ECO-FRIENDLY ADVANCES IN CONSTRUCTION TECHNOLOGY

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ABSTRACT

Cement is an important construction ingredient produced in virtually all countries. Carbon dioxide (CO2) is a byproduct of a chemical conversion process used in the production of clinker, a component of cement, in which limestone (CaCO3) is converted to lime (CaO). CO2 is also emitted during cement production by fossil fuel .Green building is one of the measures been put forward to moderate significant impacts of the building stock on the surroundings, society and economy? The last decades have witnessed speedy growing number of studies on green building. This paper gives a glance about how environment can be protected using some eco-friendly techniques and how global warming can be controlled in the same sense. The solution stands as there can be minimal use of cement, as well as use of alternative or substitute for cement to control global warming. Future research opportunities were acknowledged such as effects of climatic conditions on the effectiveness of green building assessment tools, validation of real presentation of green buildings, unique demands of specific inhabitants and future proofing. The research paper also includes recycling of concrete which can save use of resources. Overall, the motive of the research paper is to

Keywords*-global warming, building stock, eco-friendly techniques, green building, recycling of concrete, assessment tools, substitute.*

INTRODUCTION:

Green Construction

When one mentions about Green building, the position is specifically made to a structure and the processes involved that are, being environment friendly and resource-efficient throughout the building's life-cycle beginning from site to its design, construction, operation, maintenance, restoration and demolition everything. This actually requires a collaboration of, the architects, the engineers, and the client at all venture stages. Consecutively, with the new technologies constantly being developed, the current practice to admiring comment this is to create greener structures, the common intention being the design of green buildings to reduce the overall collision of the built environment on human health and the natural environment by: Efficiently by means of energy water and other resources Protecting occupant health and civilizing employee productivity sinking waste, pollution and ecological dilapidation. The green building approach goes beyond plummeting energy

Process of Construction

Everything starts with the project owner accomplishment out to contractors in order to ask for bids. The managers of construction that are interested in transport out the project will, then, offer a bid to the owner. The bid will include information about the amount of money that the project owner has to offer for the project to be accomplished. The following are the steps of

Used in Construction

a. Selection of Land
b. Preparation of texture for foundation
c. Built of Strong Reinforced foundation
d. Built of Structure as per Blue-print
e. Provision of various facilities in that building
f. Complete ready structure
g. Maintenance of the readymade structure

Resources used in Construction Technology

a. Cement
b. Concrete
c. Reinforced bars
d. Blocks or Bricks
e. Carpentry materials
f. Electrical wires and materials
g. Wood
h. Plastic
i. Glass
j. Other materials as per prerequisite

Chemical reaction for the Production of Cement

Following chemical reactions take place during the production of cement:
1. First of all the collected limestone decomposes into lime after getting heated at a high temperature.

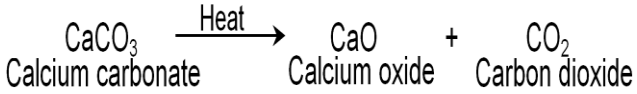

Fig.1: Reaction 1

2. The lime produced in that context is then put forward to first reaction reacts with silicon dioxide to make dicalcium silicate.

