Sustainable Planning and Architecture

Lecture 8

BREEAM

"Building the future with intention"

Is the goal for this type of rating system?

What is BREEAM?

- BREEAM is the world's leading sustainability assessment method for master planning projects, infrastructure and buildings. It addresses a number of lifecycle stages such as new construction, Refurbishment and in-use.
  So, when you look at this map below it shows the green pals which is an active use of BREEAM rating system which is use not only for building but also for master planning and infrastructure developments, which consider new construction, refurbishment and also in-use. So, if you want to make a BREEAM assessment for a building it need not be newly constructed. It can be building already been used or some building which is been used something else before and we have done some changes and you have refurbished and made into a new building those are also can come and BREEAM category.

- Globally there are more than 536,300 BREEAM certified developments, and almost 2,229,500 buildings registered for assessment since it was first launched in 1990.
  So, BREEAM is started as US body as well and it was started in 1990.which has more than 536,000 of certification programs and it also has more than 2 million registered buildings.

BREEAM IN NUMBERS

So, let see BREEAM in numbers.

So, it has over 536,341 certification and more than 2 million registered buildings and it has over 73 countries.

HOW BREEAM WORKS

- The BREEAM assessment process evaluates the procurement, design, construction and operation of a development against targets that are based on performance benchmark. So, like why's up seen in introduction of green building rating system in previous lecture. BREEAM is one of the same categories which have different benchmark and different goals for the building to get this type of certification. There are different set goals and benchmark which has to be met.

\Assessments are carried out by independent, licensed assessors, and developments rate and certified on a scale of Pass, Good, Very Good, Excellent and Outstanding.

So, when you want to get a BREAM certification there are assessors who a do this kind of different levels of rating which is been go throw completely from its requirements to complete state and post occupant evaluation to there are different scale in which this BREEAM certification works is it has scales of pass, good very good excellent and outstanding depending on the building performance.

- BREEAM measures sustainable value in a series of categories, ranging from energy to ecology. So, it does not cosine to built environment energy it been used. It also takes into account from the buy product how much it is the building is completely affecting the ecology and ecosystem around it.
- Each of their categories addresses most influential factors, including low impact design and carbon emissions reduction; so, the main criteria which is low impact design and the low

impact design is redacting emission and carbon dioxide and other hazarded cycle which is produce while creating buy product or them material still construction. So, all this even the embodied energy also calculated in this type of certification program and carbon reduction emission; design durability and resilience; adaption to climate change; and ecological value and biodiversity protection. So, it looks more on a global scale it takes into an account even ecosystem, ecology biodiversity and everything together not just the building.

CATEGORY ISSUES AND AIMS

What are the different point's increases that BREEAM consider other one it's following so, it takes into account energy. How much energy the building is consuming. And health & wellbeing of the occupant, the new innovation or new construction technique or design to reduce the energy usage or to more create awareness to the sustainable building sector. Whatever is been made that's come at the innovation and land used. Land uses mainly for sustainable side planning so, what type of land use zoning it are done if it's beneficial for the overall city development. and materials that goes in for the construction that is made into low impact material and etc. and management how the building management service system work if it efficient enough to control the energy which goes as waste like how we join the previous presentation the water level has to be cheek on a regular basis. So, let if there is any leakage it is identified quickly and it can be operated. Safe for a campus level site of project or a huge master planning our urban design planning identifying such small strategies will be very difficult. So, developing a proper BMS department is very essential in those types of categories. And pollution so, pollution is the emission which is been created while making the buy product and also with a transportation and construction and after construction what is the pollution costing for the environment. And transportation, the transportation of the

material which is been created from the place to the site. Waste is the material that been used for the construction if it can be recycled or reusable or what are the different strategies that goes in for that. And water so, water it has to consider also water efficiency in the site planning like creating different pond on picks to hold catchment area has to hold the rainwater or naturally available water resources and generating it and reducing the water table that is actually present on the site.

