
The Role of Civil Engineering in the Ecological System

Civil engineering operations, especially ones involving large infrastructure projects, can leave a significant footprint on both the physical and naturally built environments. As such, environmental considerations in such operations have a notable impact on involved projects.

Buildings have a big impact on climate change

Buildings take up more than 40% of our global energy usage and contribute a third of our greenhouse gas emissions. This is true both for developed and developing regions of the world. Most of these emissions come from the ongoing energy consumption in the buildings – electricity, lighting, heating, and cooling. However, some non-CO2 emissions come from buildings too, like halocarbons. In the past, most emissions came from developed countries, but developing countries are catching up fast and it's expected that emissions from buildings in newly-emerging countries will soon outstrip those from developed nations.

Civil engineering can play a huge role in combating climate change

The civil engineering and building sector are in a position to deliver significant, long-term reductions in greenhouse gas emissions. Civil engineering companies like Lagan Construction Group are leading the way by using new technologies and techniques in their projects. These innovative new methods can reduce the ongoing energy consumption in buildings by up to 80% and the good news is that these methods can be used both in developed and developing countries.

Furthermore, buildings are built to last. Once a building is up, the plan is for it to stay there for a while! This means that methods and techniques used in its construction will carry on paying environmental dividends for at least decades to come. More than 80% of a building's greenhouse emissions come from the phase when it's in use – a busy office, a happy family home; the remainder of the emissions are created when it's being built, renovated and then when it's being demolished. By targeting the so-called operational phase, the time when the lights and the air-con are on, great reductions in CO2 can be achieved.

Older buildings still in their operational phase can be retrofitted, and new buildings can be made with environmental considerations. This is especially important in developing economies, as these areas will be building more structures than ever before.

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Governments have a role to play in making sure new buildings look to the future. They have to make the building and civil engineering sectors a priority in their climate change strategies and plans. Each country's government can help its building sector by introducing credible, achievable and measurable energy performance standards and targets. There should also be training provided so that there are technicians and assessors who can assess the energy performance of buildings and make sure all available technologies and methods are used. Education is also key, with all parts of the building sector becoming engaged and motivated to reach emissions targets.

If emissions from buildings are reduced then it's good for the economy and the people in it. Globally, the building, renovation, and maintenance of buildings – commercial and domestic – is around 25% of a country's GDP and employs around 10% of the populace. By introducing extra measures to make buildings greener, there's huge potential for new employment and new businesses to serve these drives and development goals.

Civil engineering has always had a big impact on our society and environment. Decisions made by the government and private investors are generally money orientated but recently some of the planning and construction of projects has been halted due to the credit crisis. Currently, problems are now being resolved and debts are being paid off. The government and Investors are recently more worried about the environment and how to tackle occurring and future problems. Society is relying on them for plans, improvement, and developments to stop civilization from suffering the further effects of global warming. The Earth summit, Kyoto Protocol and Copenhagen conference in 2009 was surrounding the issues on gas emission on global warming and what governments can do together to give society a better chance for the future. With the help of construction projects from eco-housing firms, public buildings, and private funded structures, this will allow society to be aware of the problems caused by global warming and therefore respond by giving something back to the earth. This report will be based on what the world is doing about global warming, how it is put into action in the United Kingdom and how society can help.

World leaders gather for summits and conferences to discuss current issues and affairs that concern the whole nation. Big problems such as fossil fuel crisis, scarcity of water, global warming. With these concerns addressed, the government can take action and inform the rest of the nation of the crisis we are facing in the near future. Certain nations or countries would not accept or agree with the issues that are addressed because of their economic and financial status. This causes differences and causes other problems to break out.

In 1992, more than 100 representatives from all over the world met in Rio de Janeiro for the first international Earth summit. Where Agenda 21 was first heard, the Rio Declaration on Environment and Development, the Statement of Forest Principles, the United Nations

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Framework Convention on Climate Change and the United Nations Convention on Biological Diversity. The topics that occurred in the summit were, by replacing fossil fuels with alternative energy and concern of the scarcity of water was brought to the world leader's attention. Agenda 21 is 300 pages, 40 chapters and 4 categories plan for achieving sustainable development for the 21st century. The plan consists of 'social and economic dimensions' includes dealing with poverty, promoting health etc. The conference also included a more relevant topic on 'conservation and management of resources for development' which would cover how to combat poverty, stopping or minimizing deforestation, controlling the level of pollution, protecting the environment and conserving biodiversity. There are 2 other topics which are 'strengthening the role of major groups' that includes the roles of business workers, women, and children. The last topic is 'means of implementation', which consist of education, science, and technology. The most discussed topic that is addressed in the Kyoto Protocol from the United Nations Framework Convention on climate change is the 'conservation and management of resources for development as combating global warming' due to the current world affairs. The plan of the Kyoto Protocol is an international treaty for controlling the number of greenhouse gases that go into the atmosphere to prevent further damage from global warming.

Between 7th and 18th December 2009 there was a United Nations Climate Change Conference in Copenhagen, the topic that started it off was 'Climate change: Global Risk, Challenges and Decisions' where the most important messages was the 'climatic trends' which is proving that the rate of emission had increased, climate changing dramatically and damages did the ocean and ice sheet. Another key message is 'social disruption' where society is also the main suspect for the recent change in the climate. Another key message was 'long-term strategy' which was implying to reduce intensive radioactivity in order to reduce the harm in global warming. 'Equity dimensions' means to take into consideration the effect of climate change on society. Another point was 'inaction is inexcusable' which mean climate change will affect everything and what benefit they can gain from it such as job growth, restoration of the ecosystem. Finally, the last message is 'meeting the challenge' which means with the increase of emissions, can be overcome with the help of the public and private sector. This is done by allowing society to have better knowledge of the current status.

