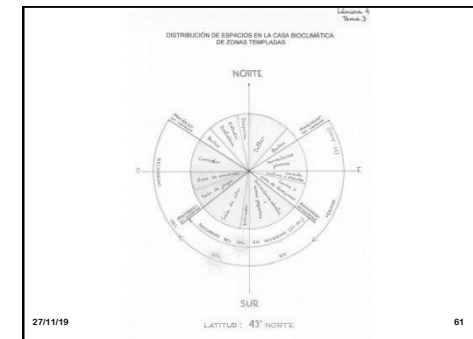
CLIMATE

ALBEDO + CONDUCTIVITY

AFFECT MICROCLIMATE

© ARE USA Architects Registration Examination

27/11/19 60



**GBE**  
https://www.buildingintegrity.co.uk

## South facing for winter solar gains

## And summer overheating?

## Needs summer solar shading and winter solar penetration

Passive Hub Norwich

27/11/19

**GBE**  
https://www.buildingintegrity.co.uk

## Back to back

## 19th Century design relic

## What is it still doing here in the 21st C?

## Fiduciary Rules?

## Cheap and profitable

Back-to-back Housing

27/11/19

GBE

<https://www.buildingforenergy.co.uk>

**Winter:** Small windows to the north, big windows to the south

**Summer:** Small windows to the south or solar shading needed

**Winter**

Small windows to the north, big windows to the south



**Summer**

Small windows to the south or solar shading

Door? Why the hell not a door?

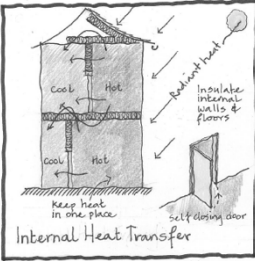
General Approach

[illegible]


**GBE**


<https://www.birmingham.ac.uk>

**Keep heat in its place of arrival**  
**Maintain safe refuge on the cooler side**  
**Insulate internal floors and partitions**  
**Close doors**  
**Promoted by BedZED**



The diagram illustrates a cross-section of a house with two floors. The top floor is labeled 'Cool' on the left and 'Hot' on the right. The bottom floor is also labeled 'Cool' on the left and 'Hot' on the right. Arrows show heat flowing from the top floor to the bottom floor through the partition, and from the bottom floor to the ground through the floor. A label 'Insulate internal walls & floors' points to the walls and floors. A label 'Radiant heat' points to the top floor. A label 'Self closing door' points to a door on the bottom floor. The text 'Internal Heat Transfer' is written at the bottom.

**Planners insist on top floor additions set-back**

**Structure needs lightweight construction**

**Comes with weak insulation**

**Will overheat**

**Needs air-con**

GBE

<https://www.shibingdongyepedia.uk>

Radiant  
verses  
Conductive  
heat flows

Insulation  
needs to  
resist both or  
overheating  
occurs

Overheating of Buildings

GBE


<https://www.bbc.com/news/health-1-48444444>

Once radiant heat gets in it warms the space and the warmth cannot get out through conductivity insulation

Overheating of Buildings

The sun moves around the building

In big buildings you can move away from the heat to cooler parts on extreme days



The diagram shows a diamond-shaped building with a central white rectangular area labeled 'Flexible Living Spaces'. The building is divided into four quadrants, each with a different shading pattern. A circular arrow around the building indicates the sun's path: 'Morning Activity' (top-right, NW), 'Mid-day Activity' (right, N), 'Evening Activity' (bottom-right, NE), and 'Morning sun' (bottom-left, SE). A small sun icon is at the top-left. A compass rose shows N, E, S, and W. A small inset shows a grid of building footprints.

