Zbornik referatov / Collection of Papers
ISBN 978-961-93153-8-5

2. znanstvena konferenca z mednarodno udeležbo
Konferenca VIVUS – s področja naravovarstva, kmetijstva, hortikulture in živilstva
»ZNANJE IN IZKUŠNJE ZA NOVE PODJETNIŠKE PRILOŽNOSTI«
24. in 25. april 2013, Biotehniški center Naklo, Strahinj 99, Naklo, Slovenija
---
2nd Scientific Conference with International Participation
Conference VIVUS – Environmentalism, Agriculture, Horticulture, Food Production and Processing
»KNOWLEDGE AND EXPERIENCE FOR NEW ENTREPRENEURIAL OPPORTUNITIES«
24th – 25th April 2013, Biotechnical Centre Naklo, Strahinj 99, Naklo, Slovenia

Učinek tople grede in globalno segrevanje

Miloša Gogala
Biotehniški center Naklo, Slovenija, milosag@gmail.com

Izvleček
V prispevku bom razložila učinek 'tople grede' in kako deluje. Pri tem bom omenila Zemljino ozračje, ki deluje podobno kot topla greda. Opisala bom dejavnike, ki vplivajo na učinek tople grede, govorili bomo o toplogrednih plinih in posledicah ter različnih metodah, kako omejiti izpust CO_2. Omenila bom še okoljevarstvene skupine, kot so 'Future Forest', ki jo podpirata glasbeni skupini Cold Play in Pink Floyd; Surfers against Sewage in Reclaim the Streets. Dotaknila se bom tudi dveh nasprotujočih si filmov z naslovom 'An Inconvenient Truth', katerega ideje podpira Al Gore, in 'The Great Global Warming Swindle', s podporo naftnega lobija. V predavanje bosta vključena posnetek na temo 'Aeroplane and Warming' in test bralnega razumevanja.

Ključne besede: učinek tople grede, globalno segrevanje, predavanje

Global Warming and Greenhouse Effect

Abstract
In my lecture I am going to explain a greenhouse effect and the way it works. The earth´ atmosphere, which is similar to a greenhouse will be dealt with; the factors that influence the function of a green house will be described; greenhouse gasses, the consequences and alternative ways to curb CO_{2+} emissions will be discussed ; the environmental protest groups such as Future Forest backed up by Coldplay´ and Pink Floyd, Surfers Against Sewage and Reclaim the Streets will be mentioned. Two contradictory films entitled An Inconvenient Truth supported by Al Gore and The Great Global Warming Swindle supported by a gas lobby will also be touched upon. The recording on ´Aeroplane and Warming´ and a reading comprehension tests will be incorporated into the lecture.

Key words: Global Warming, Greenhouse Effect, Lecture

1. The Process of Greenhouse

In a greenhouse, energy from the sun passes through the glass as rays of light. This energy is absorbed by the plants, soil, and other objects in the greenhouse. Much of this absorbed energy is converted to heat, which warms the greenhouse. The glass helps keep the greenhouse warm by trapping this heat. The earth's atmosphere acts somewhat like the glass of a greenhouse. About 31 % of the incoming radiation from the sun is reflected directly back to space by the earth's atmosphere and surface (particularly by snow and ice), and another 20 % is absorbed by the atmosphere. The rest of the incoming radiation is absorbed by the earth's oceans and land, where it is converted into heat, warming the surface of the earth and the air above it. Particular gases in the atmosphere act like the glass of a greenhouse, preventing the heat from escaping.

2. Greenhouse Gases

These greenhouse gases absorb heat and radiate some of it back to the earth's surface, causing surface temperatures to be higher than they would otherwise be. The most important naturally occurring greenhouse gas is water vapour and it is the largest contributor to the natural greenhouse effect. However, other gases, although they occur in much smaller quantities, also play a substantial and growing role in the greenhouse effect. These include carbon dioxide, coming from the combustion of fossil fuels in cars, factories and electricity production, methane – released from landfills and agriculture (especially from the digestive systems of grazing animals)and nitrous oxide from fertilizers, gases used for refrigeration and industrial processes, and the loss of forests that would otherwise store CO_2.

3. The Consequences of the Greenhouse Effect

Now, with concentrations of greenhouse gases rising, Earth's remaining ice sheets (such as Greenland and Antarctica) are starting to melt too. The extra water could potentially raise sea levels significantly.