The accord of the conference was to endorse the continuation of the Kyoto Protocol, reducing emission from deforestation and needs to enhance removals of greenhouse gas emission by forest criticism were not good as no decision was taken on whether to agree a legally binding successor to the Kyoto Protocol, only drafted by 5 countries, no real targets to achieve in emissions reductions and no international approach to technology. This shows that the COP15 was not successful enough to make a big change, but the knowledge among the public will allow the government to realize how important they take the climate change in this generation and for the next.

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Large-scale constructions in the United Kingdom are owned by private investors or the public. It is important for the planning to go accordingly and not dishearten and upset nearby residents or commuters. Housing estates built in the United Kingdom are mostly from private investors, where they have to go through a long process with the council to determine whether or not they get a planning permission. Houses are producing approximately 30% of all energy consumed and Co2 emissions, therefore, companies are starting to develop new eco-homes, where houses are designed lower carbon emissions or using renewable resources. Companies that have invested in projects have to seriously consider the problems they are going to face regarding environmental issues. As regular problems such as whether the structure or development will fit into the surrounding environment, what sort of structure is being built and considering the neighborhood.

A good example of construction and development problem is Falmer stadium near the University of Brighton. As planning permission was given by Brighton and Hove city council, problem aroused from Lewes council as the stadium was planned for construction on the boundary between Brighton and Lewes. The village of Lewes was not happy due to the problems that will occur in the future such as traffic congestion, roadblocks, pollution from vehicles and construction pollution. Problems they will be facing should not be brought to a small village. The Falmer for all group held a protest during the Liberal Democrat meeting in 17th September 2006, as the 'FFA said that there was more than 5,000 residents of the Lewes district had signed a petition' which opposed their council's court action. And a further hearing is scheduled for the 5th and 6th December. Though further debate and decisions, the government decided to give the go-ahead for the construction of Falmer stadium. Work commenced on the 17th December 2008 but the work on the actual stadium is not ready to start until April 2009. It has been said that the Falmer Stadium was one of the longest struggles for a football club to have their own stadium to be built.

A good example of an eco-friendly building is Jubilee library in Brighton, which was finished in 2004 with the overall cost of £14,500,000. The library was designed to use the natural energy provided by suns light and wind from the south coast. The suns energy is gathered through the glazed wall in winter. The Solar shading and automatically opening vents will reduce solar glare in the summer. Water use is minimized by the collection and reuse of rainwater for toilet flushing. The heat created by equipment in the building is also reused but energy use has been minimized, as the building has a high thermal mass and a solid, heavy structure called 'Termodeck'. Heat is stored in the floor and walls, being released slowly into surrounding areas as part of a low energy release ventilation and heating system. Instead of air conditioning, natural ventilation from sea breeze is released to cools the building, five-meter high wind towers on the roof use the breeze to draw excess heat from the summer. By using sunlight, both quality of the environment and of reduction of energy consumption will sustain a good surrounding environment. The building itself won several prestigious awards for design and good to the

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environment.

In the recent years, society has been looking for houses which will save them money on utility bills and help save the environment from global warming, therefore, firms like Baufritz, a design and construction company using eco-friendly timber-framed. It is calculated that a typical house consumes 250 kWh/m² whilst Baufritz consumes 40 kWh/m², a typical house uses 25 liters/m² of heating oil whilst Baufritz uses 4 liters/m² and brickwork wall loses 0.45 W/m²K though thermal transfer to exterior walls when Baufritz lose 0.16 on a 400mm thick standard "energy wall". The energy wall is constructed from an internal wall finish, plasterboard made from natural gypsum or other requested finish, natural plasterboard with protective shield against external high-frequency radiation and low-frequency electric fields, building paper to improve airtightness of wall, timber frame with fulfilling cavity insulation made from wood shavings, wood fiberboard and external timber cladding with ventilated cavity.

This concludes that world leaders are doing everything they can to come up with a solution for the concerning problem regarding global warming. Summits and conference are making a difference but not fast enough as Global warming has been an issue for the last 20 years. Although we are making slow and steady progress if decisions and actions are not made sooner, this generation and the next will suffer. As the Earth summit hardly made an impact, Agenda 21 is still an important topic and plan that nations are still using. This report shows that most decisions made in COP15 are not legally bound therefore not much progress was made. Agenda 21 and Kyoto protocol was brought up in Copenhagen and a continuation of these objectives are in order. The Key messages in the conference were addressed and encouraged nations to do their best in securing a better future. The past conferences had made an impact on the society but not enough to slow down global warming fast enough. As shown on this report, progress being made in terms of civil engineering are like companies similar to Baufritz, which is encouraging society to invest in properties that allows them to benefit from the money saved on utility bill as well as saving the environment. It is important for companies like Baufriz to have a smooth development and construction period unlike Falmer Stadium, which caused a lot of problems due to disruption to the nearby environment, therefore, putting home buyers off. The government showed a great example with Jubilee library in Brighton where its award-winning for its eco-friendliness speaks for itself. The library itself is a wonderful structure with the help of advancement on technology that allows it to be very energy efficient. As a whole, civil engineering has made changes in the past, present and will make changes for the future. With the help of governments, civil engineering gives a chance for society to independently help save the planet from global warming for the future generation. Sustainability for the future relies on the government to take further action to allow more eco developments and constructions to take place. With society's knowledge growing about the rising threat, our chances to save the future is growing.

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