GBE

<https://www.shutterstock.com/royaltyfree/uk>

100% Glass facades

20<sup>th</sup> century construction

Fuel poverty (cooling) or wellbeing might stop it

We need solar shading

Agile working might help share the burden

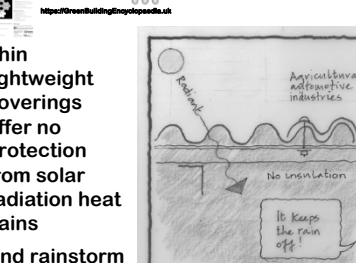
My desk (And I can't move)

Glass Office Block

Overheating in Glazed Offices

**Thin lightweight coverings offer no protection from solar radiation heat gains**

**And rainstorm water noise**

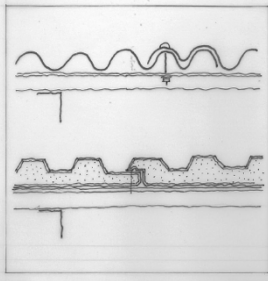


<https://www.bldgblog.com/papers/uk>



**GBE**  
https://greenbuildinginspiration.co.uk

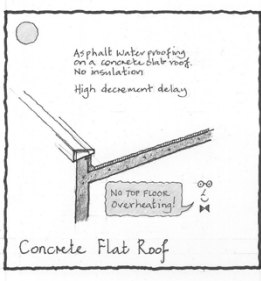
**Profiled Metal roof cladding**  
**No insulation or plastic sandwich panel**  
**Both ineffective against solar gains**



27/11/19

**GBE**  
https://greenbuildinginspiration.co.uk

**Concrete and Asphalt Flat Roof**  
**No Insulation**  
**High Decrement**  
**Delay concrete**  
**No overheating**  
**Well eventually**

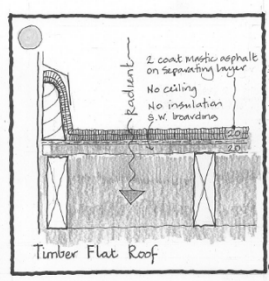


Asphalt water proofing on a concrete slab roof  
No insulation  
High decrement delay  
No top floor overheating!  
Concrete Flat Roof

© GBE 8th September 2017 Danreck & Hill

**GBE**  
https://greenbuildinginspiration.co.uk

**Old timber and asphalt roofs keep you roasting in summer**



2 coat mastic asphalt on separating layer  
No ceiling  
No insulation  
g.w. boarding  
Timber Flat Roof

© GBE 8th September 2017 Danreck & Hill

**GBE**  
https://greenbuildinginspiration.co.uk

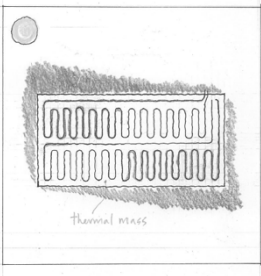
**Active Heat**

- Lighting: lower wattage lamps, common today
- Hot water: cylinder constant or as required, uninsulated pipes
- Heating: 16 hours of 24 hour day
- Cooking: Intermittent
- TV ITC Equipment
  - Standby modes 80%
- Fridge/Freezer: 24 hours
- Humans at rest 100 watts, some animals and babies less
- Olympic Athlete 2000 watts at peak
- Passivhaus: exploits it all, recycles heat only to warm fresh air coming in
- Mechanical Ventilation with Heat Recovery MVHR

27/11/19 77

**GBE**  
https://greenbuildinginspiration.co.uk

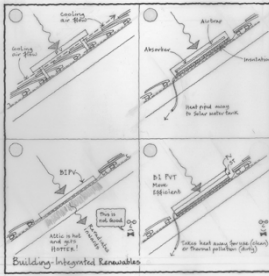
**Hot floor slabs fitted with under floor heating pipes can move heat to the colder parts**  
**Suffolk CC in Ipswich**



Thermal mass

**GBE**  
https://greenbuildinginspiration.co.uk

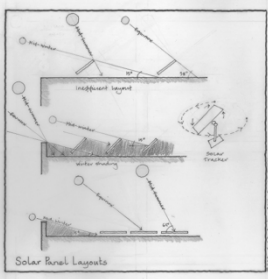
**Building Integrated Renewables**  
**Is it really a good idea?**  
**I don't think so**