As the mercury rises, the climate can change in unexpected ways. In addition to sea levels rising, weather can become more extreme. This means more intense major storms, more rain followed by longer and drier droughts (a challenge for growing crops), changes in the ranges in which plants and animals can live, and loss of water supplies that have historically come from glaciers. Without this natural green house effect, the earth would be much colder than it is now – about 33 °C colder – making the average temperature on the planet a freezing -18 °C rather than the balmy 15 °C it is now. The warmth of our climate is crucial because on earth and in the atmosphere, water can exist in all three of its phases – frozen as snow or ice, liquid as water, and gaseous as water vapour. The cycling of water from one phase to another is critical to sustaining life since it is this cycling of water through the land-ocean-atmosphere system that replenishes the water available to life on earth. The water cycle is also an important part of what drives our weather and the climate system generally. Some impacts from increasing temperatures are already happening.

Other effects could happen later this century, if warming continues.

- Sea levels are expected to rise between 7 and 23 inches (18 and 59 centimetres) by the end of the century, and continued melting at the poles could add between 4 and 8 inches (10 to 20 centimetres). The ice sheets of Greenland and Antarctica contain about 99,5 per cent of the Earth´s glacier ice and could raise sea levels by 65 metres if they melted completely – although experts think this is highly unlikely in the foreseeable future. The study published in the journal Nature Climate Change claims that glaciologists believe there is one in 20 chance of sea levels rising by a metre or more by 2100. The impacts of sea level rise of this magnitude are severe, implying a risk of the forced displacement of up to 187 million people within this century.
- Hurricanes and other storms are likely to become stronger.

- Species that depend on one another may become out of sync. For example, plants could bloom earlier than their pollinating insects become active.
- Floods and droughts will become more common. Rainfall in Ethiopia, where droughts are already common, could decline by 10 percent over the next 50 years.
- Less fresh water will be available. If the Quelccaya ice cap in Peru continues to melt at its current rate, it will be gone by 2100, leaving thousands of people who rely on it for drinking water and electricity without a source of either.
- Some diseases will spread, such as malaria carried by mosquitoes.
- Ecosystems will change—some species will move farther north or become more successful; others won't be able to move and could become extinct. Wildlife research scientist Martyn Obbard has found that since the mid-1980s, with less ice on which to live and fish for food, polar bears have gotten considerably skinnier. Polar bear biologist Ian Stirling has found a similar pattern in Hudson Bay. He fears that if sea ice disappears, the polar bears will as well.

4. Solutions to Global Warming

The technologies and approaches outlined below are all needed to bring down the emissions of greenhouse gases by at least 80 percent by mid-century.
Boosting energy efficiency: The energy used to power, heat, and cool our homes, businesses, and industries is the single largest contributor to global warming. Energy efficiency technologies allow us to use less energy to get the same—or higher—level of production, service, and comfort. This approach has vast potential to save both energy and money, and can be deployed quickly.

- Greening transportation: The transportation sector's emissions have increased at a faster rate than any other energy-using sector over the past decade. A variety of solutions are at hand, including improving efficiency (miles per gallon) in all modes of transport, switching to low-carbon fuels, and reducing vehicle miles travelled through smart growth and more efficient mass transportation systems.
- Painting roofs white: One of the simplest, yet most effective, ways of engineering the urban environment to cope with global warming is to increase the reflectivity(albedo) of the cityscape so that more of the incoming sunlight is directed back into space.
- Revving up renewables: Renewable energy sources such as solar, wind, geothermal and bioenergy are available around the world. Multiple studies have shown that renewable energy has the technical potential to meet the vast majority of our energy needs. Renewable technologies can be deployed quickly, are increasingly cost-effective, and create jobs while reducing pollution.
- Phasing out fossil fuel electricity: Dramatically reducing our use of fossil fuels—especially carbon-intensive coal—is essential to tackle climate change. There are many ways to begin this process. Key action steps include: not building any new coal-burning power plants, initiating a phased shutdown of coal plants starting with the oldest and dirtiest, and capturing and storing carbon emissions from power plants. While it may sound like science fiction, the technology exists to store carbon emissions underground. The technology has not been deployed on a large scale or proven to be safe and permanent, but it has been demonstrated in other contexts such as oil and natural gas recovery. Demonstration projects to test the viability and costs of this technology for power plant emissions are worth pursuing.
- Managing forests and agriculture: Taken together, tropical deforestation and emissions from agriculture represent nearly 30 percent of the world's heat-trapping emissions. We can fight global warming by reducing emissions from deforestation and forest degradation and by making our food production practices more sustainable.
- Making the trunk call: Trees in Brazil's Amazon rainforest are being fitted with mobile phones in an attempt to tackle illegal logging and deforestation.
- Exploring nuclear: Because nuclear power results in few global warming emissions, an increased share of nuclear power in the energy mix could help reduce global warming—but nuclear technology poses serious threats to our security and, as the accident at the Fukushima Diaichi plant in Japan illustrates to our health and the environment as well. The question remains: can the safety, proliferation, waste disposal, and cost barriers of nuclear power be overcome?
- Developing and deploying new low-carbon and zero-carbon technologies: Research into and development of the next generation of low-carbon technologies will be critical to deep mid-century reductions in global emissions. Current research on battery technology, new materials for

solar cells, harnessing energy from novel sources like bacteria and algae, and other innovative areas could provide important breakthroughs.

