

CPD: SUSTAINABLE CONSTRUCTION **ENERGY ANALYSIS OF BUILDINGS &** **BUILDING MATERIALS**

TANZANIA

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Energy and Low Income Tropical Housing

Wednesday 14th: Tour of Mbezi and Ando Factories - All

Tour of NHBRA Workshop - All

Workshop - 20 Things learnt & 20 Questions - All





ando
roofing products

We lead in quality, affordable in price

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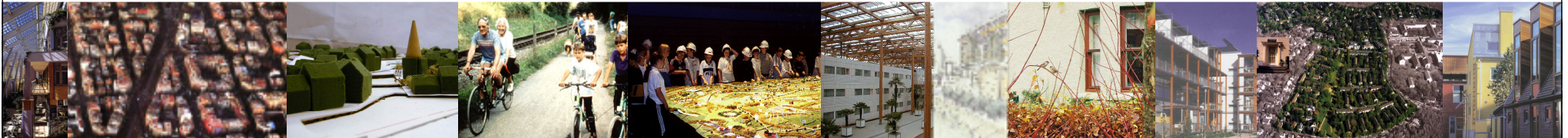








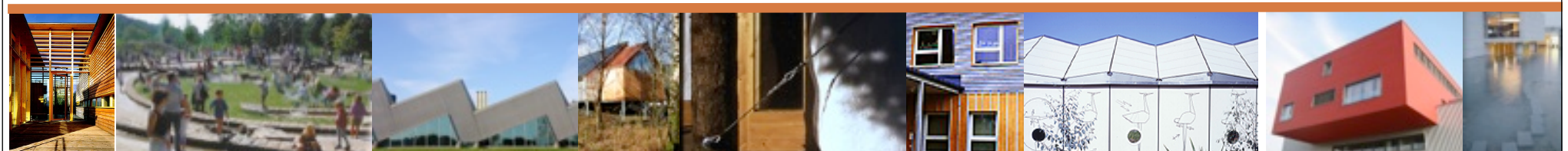




WORKSHOP

20 Things Learnt

20 Questions



LONDON BEATS

Learnt:

1. Embodied energy
2. Green house gases
3. Types of energy
4. Heat capacity & specific heat capacity of building materials
5. Natural cooling of residential houses
6. Maximum day light in houses
7. Embodied energy of sand – cement & mud bricks (comparison)
8. Utilization of geothermal energy for domestic uses
9. Processing and use of solar energy
10. Utilizations of hydropower energy
11. Storage of solar energy
12. Calculations of embodied energy in houses (residential)
13. Energy comparison between embodied energy during construction and demolition (end of house)
14. Used of biogas energy in housing
15. Comparison of embodied energy in burning bricks by gas and coal (Level of pollution)
16. Reducing embodied energy in transportation
17. Utilization of energy in refrigeration
18. The importance of forests in relation to embodied energy
19. Green house gases that have great impact to human beings
20. Useful conservation of embodied energy

Questions

1. What is the difference between energy & embodied energy?
2. What is meant by green house?
3. How global warming is related to embodied energy?
4. What are the advantages of wind energy as compared to other types of energy?
5. Why do we consider the embodied energy in houses?
6. What is the importance of knowing energy issues in housing (building industry)?
7. What are the proper uses of energy?
8. What is the effect of embodied energy to our health?
9. Mention the useful and harmful embodied gases?
10. What are the cost implications of embodied energy to housing
11. How can we minimize embodied energy in houses?
12. What house will be cool inside? The one with low embodied energy or with high level of embodied energy
13. Why do we consider embodied energy in housing only, and not in other areas?
14. Is it possible to design a cool house so that even vegetable and fruits can be stored safely? How?
15. What is the energy produced by human being and energy produced by building products?
16. What is the effect of gravitational force to emission of embodied energy
17. Does altitude affect the embodied energy
18. Nitrogen & sulfur?