Building Integrated Renewables

**GBE**  
https://greenbuildinginspiration.co.uk

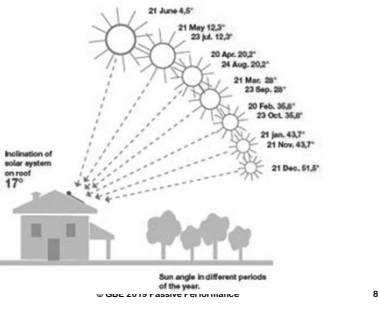
**Solar panel layout to avoid overshadowing by one panel on another**  
**Winter is worse**  
**Get your angles right**



Solar Panel Layouts

**GBE**  
https://greenbuildinginspiration.co.uk

**Sun angle in different periods of the year**



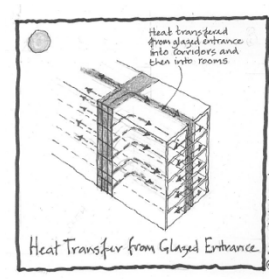
Inclination of solar system on roof 17°

21 June 4.5°  
21 May 12.3°  
20 Apr 20.2°  
24 Aug 20.2°  
21 Mar 28°  
23 Sep 28°  
20 Feb 35.8°  
23 Oct 35.8°  
21 Jan 43.7°  
21 Nov 43.7°  
21 Dec 51.5°

© GBE 2012 Passive Performance

**GBE**  
https://greenbuildinginspiration.co.uk

**Glazed communal stairs and corridors serving apartments student accommodation**  
**Everything overheats**



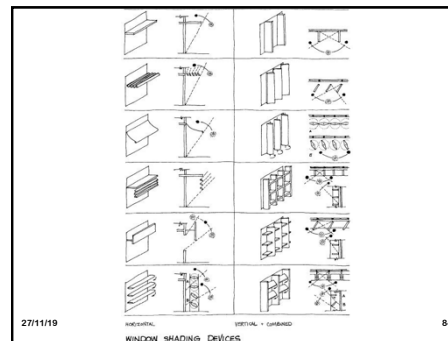
Heat transferred from glazed entrance into corridors and then into rooms  
Heat Transfer from Glazed Entrance

© GBE 8th August 2017 Danreck & Hill

3-D View	Section Plan	Wind orientation	View restriction
Horizontal single blade		South	★★★★
Outrigger system		South	★★★★
Horizontal multiple blades		South	★★★★
Vertical fin		East West	★★★★
Slanted Vertical fin		East West	★★★★
Eggcrate		East West	★★★★

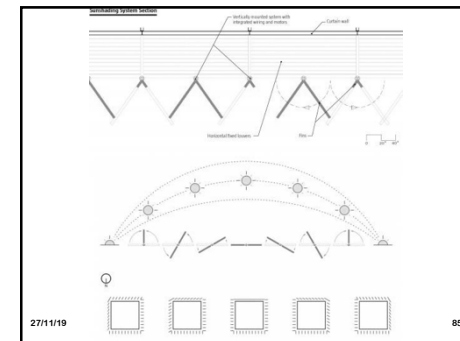
27/11/19

83



27/11/19

84



27/11/19

85

**GBE**  
https://www.buildingenergyperformance.co.uk

## Heat Assessment

- North Point and scales essential
- Northern or Southern Hemisphere?
- Plans of whole (site or building) and indicate part
- Building Profile: Section of whole and part
- Existing glazing positions, sized
- Window treatments if any (inside or out)
- Analysis: Plans Sections Elevations: sundial paths
- Shadow analysis: floors and walls, inside and out
- Your response to shadow analysis
- Any internal enclosure and glazing
- Construction Assemblies showing insulation and mass
- Analysis of existing heat to be exploited
- Any interventions by you to provide heat