- Ensuring sustainable development: The countries of the world—from the most to the least developed—vary dramatically in their contributions to the problem of climate change and in their responsibilities and capacities to confront it. A successful global compact on climate change must include financial assistance from richer countries to poorer countries to help make the transition to low-carbon development pathways and to help adapt to the impacts of climate change.
- Influencing and working on people's conscience through environmental groups such as Friends of the Earth who belong to a global network representing more than 2 million activists in 76 different countries. They urge policymakers to defend the environment and work towards a healthy environment for all people and Future Forest – a partnership of regions which strive to contribute to carbon sequestration and the reduction of risks caused by climate change.
- In particular it looks at:
  - Adaptation of forests to maintain their resilience
  - How forests can help society adapt to the impacts of climate change
  - How trees and timber can do more than just lock away carbon
- Partner regions
- Each of the seven partners is responsible for looking at the challenges to be faced:
  - Auvergne, France – biodiversity
  - Brandenburg, Germany – knowledge transfer
  - Bulgaria – soil protection
  - Catalonia – natural risks
  - Latvia – timber production
  - Slovakia – carbon sequestration
  - Wales – water management

Adapting to changes already underway: As the Climate Hot Map demonstrates, the impacts of a warming world are already being felt by people around the globe. If climate change continues unchecked, these impacts are almost certain to get worse. From sea level rise to heat waves, from extreme weather to disease outbreaks, each unique challenge requires locally-suitable solutions to prepare for and respond to the impacts of global warming. Unfortunately, those who will be hit hardest and first by the impacts of a changing climate are likely to be the poor and vulnerable, especially those in the least developed countries. Developed countries must take a leadership role in providing financial and technical help for adaptation.
The Doha climate summit agreement which delayed vital action to tackle global warming till 2020 will increase the cost by 25% ensuring emissions are reduced to a level that give the world a fair – 60 per cent chance of keeping global warming to two degrees.

However, there are certain groups which claim that global warming is´ the biggest hoax the world has ever seen´. A few of them are David and Charles Koch who are extraordinarily wealthy. They are right-wing libertarians who believe in minimal regulation of industry, smaller government, lower corporate taxes and less generous social services. Together, the two brothers have given millions of dollars to non-profit organisations that criticise environmental legislation and support lower taxes for industry. David Bellamy, a famous English botanist, is also one of the activists who is certain that global warming is nothing but ´poppycock´. The film The Great Global Warming Swindle supports the idea directed against global warming, so the doubts about global warming have been raised by different groups. Now it depends on you what idea you will be in favour of.

5. Listening Comprehension Exercise on Global Warming - Testing

Aeroplanes and global warming (tapescript) – Listening comprehension

http://c0953132.cdn.cloudfiles.rackspacecloud.com/magazine-aeroplanes-and-global-wlarming.mp3

Have you ever looked out of the window of a plane at 30,000 feet at the vast expanses of empty ocean and uninhabited land, and wondered how people can have any major effect on the Earth?
Instructions

Gimme a ticket for an aeroplane,
Ain't got time to take a fast train.
Lonely days are gone,
I'm a-goin' home,
'Cause my baby just a-wrote me a letter.
Wayne Carson Thompson - The Letter

Have you ever looked out of the window of a passenger plane from 30,000 feet at the vast expanses of empty ocean and uninhabited land, and wondered how people can have any major effect on the Earth? I have. But it is now becoming pretty clear that we are causing a great deal of damage to the natural environment. And the planes which rush us in comfort to destinations around the globe, contribute to one of the biggest environmental problems that we face today – global warming.

For those of us lucky enough to have money to spend, and the free time to spend it in, there are a huge number of fascinating places to explore. The cost of air transport has decreased rapidly over the years, and for many people, especially in rich countries, it is now possible to fly around the world for little more than the contents of our weekly pay packets.