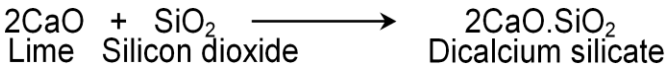

Fig. 2: Reaction 2

3. Lime also reacts with silicon dioxide which produces one more compound tricalcium silicate in that process.

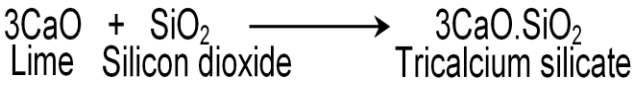

Fig.3: Reaction 3

4. Lime also reacts with aluminum oxide and further forms tricalcium aluminate.

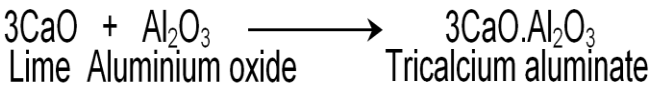

Fig.4: Reaction 4

5. In the final step calcium oxide, aluminum oxide and ferric oxide react together to form cement.

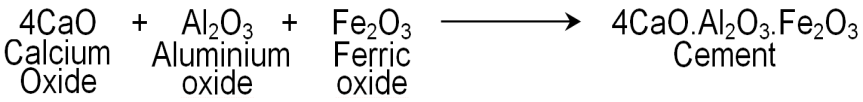

Fig. 5: Reaction 5

Note-As per the evidence of above reaction carbon-di-oxide is released in the atmosphere which causes air pollution, global warming, ozone depletion and many more. Therefore, carbon-di-oxide is a gas required for the production of cement which in turn harms the environment

Some reviews of respondents in accordance with the cement production

Several types of external reviews or audits may be appropriate such as:

• Third party audit- An audit of the documentation and calculations by an attributed organization, expert or independent third party ensures that each number is traceable to its origin. Given that much of the information used in developing CO2 emission estimates from cement production may be proprietary, a third party audit that protects confidentiality may be obligatory.

• Expert (peer) review- A detailed peer review would be suitable when a procedure for shaping CO2 emissions is first adopted or revised; it would not be looked-for on an annual basis. Such a review is designed to guarantee that the methodology precisely represents the plant's meticulous situation, is as rigorous as possible and that the data and assumptions reflect the best available information.

• Stakeholder review-Review by cement producing companies, industrial organisations and government can make available a forum for review of the methods used.

• Public review- Some countries make their entire inventory accessible for public review and comment. This process may result in a variety of remarks and issues on a broader level than other review processes. Confidential Business Information Issues Reviewing production data involves investigative data from each plant. However, given that the plant-level production data are often measured confidential, some producers may be unwilling to release production data, or to have production data released to the public.