27/11/19

87

**GBE**  
https://www.buildingenergyperformance.co.uk

## Ventilation

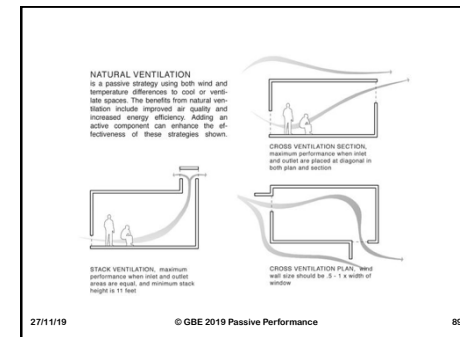
Passive Active Mechanical

Avoiding Air conditioning  
“Comfort Cooling”

© GBE 2019 Passive Performance

27/11/19

88



27/11/19

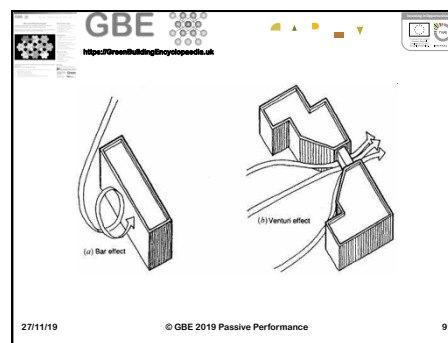
© GBE 2019 Passive Performance

89

## Purpose of Ventilation Control

- Control Indoor Air Quality IAQ
- Control Humidity levels, Moisture Content of materials, minimise risk of mould
- Control Temperature
  - Remove solar heat gain warmed air
  - Cross ventilation
  - Overnight purging of thermal mass heat
- Control release or remove Smells
- Control VOC levels (off-gassing from plastics, synthetics, adhesives, paints)
- Maintain Life: Airtightness levels below 3 need deliberate and dedicated ventilation