INTERLOCKING GROUP

THINGS LEARNT FROM TRIP

1. Material used for making roman concrete roofing tiles
2. Procedure of making roman concrete roofing tiles
3. Materials used to make paving blocks
4. Curing process of the roman concrete roofing tiles
5. Plants and equipment used for making roman concrete tiles
6. Sources of raw materials for making roman concrete roofing tiles
7. Quality control and assessment of both raw materials and products
8. Procedure for making concrete blocks
9. Varieties of concrete blocks
10. Production rate of concrete blocks
11. Energy used for production of concrete blocks
12. Amount of water used
13. Bulk cement storage
14. Cement storage capacity in the silo
15. Packing and transportation of paving blocks
16. Procedure for making kerbstones
17. Surface renewal of aged concrete roofing tiles
18. Procedure for making granules used as coating material
19. Different types of roofing tiles produced at Ando tiles
20. Sources of raw materials used for making Ando tiles

QUESTIONS

1. What is the difference (in terms of quality and durability) between the Ando roofing tiles and others?
2. How much energy is used for production of roofing tiles, concrete blocks as well as paving blocks?
3. What is the life span of Roman concrete roofing tiles?
4. What is the life span of the Ando roofing tiles?
5. Maintenance
 - Deformation of the colour (defeats) which appears after 10-15 years there are special machines for cleaning.
 - If tiles breaks there are replacement with the rewores
6. End of life

HADIJA GROUP

Learnt

1. Addition of aluminium and zinc to steel sheets
2. They add natural stone chips to both walling and roof
3. Printing on steel sheets
4. Salt air affects binding resin
5. Steel sheets can be coated in different colours
6. Average span life is between 15 – 20 years (Ando long and Ando tiles)
7. Steel sheet gauges ie 28 gauge 0.4mm, 26 gauge (strength) 0.3mm
8. Sources of raw material , stone chips from Arusha, pigment from England, steel sheets from Korea, Japan and Taiwan
9. Energy consumption 300shs/m for sheets, 400shs/m for tiles
10. Steel sheets can take the load of 12 MPA
11. Production of sand cement blocks paving blocks using automatic machines
12. Production of tiles using sand, cement and pigment (350 kg sand, 100 kg cement and 4 kg pigment gives 102 tiles).
13. Source of material for Mbezi tiles are from Kisarawe (TZ) pigment from Germany
14. Energy used for blocks production about 100 units
15. Manual curing for blocks and curing chambers for tiles
16. They used aluminium mould for tiles production
17. Production of interlock bricks(soil-cement bricks)
18. 1 bag of cement produces 90 – 100 bricks

19. Claus content if soil determine cement content (ratio) which ranges from 10 – 40%
20. Compressive strength is 4 MPA average, weight 7 kg
21. Ratio for roofing tiles (1:2.5)
22. Raw materials for tile include sand, cement and sisal fibres (pigment)
23. Curing in water chambers not less than 14 days

Questions

1. How much water used for production process of both blocks and tiles?
2. What is the life span for BRA products?
3. How so they control the constant quality of raw materials?
4. What is the different between curing chambers and open air curing?
5. What is the best curing method?

UMOJA GROUP

Lessons

1. Private companies/owner are doing much better than government
2. The cost of a material (eg. Roofing tile) can be brought down by 40% - 75% without compromising quality
3. We process of manufacturing bricks. Pavers, tiles and blocks
4. Private firms are capital intensive compared to say NHBRA who are labour intensive
5. Curing tiles in air controlled rooms instead of using water
6. A lot of the materials and equipment are imported from Korea, China, Australia, Germany etc
7. Zn + Al are used to protect against rust and a volcanic compound from Arusha/Kilimanjaro against decolouration and ilicreane lifespan 10 between 15 and 30 years
8. No clay soil for burnt brick in Dar – the source is as far as Iringa, Songea, Mbeya, Morogoro
9. Cost @ sqm of tiles ANDO (15,500 to 158,500 Tshs)/ NHBRA (Tsh 5200)
10. Sand is got from a distance of 40km – 60 km?
11. NHBRA – Cement soil (1:16/ Mbezi – cement and sand (1: -?)
12. 26 gauge CGS sheets are used in industrial buildings compared to 28 gauge in residential building to support difference in spanning of pulling + ralters