AWARDING OF CREDITS

During the assessment process, each category is sub-divided into a range of issues, which promotes the use of new benchmarks, aims and targets. So, as we seen the previous slide which shows on a larger scale from energy to water conservation it even this category are also further subdivided into smaller categories which takes into account each every step and process which goes into create them building. When a target is reached credits are awarded. Once the development has been fully assessed, depending upon the total number of credits awarded, a final performance rating is achieved. So, as we said before there are different goals and aims in which BREEAM works. So, after they asses all this individual different rating systems. They give award and point each and every topic in which a point is avoided and then depending on it's given as from pass and outstanding a building is certified according to which performance.

CASE STUDY – ONE EMBANKMENT PLACE, LONDON

So, now moving on to a case study its one embankment place in London. So, this is the building which is located along the embankment of the river.

One embankment place is a commercial office building constructed in the early 1990s. Constructed above Charing Cross station, it is the first air rights building in the UK.

So, this building is constructed 1990 and it's constructed over this metro station called Charing Cross. So, there is Charing Cross metro station above which this building is been constructed. This is the first building which happens in this type.

- Approximately 40,000m^2 total floor area comprising a ground floor below the station and floor 1 to 9 above with structure, services and lifts passing through Charing Cross station. So, they have totally 40,00m^2 of area which is including Charing Cross station which is on the ground floor and from 1 to 9^{th} floor of the embankment place station there is lifts in other service area which also pass though this station.
- The current occupier PwC desired a high BREEAM rating as part of their high as part of their corporate policy along with a good EPC score and considered this high on the priorities at concept stage. So, this building was first from the beginning of the concept stage to get the certification. So, it like be a bright for a building it was designed on the basis of following the BREEAM requirements and goals, with the BREEAM requirements featuring high on the list next to space planning and cost analysis.

KEY FACTS

- BREEAM RATING: Outstanding
- Score: 96.31%
- Size: 39936 m^2. Which approximately 40,000m^2
- Stage: Post-Construction
- BREEAM version: BREEAM 2008 offices.

  So, BREEAM under 2008 office building this building was assets.

OVERVIEW OF ENVIRINMENTAL FEATURES

- Bio fuel regeneration CCHP with and absorption chillers.

- Bio fuel is sourced from locally collected and refined waste vegetable oil. So, the fuel that's been used for the chillers and the plants first space heating and space cooling are from fuel which has been used waste vegetable oils.
- Green walls and landscaped garden planting. So, this type of plantation reduces heat which during the sum of months penetrate inside, which eventually increases the air conditioning capacity.
- Waterless urinals and low flush toilets. So, this points for assets water efficiency since they have waterless urinals and they use low flush toilets.
- Comprehensive metering strategy and BMS. So, as we discuss before they have good building management service department which takes care and supervisor all the different strategies to check the requirements to meet up to BRREAM.
- Interactive screen in reception confirming building energy usage. So, they have a screen in which tells how much energy it's been used. So, when it's exceeding we will can be alerted immediately to reduce its usage.
- An innovation credit was achieved for the responsible sourcing of materials. More than >95% of materials used within the construction here responsibly sourced with an ISO 14001 certificate as a minimum. So, the material used for that construction which also met this ISO standards minimum standard of 14001 building code. So, which added the points to the BREEAM certification of this building
- Staircase installed within the atria to promote vertical movement without the use of lifts. So, when you see usually on a toll building usually they keep an escalator or lift in the central code so, people when they come use the lift. But when the lifts are moved when the staircase is placed in front people

using people are more enraged to use the staircase rather than using lifts in escalator. Which run on an energies.