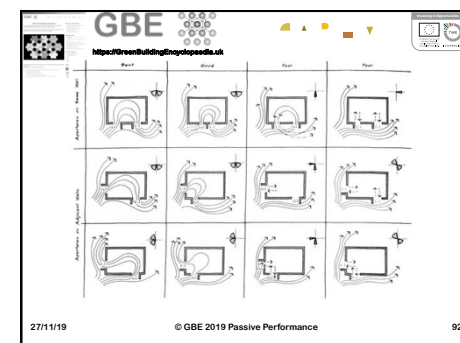
27/11/19



27/11/19

© GBE 2019 Passive Performance

91

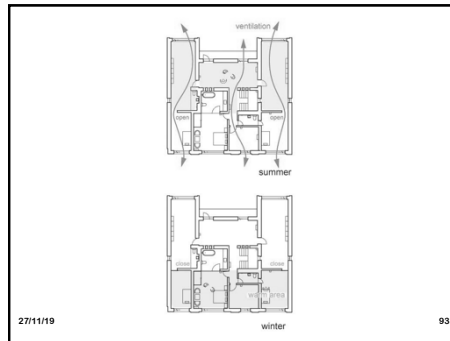


27/11/19

© GBE 2019 Passive Performance

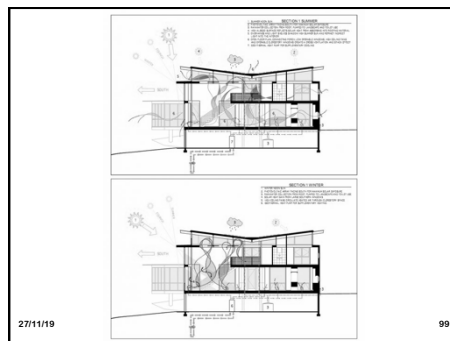
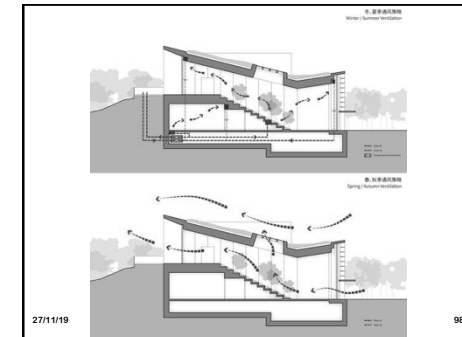
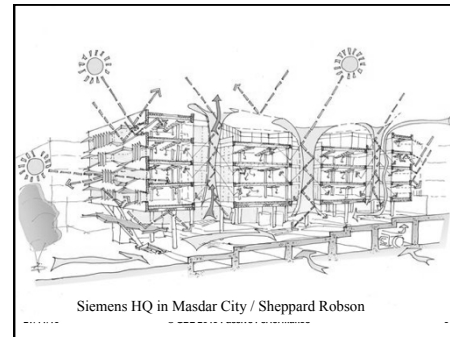
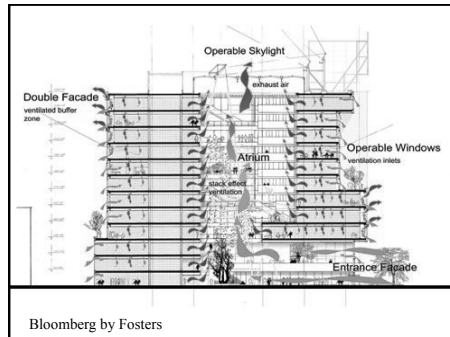
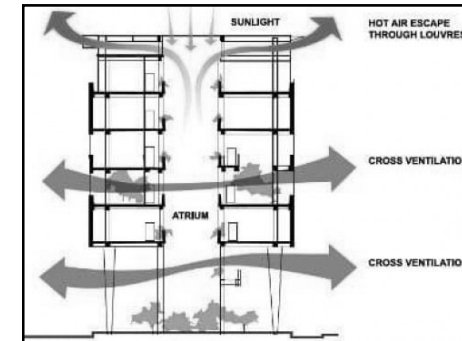
92





**Passive Vent**

- Open Windows and doors let fresh air in, to cross flow ventilate building
- Open roof lights/roof vents
- Stack effect up stairwells in summer
  - Need doors to close in winter
- Passivhaus: can be ventilated by opening windows but turn off the MVHR
- Conservatories attached to house need ventilation top and bottom and be closed from house (Building Regulations)



**Passive Interventions**

- Passive vents actuated by humidity do not open for smells
- Clay finishes absorb smells and moisture
- High Titanium Dioxide coatings clean the air
  - But extremely high environmental impact to make it
- Essence of Cherry eats bacteria in the air
- Opening opaque vents in walls becoming popular
  - (insect grilles and security essential)
- Passive Ventilation with Heat Recovery
  - Existing Fireplace and Chimney
  - New duct inserted with PVHR cowl on top

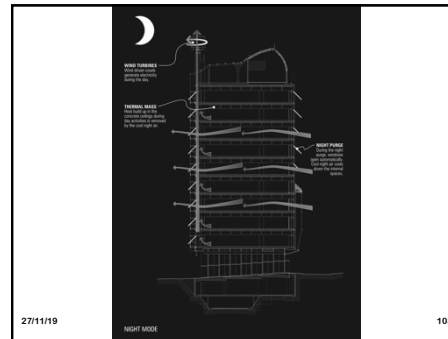
**Active Vent**

- BedZED cowls
  - Wind pressure drives fresh air in
  - Pushes stale air out
  - Transfers heat-only from outgoing to incoming air
- Night time Purging of heat
  - Thermal mass heated during day
  - Thermal mass cooled at night
  - Cooled thermal mass exposed to soak up heat during following day