Unfortunately, planes produce far more carbon dioxide (CO_2) than any other form of public transport, and CO_2 is now known to be a greenhouse gas, a gas which traps the heat of the sun, causing the temperature of the Earth to rise. Scientists predict that in the near future the climate in Britain will resemble that of the Mediterranean, ironically a popular destination for British holidaymakers flying off to seek the sun. If global warming continues, we may also find that many tourist destinations such as The Maldives have disappeared under water because of rising sea levels.

As usual, people in the developing world are having to deal with problems created mainly by those of us in developed countries. Beatrice Schell, a spokeswoman for the European Federation for Transport and Environment says that, "One person flying in an airplane for one hour is responsible for the same greenhouse gas emissions as a typical Bangladeshi in a whole year." And every year jet aircraft generate almost as much carbon dioxide as the entire African continent produces.

When you are waiting impatiently in a crowded departure lounge for a delayed flight or trying to find luggage which has gone astray, plane fares may seem unreasonably high, but in reality we are not paying enough for air travel. Under the "polluter pays principle", where users pay for the bad effects they cause, the damage caused by planes is not being paid for. Aircraft fuel is not taxed on international flights and planes, unlike cars, are not inspected for CO_2 emissions. Also, the Kyoto agreement does not cover greenhouse gases produced by planes, leaving governments to decide for themselves who is responsible.

So what can be done to solve the problem? Well, although aircraft engine manufacturers are making more efficient engines and researching alternative fuels such as hydrogen, it will be decades before air travel is not damaging to the environment. Governments don't seem to be taking the problem seriously, so it is up to individual travellers to do what they can to help.

The most obvious way of dealing with the problem is to not travel by plane at all. Environmental groups like Friends of the Earth encourage people to travel by train and plan holidays nearer home. However with prices of flights at an all time low, and exotic destinations more popular than ever, it is hard to persuade British tourists to choose Blackpool instead of Bangkok, or Skegness over Singapore. Friends of the Earth also advise using teleconferencing for international business meetings, but most businesspeople still prefer to meet face-to-face.

However there is a way of offsetting the carbon dioxide we produce when we travel by plane. A company called Future Forests, whose supporters include Coldplay and Pink Floyd, offers a service which can relieve the guilty consciences of air travellers. The Future Forest website calculates the amount of CO_2 you are responsible for producing on your flight, and for a small fee will plant the number of trees which will absorb this CO_2. Another company, co2.org, offers a similar service, but invests your money in energy saving projects such as providing efficient light bulbs to villagers in Mauritius.

Yesterday I returned to Japan from England, and was happy to pay Future Forests 25 pounds to plant the 3 trees which balance my share of the CO_2 produced by my return flight. Now the only thing making me lose sleep is jet lag.

You are going to hear a passage about aeroplanes and global warming. While listening, circle the answer (A – D), which best completes each statement (1 -8). Start studying the statements now.

1) One of the causes of global warming mentioned is_____.
a) the empty ocean
b) natural environment
c) airplanes
d) the uninhabited land

2) Travelling around the world by plane requires _____.
a) a lot of money
b) a little money
c) a good job
d) adventurous spirit

3) CO_2, greenhouse gas, has caused _____.
a) the change of climate
b) the disappearance of the Maldives
c) the increase of temperature
d) the decrease of temperature

4) Most greenhouse gas emissions are produced by _____.
a) developing countries
b) Schell chain companies
c) developed countries
d) airplanes

5) The price of a plane ticket in reality is _____.
a) reasonable
b) underestimated
c) high
d) exorbitant

6) Reduction in air travel requires_____.
a) the increase of ticket prices
b) the creation of environmental groups
c) the cancellation of business meetings
d) a change in user's perception

7) One can compensate for travelling by plane by _____.
a) joining environmental groups
b) relieving guilty conscience in a church
c) paying an additional fee
d) investing money in other means of transport

8) The speaker of the recording is _____ about environment.
a) concerned
b) irresponsible
c) indifferent
d) conscientious

Key: 1)c, 2)b, 3)c, 4)c, 5)b, 6)d, 7)c, 8)d
Source: British Council, Listening Magazine

6. Reading Comprehension Exercise on Global Warming - Testing

Read the following article. Complete the statements (1 -7) using no more than SIX words.

Beijing is left fighting for breath as pollution goes off scale

Sixteen of the world's 20 most polluted cities are in China. Now after years of denials, officials admit they have a problem with smog –rather than 'fog'

My kids can tell when it is a bad day for smog in Beijing. It seeps into the hall of our apartment building and they can taste it in the air – it's tangy, like an airborne mixture of oil and gas. Usually, we take a quick look out of our front window on to Jianguo Avenue, the thoroughfare that traverses central Beijing and is permanently full of cars, to test whether the air is clean enough for us to see the skyscrapers across the street. Today – when pollution readings were at such hazardous levels that they had risen above the scale used to measure them – all we could see were clouds of pollution.