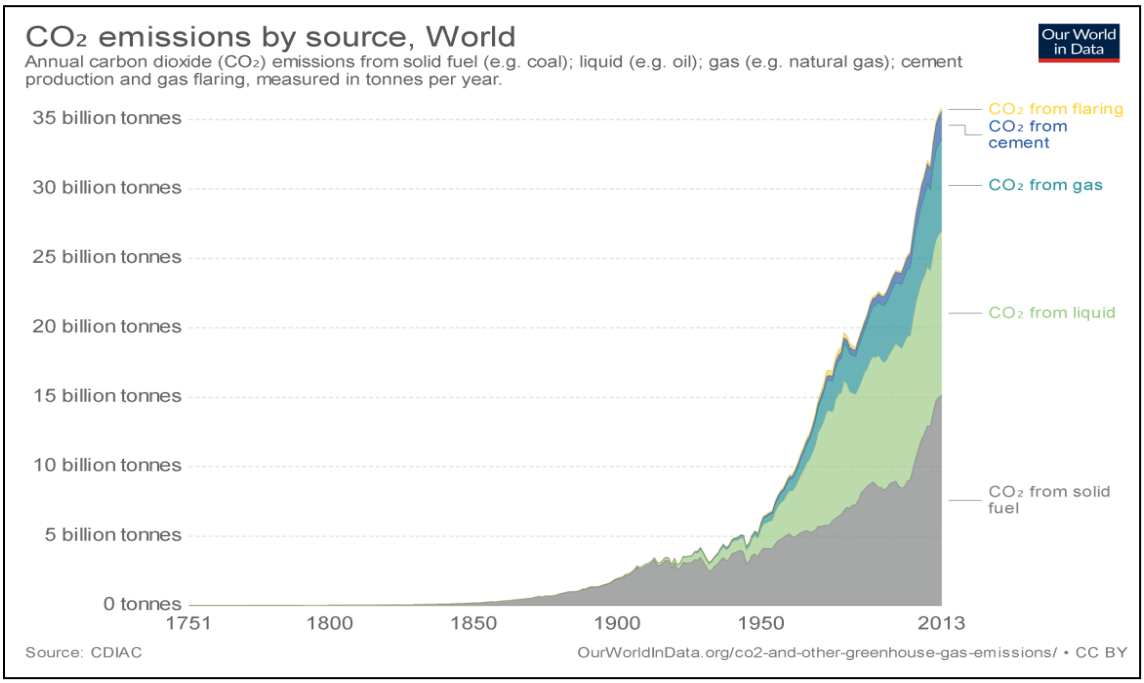

Fig. 6: Amount of CO_2 released by the production of cement

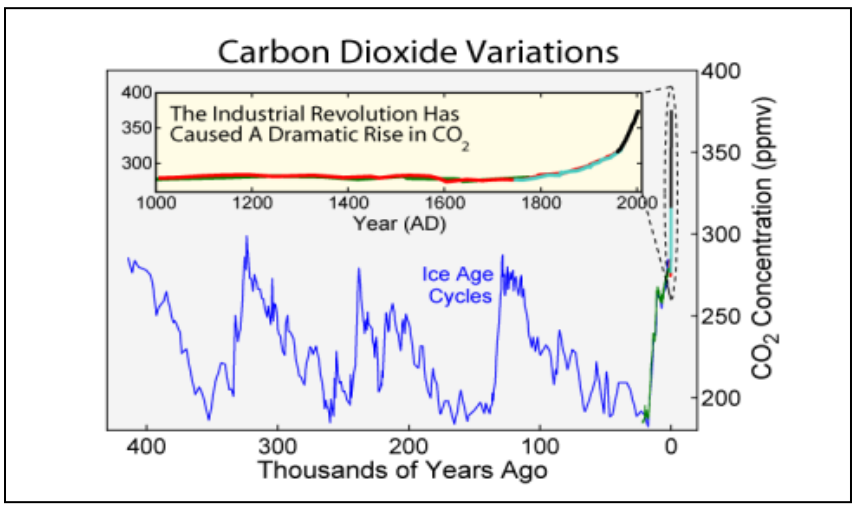

Fig. 7: CO_2 Concentration in Earth's Atmosphere

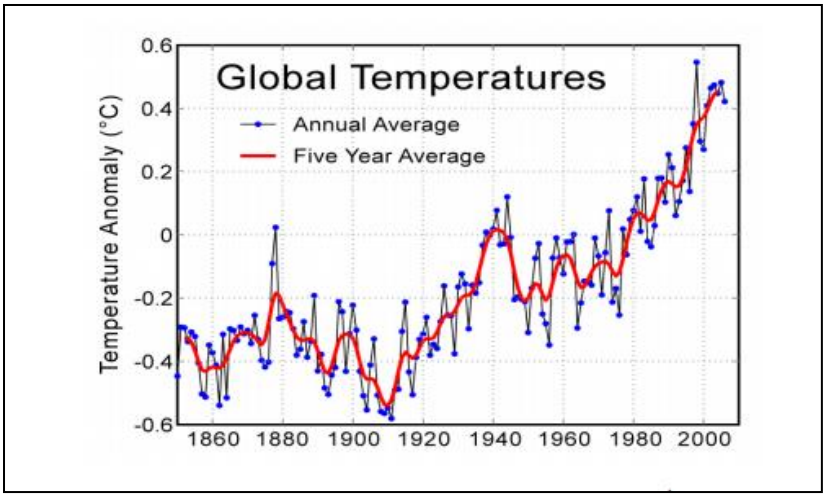

Fig. 8: Variation of Global Temperature

Concept of Eco-friendly Advances

The concept of Eco-friendly advances relates to the changes or alteration in construction technology which are eco friendly which means harmless to the Environment and beneficial for construction technology

Options of Eco-friendly Advances or alternative to cement

1. Geopolymer

Geopolymers & mdash they appear like a ceramic, deem like a ceramic, but they're not a ceramic. A geopolymer is in reality an inorganic compound that is positioning itself as eco-friendly substitute for Portland cement, the highly energy intensive and carbon dioxide producing binder used to make concrete which is used for construction. Not only are geopolymers stronger and less destructive to the earth, but they can also be prepared with byproducts of other industries such as slag and fly ash

Concrete is one of the most regular and strongest building materials on earth. Unfortunately, one of the components of concrete, Portland cement, is exceptionally energy exhaustive to make and can emit up to 1 ton of carbon dioxide for every 1 ton of of Portland cement product. Geopolymers on the other hand only release 2 tons during its lifetime.