27/11/19

102



27/11/19

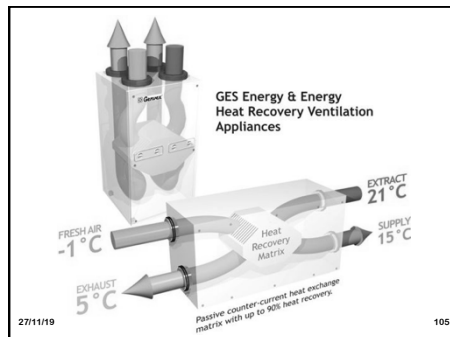
103

**GBE**  
<https://www.buildingenergyperformance.co.uk>

## Mechanical Ventilation

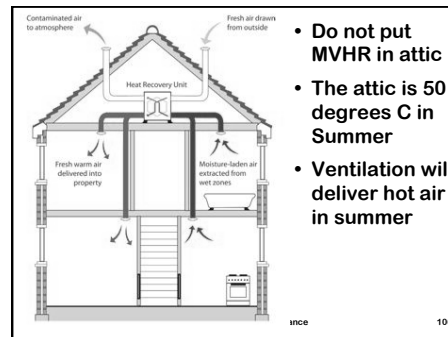
- Passivhaus: MVHR whole house system
  - Extract from Kitchen and Bathrooms
  - Input into Living and bedrooms
  - Circulate via corridor
- Extractors in Bathrooms and Kitchen (humidity smells removed but heat lost)
  - MVHR through walls are available too

27/11/19 © GBE 2019 Passive Performance 104



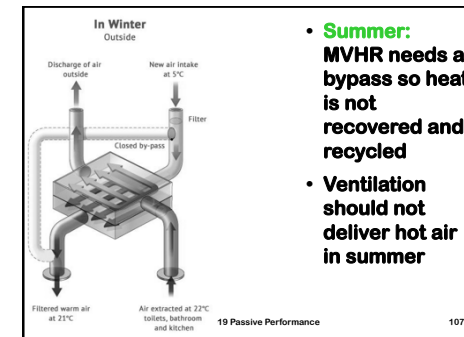
27/11/19

105



106

- Do not put MVHR in attic
- The attic is 50 degrees C in Summer
- Ventilation will deliver hot air in summer



- **Summer:** MVHR needs a bypass so heat is not recovered and recycled
- Ventilation should not deliver hot air in summer



Click to browse items

**GBE**  
<https://www.buildingenergyperformance.co.uk>

## Ventilation Assessment

- North Point and scales essential
- Prevailing wind rose
- Plans of whole (site or building) and indicate part
- Building Profile: Section of whole and part
- Wind access to site, shadows, urban climate issues if applicable
- Analysis: Plans Sections Elevations:
  - Your response to wind and shade analysis
  - Any internal enclosure and glazing
  - Analysis of existing ventilation to be exploited
  - Any interventions by you to provide ventilation
    - Background or task ventilation or both