THE BREEAM ASSESSMENT

So, for this building one embankment place BREEAM as certified,

- Management 100.00%
- Transportation 100%. Since mainly it located just below the Charring Cross people would be more using the charring cross station.
- Materials has 100.00%
- Energy uses 95.65%
- Waste is used for 85.71%. Since they are using more of recyclable waste and they are created awareness among the employees to use such type of methods and storing and reusing the and dumping the waste also. And water efficiency as we seen water less urinals and less water fleshing toilets are used which has given this building a used 83.33% of BREEAM assessment.
- Land usage 80%
- Innovation 80.00%

BUILDING SERVICES

- The base load of the chilled water demand is via two kW adsorption chillers driven by the hot water generated by two 520 (KWe – electrical output) biodiesel combined heat and power units. So, they are using majorly two chillier points which is been access bio fuels which comes from the waste vegetable oils. So, the source which goes in for the chillers basically very green and it reduces the impact on the environment.
- The remaining cooling duty is met by three 1.5 MW screw chillers (two duty and one standby). To provide resilience in the

system, the capacity of the screw chillers has been sized to maintain the total peak load of the building via two units, also providing backup in case CCHP is not operating for maintenance. So, they have one screw chillers for a hotter months which is 1.5 kW and there is one which is stand by which can be used when their in any problem which is been happening so they a good backup system which is been maintained by building management services again. And so this is one of image. So, as you see in main atrium here there is a staircase which is provided which encourage the users to access to the office building on the above floors to use the staircase and rather than prefer lifts and escalator.

- Boilers provide heating to the low grade hot water circuit serving the 4-pipe chilled beams within the office floor plates and the trench heaters system plus the Constant Temperature LTHW circuit serving all air handling units and fan coil circuits on the floors and the hot water service generation plant. So, they have four main pipes chilled been which is been to circulated throw the building to create this to meet to the requirements to the chilled towers. Which is catering to the air handling unit's requirements so, this is the image. So, the laby loaf.

GREEN STRATEGY

The different green strategies

- Biomass fuel has been locally sourced via Uptown Biodiesel. This is also located in London.PwC entered into a knowledge partnership with London South Bank University. This has resulted in the boo fuel being certified to EN14214. The collaboration has allowed PwC to run its CHHP engine with clean carbon neutral fuel, thus reducing the buildings EPC to 11

representing an A rating. So, the biomass fuel which has been is out sourced by a knowledge transfer program. So, the new innovation has been used in the building can be given a copy right or transferred as a knowledge to this another body from the uptown biodiesel. Which maintain these building chillier units and also uses the same knowledge to develop its further

- PwC engaged a BREEAM AP and energy modelling specialist at RIBA stage B to develop options to achieve the desired BREAM rating of Excellent with an aspiration for Outstanding. So, they are in a part of Reba council as will which is roil institute of British architect and they are developing BREEAM brings into excellent to an aspiration of outstanding the building aspiration to the leading green building assessment.

PROJECT TEAM DETAILS

Client	**Prince water house coopers**
Project manager	Turner & Townsend
Architect	TP Bennett
Main contractor	Over bury
Building services	ChapmanBDSP
BREEAM assessor	ChapmanBDSP
Structural engineers	Arup
Specialist lighting designers	ChapmanBDSP
Sustainability consultants	ChapmanBDSP

GRIHA (Green Rating for Integrated Habitat Assessment)

Now moving on the second certification program. Which is GRIHA is more for Indian type for a climate. So, its green rating for integrated habitat assessment.

- GRIHA has been conceived by TERI and developed jointly with the ministry of new and renewable energy, government of India. it is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country. So, this was created by a body called TERI combination with renewable energy resources and government India which produce this certification program. It takes into account Indian life style and climatic conditions for different zones throw our country.
- GRIHA is a national system of India.
- It evaluates environmental performance of buildings holistically over its entire lifecycle, thereby providing definitive standards for what constitute a green building. So, it also take the entire lifecycle as we have seen BREEAM only are LEED examples in which takes from resource and buy product to manufacturing and construction and also in post occupancy assessment as well.

GRIHA: CRITERIA'S

So, GIRHA works under 34 points. So, points are between51-100. This is given in different star rating.