Geopolymers are fundamentally inorganic polymers made from aluminum and silica based materials. Geopolymer cements can also be prepared from natural sources such as lava, or industry byproducts such as fly ash from coal or slag.

One of the reasons Portland cement generates so much CO2 is because its construction requires a very high temperatures through the firing process. Geopolymer, on the additional hand, doesn't have to be fired and can be set in 1-3 days, while Portland cement can acquire up to 28 days to set.

Scientists are still researching the many probable uses of geoplymers, some potentials include: plastic replacements, fire fortification, thermal insulation and shock absorption, corrosion resistance, paints and coatings, water filtration and CO2 sequestration and many more which can be beneficial to the surroundings.

2. Greencrete

Greencrete's patterned, perforated blocks allow grass or other plants to grow surrounded by them. Creating a arresting aesthetic, the grass reduces the quantity of concrete used and absorbs rainwater.

3. Hempcrete and Timbercrete

Another move toward to 'greening' concrete is to substitute cement for more natural resources Hempcrete uses the inner fibres of the ever-versatile hemp plant, a rapid growing renewable substance. While, Timbercrete uses a mixture of industrial waste sawdust and concrete. Both resources are far lighter than established concrete, leading to reduced transportation costs.

4. Mycelium

Why not nurture your own concrete-like material? Mycelium is a fully natural material made from the root makeup of fungi. It can be buoyant to grow in certain shaped molds and once dried it is tremendously light.

5. Ferrock and Ashcrete

As with Hempcrete and Timbercrete, Ferrock and Ashcrete use substitute components – this time industrial squander. Ferrock contains steel dust, building it stronger than traditional concrete and competent to absorb and trap CO2 in its drying process. Ashcrete uses fly ash, a by-product of burning coal, enabling recycled material to form 97% of conventional components.

6. Aircrete

Aircrete, also known as autoclaved aerated concrete, contains of 80% recycled content. Requiring no supplementary fireproofing, Aircrete comes off 8% cheaper than a timber enclose. The lightweight material can be used for load bearing purposes, and paint or wallpaper can be functional straight onto the smooth surface.

With a rising concern for sustainability in the industry, these modern solutions are ideal for wounding down on carbon intensive concrete.

Fig. 9: CEMENT Sample

Fig. 10:

GEOPOLYMER Sample

Use of some modified technique in Construction Technology

1. Use of Concrete crusher

Concrete crusher is the machine in which readymade or used concrete can be processed in and which used sand, grovels and cement can be differentiated separately and we can use raw materials separately for any further use.

2. Recycling of concrete

Recycling of concrete refers using the used concrete and crushing the concrete and that crushed concrete can be used in the material compostion of pavement

3. Less usage of Red Bricks

As the usage of Red Bricks leads to the soil erosion which ultimately leads to the consumption of soil and larger usage of mud which detoriate soil nutrients

4. Maximum use of Blocks

The maximum use of blocks instead of bricks should be used

On large scale because of the following reasons

a) Usage of less mortar to blocks instead of bricks

b) Avoids Soil Erosion

c) Less Labour Required

d) Less time required to build walls

e) Strength gets improved

CONCLUSION

The utmost perspective of this research paper is that eco friendly cement cannot completely replace Portland cement but we can take small effort to use it on a small scale so that to a small extent global warming, carbon-di-oxide emission can be controlled etc. As we all know that small drop of water can fill the ocean by applying same context we should take take some efforts

as well as some initiative to "GREEN AND HEALTHY ENVIRONMENT". The environmental reimbursement of eco-friendly construction are noticeable, but there are other convincing reasons to implement green building practices that may not instantly come to mind. The content includes:

- Healthier and happier workers—employees that work in green buildings account fewer headaches, as well as improvement in asthma and allergy symptoms.
- Abridged energy costs.
- The aptitude to attract and preserve top talent.
- Greater probability a green building will sell for more money than a standard building.
- Additional business opportunities that come from attractive to an ever-growing pool of cognizant consumers.

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If NATURE yields all the resources Gently, It's our Responsibility to be "Eco-Friendly".

Fig. 11: Eco Friendly Shelter