27/11/19 109

**GBE**  
<https://www.buildingenergyperformance.co.uk>

## Cooling

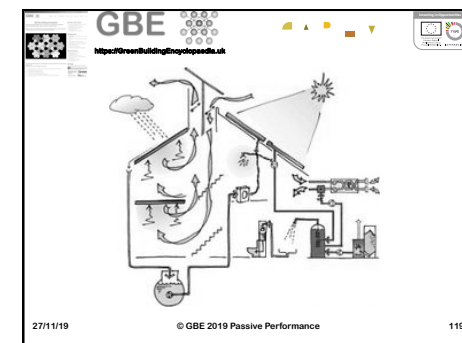
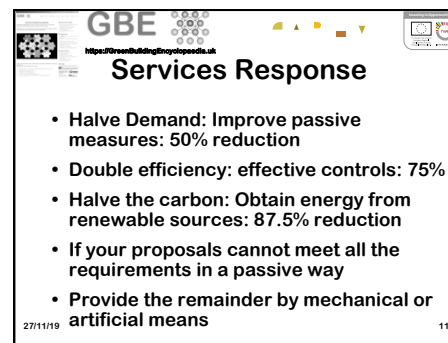
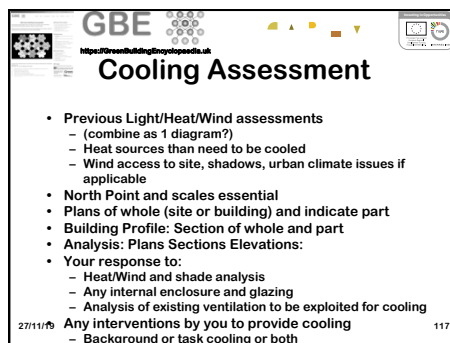
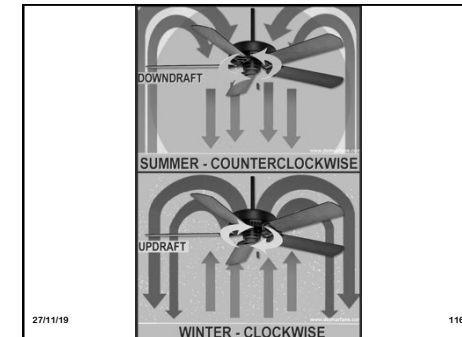
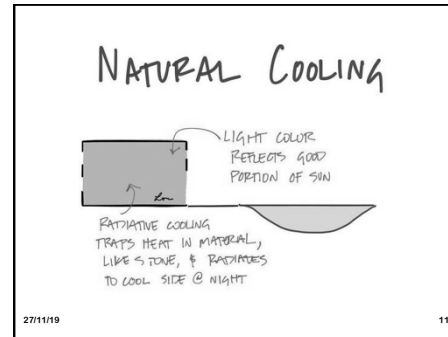
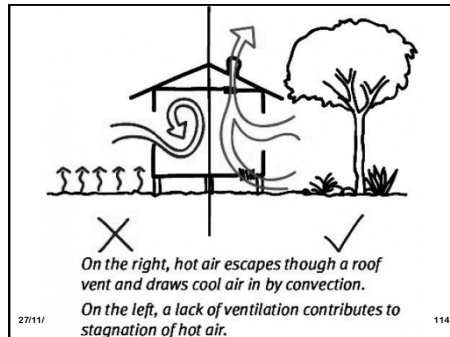
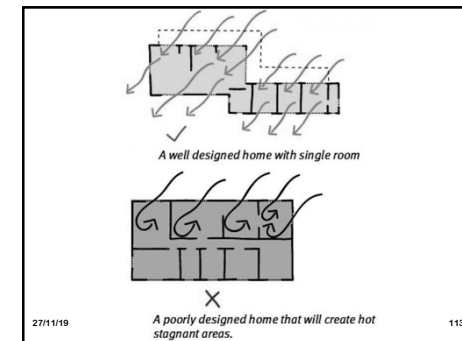
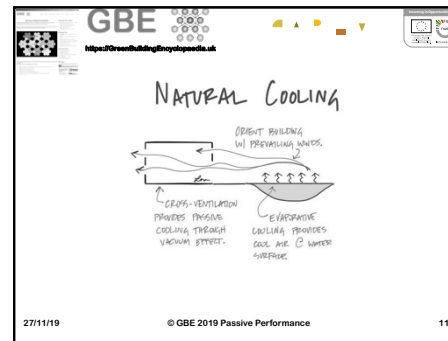
Choose Passive Active Mechanical Ventilation  
Avoiding Air Conditioning wherever possible

**“Comfort Cooling”**

27/11/19 © GBE 2019 Passive Performance 110

## Purpose of Cooling Control

- Remove excess heat and humidity
- Air conditioning is energy intensive to heat, cool and change relative humidity
- Depending on fuel source also carbon intensive, and probably 24 hours
- Rare books, photographic collections, exhibits, art or sculpture
- May need to be kept at a low temperatures and humidity to avoid mould growth
- Laboratories or chemical stores may need to be kept cool to avoid spontaneous combustion
- Food storage mountains need to be kept cool
- If the building fabric lets in solar radiation heat by using wrong materials with wrong decrement delay in the roof and E>S>W facades
  - the building will need to be cooled more on sunny days
- 100% fixed glazed facades need 100% air conditioning to control: heat and humidity from people, equipment and solar heat gains
  - Canary Wharf Tower: 1 million watts from people alone