Like if a building is 51-60 points are credits given as one star. And when higher 61- 70 it is two star. And 71- 80 it is three stars. And 81-90 it is four stars. And 91- 100 it is five stars. So, it is very similar to what we join GREHA, BREEAM from pass to outstanding likewise if 91-100 point building its get a certification of outstanding which is five stars rated. And it also takes into account,

1. Sustainable site planning
2. Protection : which is well being
3. Water management
4. Building design optimization
5. Energy performance optimization

6. Sustainable building material & construction technology
7. Waste water management
8. Renewable energy utilization
9. Solid waste management
10. Environmental quality

So, as we discussed on BREEAM it is very similar type of strategies. Which is in taken an account in GRIHA as well So, it takes in account all the different aspects which goes which takes into care ecology level to end user level on there well being too.

So moving on the case study for GRIHA,

IIT KANPUR FOR ENVIRONMENTAL SCIENCES: 5 STAR GRIHA RATED BUILDING

So, this is the overall side plan of the building.

OVER VIEW

- Optimum orientation and architectural design for reduced energy consumption and maximum comfort. So, since the design this building is also for a GRIHA rated building. So, they architect taken to the account from the design stage from every detail like how to orient each and every class room and places which demands high ventilation or a natural delighting everything is been taken into an account.
- Efficient landscape design for improved micro-climate conditions ECBC compliant envelop and systems. So, noted only the architecture sustainable side planning and landscaping of the entire site was taken care. So, it preserves the existing biodiversity, ecosystems and everything and nothing it affected by this building.
- EAT system for pre cooling of fresh air. Which will be seeing later?

- Solar PV to meet 30% of lighted energy consumption. So, likewise like how saw in leap is this green business centre. This also uses PV cell which reduces the energy demand by 30%. So, this is one of the pictures. So, as you see the glazing is reflective glazing which reflects the most of the radiation and makes very less solar radiation to penetrate and even here they have used another roof which has been products shaded by semi covered structure. Which protects the solar radiation directly falling on this roof and we can see abundant amount of landscape around which reduces solar radiation again.

- Energy consumption 98kWh/sqm/annum for AC spaces and 14 kWh/sqm/annum for non- AC spaces: water consumption reduced by 25% over BIS standards. So, these are some of the post occupancy evaluation results. Which has given for this building

INNER COURTYARDS

So, this was small packets of inner courtyards which is been introduced in this design as well to bring in light walls to reduce a artificial light usage and increase the delighting. So, as you see these picture different packets of courtyards and greenery which a round's it.

NATURAL SHADES ON WALLS AND WINDOWS

So, all the class room as you see has good deep long corridors' which products the class room which is below due to the corridor on the above the solar radiation which penetrating with in the classroom has been reduced. And these are again windows, which is been shadowed landscaping. And as you see here there is lot of slab which is been projected to shade this window. And different block has been designed in such a way there is self shading of different walls,

different time of the day. So, it products different space hazards being exposed direct sun light.

WALL INSULATION

So, these are not in the campus but these are other from private residence which is also been consider for GRIHA certification. So, like rat trap bond with glass wool and Falcón blocks for external walls. Which is created from ash that produced by the boilers.

HIGH REFLECTIVE PAINTS

So, its bounds back the solar radiation. So, as you see in this picture these are painted highly reflective materials. And also roof insulation which produces from flexuation of diurnal radiations.

Product Certification

Architecture services

- Can deliver a green home at minimum / no increment cost
- Knowledge levels sporadic.
  - Energy and water efficiency products
  - Vendor critical
- Reuse of materials.

So, these are the product certification

GRIHA has been divided into three main categories. One is first is, Product certification and different drivers for different people.

Different Drivers for Different People

It like awareness,

Occupants

- Passion, quality of life, pride.

Developers

- Business case
- Demand for green homes should increase
- Available of materials

  These are some of again drivers for different people to gets into the green rated buildings to increase the awareness.

Product certification

Product certification made be,

Individual houses

- Sourcing of materials-issues solution
- Market transformation
- Materials off the shell