Questions

1. How can a researchers organisation/agency enter mainstreams business?
2. What is the cost of investment ? what'/who could be potential investor?
3. What possibilities and who is available for public private ventures?
4. What lessons can we learn of private companies discipline at work?
5. What plans does NHBRA have for labour efficiency and technology?
6. How come ANDO has many more cadres than Mbezi?
7. Are we aware of who else in the EAC is attempting what NHBRA is doing? If so, who?
8. What are some successful on going projects that are employing technology from NHBRA?
9. How many NHBRA bricks/blocks per day are feasible for completion of a simple dwelling in 9months?
10. How much is one likely to save against purchasing Mbezi blocks?
11. Are Mbezi/ANDO aware of the concept of embodied energy? If so, how do they deal with it a
12. Can the tiles/bricks/blocks be made lighter?

ONE MAN TEAM

Learnt

1. How they control the quality of bricks
2. The process is more mechanised
3. How they mix the materials
4. I found that they made 600 bricks per day
5. The accuracy of roofing tiles sizes
6. Curing process of the tiles
7. Energy and water used in production of bricks: 900 lts of water and 100 kWh for producing 3000 blocks for 6 hours
8. They produce different types of bricks heavy duty and normal
9. The stand by generator is producing a lot of noises
10. Roofing tiles are produced using locally available material
11. The sand is being sieved before used for making tiles
12. Repeatedly testing of blocks for each batch
13. They produce different tiles varieties
14. The machines depends much on power (electrical power) for production
15. Tiles maintenance is free Eg. cleaning

Questions

1. Aluminium zinc +?
2. We intend to produce a mould which will produce 3 tile at a time – which/how does that work?
3. What is the amount of energy used in production of Mbezi roofing tiles
4. What the energy used or producing NHBRA tile?
5. How much energy in soil transportation to Chamanzi
6. How much energy used to produce the concrete block
7. What energy used for production of NHBRA bricks
8. Is 15 years roof tile life time enough?
9. Is 75 kgs supported by NHBRA tiles enough?
10. How do they categorised the heavy duty from light duty blocks? (Mbezi Tiles)
11. Is the source of sand for tile production at Mbezi tiles not far? (Mwakanga Kisarawe)
12. What is the thickness of coat for and roofing tiles
13. Is mining stones in Arusha (Ando tiles) does not increase the cost of the tile?
14. What type of toxication where produced in tiles productions

FOOTBALL GROUP

MBEZI TILES

A. Block paving production unit

1. Material used

- Specification fire sand
- Cement/Portland Cement
- Production Machines
 - Hopper
 - Scaling
 - Mixture
 - Computer
 - Colour Machine
- Quarry Pits
- Colour

2. Production

- Machines used producing blocks (various)

3. Usage

Blocks are used in various building purposes

- Harder blocks used for foundation
- Normal blocks used for walling etc.

B. ROOFING TILES

1. Materials used (technical specification)

- Fine sand
- Cement
- Colour/pigment 25kg per bag from German... Other colour
 - Red/Green/Yellow/Brown/Slate/Grey/Black

- Moulding

2. Production

- Rationing
- 450kg of cement & 4 kg pigments from Germany + sand 350kg gives a total of 102 pcs

3. Usage

- Tiles are used for roofing covering material
- Fixation: distance between portion should be 345 to 420 centimetre (cm)

4. Design

As per specified module profile & technical specification

Questions:

1. One bag of cement produce how may blocks?
2. At what ratio of sand & cement produce 8 blocks at once
3. What is the cost of transporting materials from quarry site to the factory?
4. What knowledge do machine operators have?
5. How may days from production to final product?
6. How many days required for a proper curing process in order to get a quality product?
7. What is the cost of producing one block?
8. What are the results of blocks you have tested?
9. Which energy used in machine operations
10. How many labour in block/paver production unit?

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Close of Day