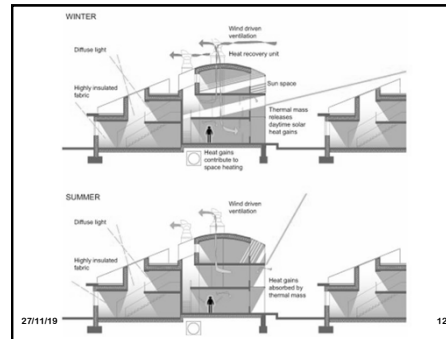


## Purpose of Services Response

- Provide comfort conditions for occupants
- Reduce Energy Demand
- Reduce Carbon in that energy
- Fuel Autonomy
  - Reduce reliance upon external energy sources and their escalating costs
- Reduce Costs
  - Reduce Business Overheads
  - Reduce Home running costs

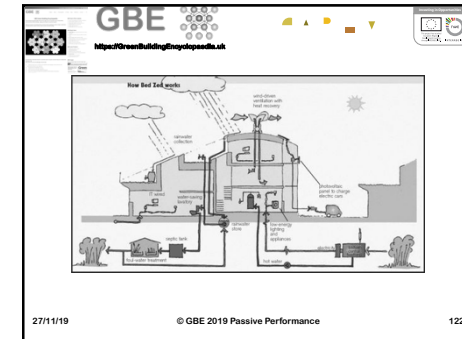
27/11/19

120



27/11/19

121



27/11/19

© GBE 2019 Passive Performance

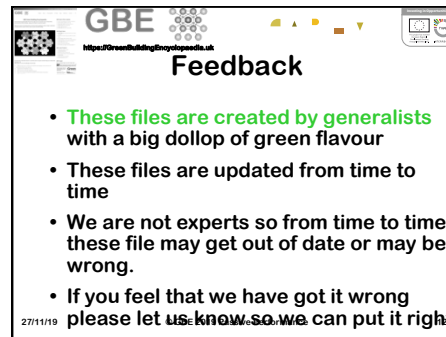
122

## Services Response Assessment

- Justify their need
- Propose services needed to meet residual demand
- Ensure the services acknowledge each other and are integrated where important to do so
- Waste from one may be a resource for another
- Describe systems and their controls
- Describe their locations in scheme
- Integrate in floors and reflected ceiling plans, room elevations and roof if required

27/11/19

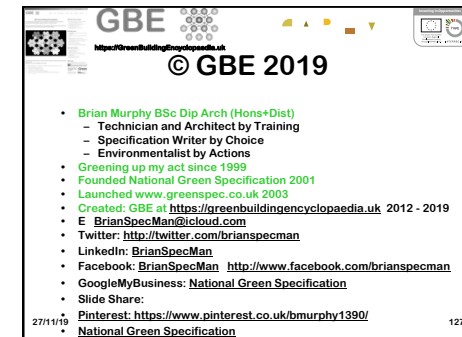
123



27/11/19

Feedback

- These files are created by generalists with a big dollop of green flavour
- These files are updated from time to time
- We are not experts so from time to time these file may get out of date or may be wrong.
- If you feel that we have got it wrong please let us know so we can put it right



27/11/19

## © GBE 2019

- Brian Murphy BSc Dip Arch (Hons+Dist)
  - Technician and Architect by Training
  - Specification Writer by Choice
  - Environmentalist by Actions
- Greening up my act since 1999
- Founded National Green Specification 2001
- Launched [www.greenspec.co.uk](http://www.greenspec.co.uk) 2003
- Created: GBE at <https://greenbuildingencyclopedia.uk> 2012 - 2019
- E: [BrianSpecMan@icloud.com](mailto:BrianSpecMan@icloud.com)
- Twitter: <http://twitter.com/brianspecman>
- LinkedIn: <http://www.linkedin.com/in/brianspecman>
- Facebook: <http://www.facebook.com/brianspecman>
- GoogleMyBusiness: [National Green Specification](https://www.google.com/maps/place/National+Green+Specification)
- Slide Share:
- Pinterest: <https://www.pinterest.co.uk/bmurphy1390/>
- [National Green Specification](https://www.greenspec.co.uk)

127