FACTFILE:
GCE ENVIRONMENTAL TECHNOLOGY

RELIANCE ON FOSSIL FUELS

Rewarding Learning

Intergovernmental Panel on Climate Change (IPCC) Report, 2007

Learning outcomes

Students should be able to:

- discuss and draw conclusions from the evidence presented by the global scientific community, for example the Intergovernmental Panel on Climate Change (IPCC), linking the combustion of fossil fuels with global warming and climate change.

Course Content

The Intergovernmental Panel on Climate Change (IPCC) was jointly established in 1988, by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), with the mandate to assess scientific information related to climate change, to evaluate the environmental and socio-economic consequences of climate change, and to formulate realistic response strategies. The IPCC multivolume assessments have since then played a major role in assisting governments to adopt and implement policies in response to climate change, and in particular have responded to the need for authoritative advice of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC), which was established in 1992, and its 1997 Kyoto Protocol.

Since its establishment, the IPCC has produced a series of Assessment Reports (1990, 1995, 2001 and this one in 2007), Special Reports, Technical Papers and Methodology Reports, which have become standard works of reference, widely used by policymakers, scientists, other experts and students.

The IPCC report of 2007 is the fourth in a series of reports intended to assess the vast range of scientific and technical information relating to climate change, the effects of climate change and possible ways of dealing with its impact. It is regarded as the largest and most detailed report of its type ever produced and is the result of work and contributions by over 6000 scientific studies. The report replaces the earlier version from 2001 and will itself be followed by another report expected in 2014. It is an enormous report running to four separate publications.

The four sections of the report are;

1. Working Group 1 The Physical Science Basis.
2. Working Group 2 Impacts, Adaptation and Vulnerability.

3. Working Group 3 Mitigation of Climate Change.
4. A Synthesis Report which attempts to combine and summarise the previous three sections.

Working Group 1 - looks at current scientific knowledge of the causes of climate change and changes in climate. It tries to link changes in climate to scientific reasoning and to make projections of future changes in climate. Some of its main conclusions are;

- Levels of carbon dioxide, methane and nitrous oxide have increased markedly.
- The primary source of the increase in these levels is due to fossil fuel use, and human activity, primarily agriculture.
- On a worldwide scenario there are fewer cold days, nights and frost events whereas hot days, nights and heat waves are more common.
- An increase in ocean temperature.
- Increases in wind intensity, drought and heavy precipitation events.
- An increase in hurricane activity.
- Predictions of increased air and surface temperatures in the 21st century.

The report presents evidence that these and other events and changes in the world's climate can be attributed to levels of carbon dioxide emission.

Working Group 2 – looks at the impact of the changes in climate and states that *"evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases"*.

Some its main conclusions are that climate change has resulted in;

- Larger glacial lakes appearing in larger numbers.
- An increase in rock avalanches in mountain regions.
- Significant changes in some ecosystems found in polar regions.
- Events which normally happen in Spring e.g. unfolding of leaves and bird migration happening earlier than previously recorded.
- Predictions of larger drought affected areas in the world with some ecosystems being placed in peril and an increase in sea levels worldwide.

Working Group 3 - looks at ways in which greenhouse gas emissions such as carbon dioxide could be reduced. The areas suggested include;

- Energy supply with a move towards renewable sources and other more "eco friendly" alternatives.
- Transport with more fuel efficient vehicles, different forms of fuel and transport systems.
- Industry using more energy efficient equipment and recycling processes.
- Buildings with more efficient heat and lighting systems and alternative energy sources.
- Agriculture and forest management adopting more "eco friendly" strategies for crop, forest and grazing land management.
- Waste strategies being developed which recover energy previously lost in incineration, recycling and waste minimization.

The synthesis report attempts to bring together all of the points and information contained in the three working groups to provide a summary for the world's policymakers.

In summary, the headline findings of all of the reports were "warming of the climate system is unequivocal" and "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (caused by humans) greenhouse gas concentrations".

Global warming facts

- According to NASA – average temperatures have risen 1.4°C around the earth since 1880. The sharpest rise in temperature has occurred in recent decades.
- The rate of temperature rise is increasing – The last 2 decades in the 20th century were the warmest for 400 years. Some climate studies suggest that they were the warmest for millennia. The IPCC reported that from 1995-2007, 11 of the 12 years were among the warmest since 1850.
- According to Arctic Climate Impact Assessment (compiled between 2000-2004), average temperatures in Alaska, western Canada and eastern Russia have risen at twice the global average.
- Time lapse photography has been used to capture disappearing glaciers and to calculate

that the Arctic may have its first completely ice-free summer by 2040 – Polar bears are already suffering from sea-ice loss.

- Coral reefs are experiencing bleaching caused by rises in temperature of sea water – the worst occurrence of this took place in 1998 when bleach rates of 70% were recorded. Experts have forecasted such events to increase in frequency and intensity in the next 50 years.

Activity 1:

There is a contrasting argument that suggests that the increase of temperature is a natural fluctuation. Refer to the following links and compile a list of evidence (using the following headings) for both arguments:

- Global warming evidence
- Natural fluctuation evidence

1. http://news.nationalgeographic.co.uk/news/2007/02/070202-global-warming.html
2. http://earthobservatory.nasa.gov/Features/WorldOfChange/decadaltemp.php
3. http://whatreallyhappened.com/WRHARTICLES/globalwarming.html

Activity 2:

In Northern Ireland there have been many advances in environmentally friendly practice at domestic level. Compile a list of environmentally friendly procedures that have been adopted by your household in the last 5 years.