The smog was so thick that more than 50 flights were cancelled at Beijing Capital International Airport, causing chaos ahead of Chinese New Year, when city-dwellers travel to see relatives. Despite warnings from the authorities not to venture outside, we decided to don our pollution masks and take a quick trip to the shops. The warnings are increasingly common but are not observed by most residents who cannot afford – or stand – to spend days confined to their homes.

A trip out in the smog is rare for our family: my partner and I usually don't let our children go out when the readings are very high. But "very high" is also a relative term. We have become aficionados of the China Air Quality mobile phone app, which displays data collected by the US Embassy in the Chinese capital.

The Air Quality Index was at 500 for much of the day – the highest and most hazardous level on the scale, suggesting that the air quality may have been even worse. The World Health Organisation recommends 20 as a healthy level.

Tiny PM2.5 particles are of particular concern "since they are small enough to directly enter the lungs and even the blood stream", according to the US Embassy's website, and they are known to cause lung cancer, bronchitis and asthma. Thankfully, our children have not suffered any ill health as a result of exposure to pollution, but I developed mild asthma because of the smog a few years ago.

For years, the Chinese government insisted on referring to the smog as "fog" and released unrealistically low air-quality readings. Now, the official data has become more reliable and the government calls it "smog", but this has only left local people even more concerned that the situation is far worse than is reported. The World Bank reckons that 16 of the world's 20 most-polluted cities are in China. The China Air Quality app gives subscribers the opportunity to see which cities are the worst every day. While Beijing feels as though it should be top of the list to us, it is often far down the list. Late in the evening, Shijiazhuang, one of the worst serial offenders, was "beyond index", while Sanya in the south, on Hainan island – known for having the cleanest air in China – displayed a reading of just 22.

Coal-fired power stations account for more than 70 per cent of China's energy production, while nearly 20 million vehicles were sold across the country last year, making it the world leader in car sales. Sometimes it seems as it they are all driving up and down outside our window.

Authorities said they would take emergency measures to curb the pollution levels in Beijing, halting production at 103 high-emissions companies, while government agencies and state-owned firms were ordered to cut vehicle use by 30 per cent before Thursday, when it is believed that the air should begin clear. – until the next time the reading goes "beyond index", that is.

1) The family decided to go out despite pollution warnings because they had _____.
2) The parents rely on _____ for measuring air pollution.
3) A still healthy level on the scale measuring air quality is _____.
4) Pollution causes several respiratory diseases such as: _____, _____.
5) The city, which is known to cause the highest level of pollution in China, is called _____.

6) The factors that most contribute to Chinese pollution are car sales and _____.
7) Several _____ were taken to decrease pollution in Beijing.

Key: 1) masks, 2) Chinese Air Quality mobile phone app, 3) 20, 4) lung cancer, bronchitis, asthma 5) Shijiazhuang 6) coal-fired power stations 7) measures
Source: The Independent, 29th January

Literature

National Geographic Society, online, http://environment.nationalgeographic.com/environment/global-warming/, access 22nd January 2013.

Union of Concerned Scientists, Solutions to Global Warming, online, http://www.climatehotmap.org/global-warming-solutions/, access 22nd January 2013.

The Independent, online, http://www.independent.co.uk/news/science/2012 - was ninth warmest year on record, access 16th January 2013.

The Independent, online, http://www.independent.co.uk/environment/climate change/fear of catastrophic sea-level rise as ice sheets melt faster than predicted, access 7th January 2013.

The Independent, online, http://www.independent.co.uk/environment/climate change/ how to catch illegal logging in the Amazon? Make the trunk call, access 16th January 2013.

The Independent, online, http://www.independent.co.uk/environment/ climate-change/painting roofs white is as green as taking cars off the roads for 50 years, access 13th January 2013.

Friends of the Earth, online, http://www.foe.org/, access 13th January 2013.

Future Forest, online, http://www.futureforest.eu/, access 13th January 2013.

The Independent, online, http://www.independent.co.uk/environment/climate change/How the ´Kochtopus´stifeled green debate, access 24th January 2013.

The Independent, online, http://www.independent.co.uk/news/people/profiles/David bellamy:´I was shunned. They didn´t want to hear´, access 13th January 2013.

Source for climate information: IPCC, 2007.

British Council: Magazine, Listening comprehension.