

# NitroEurope – ‘Your Turn Event’:

CEH Edinburgh, 24<sup>th</sup> October 2007

## Background

In 2006, CEH Edinburgh on behalf of NitroEurope hosted a ‘Your Turn’ event for young leaders run by the UK Charity “Common Purpose”. As a result of the successful CEH day in 2006, we were invited to host a programme day as part of the 2007 event.

Common Purpose ([www.commonpurpose.org.uk](http://www.commonpurpose.org.uk)) organises educational programmes and websites that challenges young people (14-18 yrs) from all backgrounds to think in new ways about their local town or city and their world and how they can contribute to them.

CEH provided a day of activities and challenges based on the nitrogen cycle and its interactions with the carbon cycle. In addition it gave an opportunity to showcase some of the research currently being done by CEH scientists within the EU integrated project NitroEurope ([www.nitroeuropa.eu](http://www.nitroeuropa.eu)).

## Participants

Thirty-four schoolchildren from 13 Edinburgh based secondary schools took part in the event.

### *Common Purpose staff*

*Louise Nolan*

*Miki O’Halloran*

### *CEH staff contributing to the organisation of the day or the programme;*

*Bill Bealey*

*Davis Innes*

*Bill Heron*

*Ian Leith*

*Sue Owen*

*Stefan Reis*

*Mark Sutton*

*Amanda Thomson*

*Netty van Dijk*

## Introduction

Mark Sutton welcomed the young people to CEH and gave a short overview of the research currently being done at the CEH Edinburgh, focussing on nitrogen pollution and climate change.

## Programme

The ‘Your Turn’ event is held over 3 days (see Annex 1 for complete 3 day programme) with CEH Edinburgh hosting one of the days. In 2006, the CEH day was on the second of the 3 days and we organised the majority of the sessions. As we were asked to host the first day this year, the programme began with a number of Common Purpose sessions (led by Louise Nolan). These short sessions were designed to a) describe the role of Common Purpose and the activities planned for the 3 day programme which were based around environmental issues, b) outline the ground rules and what was expected from the participants and c) allow them to get to know each other.

Following the introductory sessions by Common Purpose staff, an invited speaker Andrew Baird, Head of News for the Scottish Government, ran a practical session on how to ask good questions.

This included a practical question and answer exercise which involved the questioner having to find the fictitious identity of their partner.

### **Group activities**

Three activities were provided for the young people by CEH staff: NitroGenius game, Carbon Game and the lichen nitrogen experiment. Groups of 10 or 11 young people moved from one activity to the next in rotation.

#### **NitroGenius (Bill Bealey)**

NitroGenius is a computer game developed by Play2Learn together with ECN (Energy Research Centre) and Alterra (Green World Research) ([www.serc.nl/play2learn/products/nitrogenius/](http://www.serc.nl/play2learn/products/nitrogenius/)). The game is designed to illustrate in a simple way the complex relations within the nitrogen pollution problem. Combining agriculture, industrial and transportation influences, the game aims to improve understanding of nitrogen's movement in the environment. Four players (representing Agriculture, Government, Industry and Society) make decisions on how best to manage nitrogen at a national scale for The Netherlands. These decisions influence the virtual pollution levels in The Netherlands as well as jobs, wealth and happiness. Each player has the opportunity to represent each of the four sectors in rotation and the player's score at the end of the game reflects how well they have made their decisions. Bill Bealey briefly explained the rules of the game before the session started. The young people were split into teams of 2 or 3 and each team represented a player in the game. The young people played 3 rounds (representing years) as each of the sectors (Figure 1).



Figure 1. Children working in groups on the NitroGenius computer game.

#### **Carbon Game (Amanda Thomson & Sue Owen)**

This game was developed during the last few years by scientists at CEH Edinburgh, to introduce young people to the key components of the carbon cycle (Figure 2). Main sources and sinks of carbon, residence times of carbon in different environmental pools, exchanges that occur between pools are all addressed in this floor-sized board game where the young people are the moving pieces (“carbon molecules”). The scoring system conveys the global environmental need to hold carbon in long-term storage pools to avoid ever-increasing concentrations of carbon based greenhouse gases

in the atmosphere. Large numbers of points are gained if the carbon molecule finds itself in a long-term storage pool.

The game begins with all carbon molecules starting in the atmosphere, which is a square in the centre of the floor board. A large dice is thrown, and different pictures on the different dice faces indicate to the molecule where it goes next (plants via photosynthesis, ocean via deposition, dissolution, etc). The molecule then “exchanges” to that pool (another square on the floor-board). At each carbon pool, a dice is thrown or a spinner is turned to indicate the molecule’s next exchange. For example, from the plant pool, the molecule might be consumed and stored in an animal, or might become part of the soil or an oil deposit. Depending on the time that carbon is normally locked in each pool in the real world, points are allocated and accumulated on the molecule’s score sheet. Whenever the carbon molecule returns to the atmosphere pool (by respiration, fossil fuel burning etc), one of five “lives” is lost. When each of the five atmospheric lives has been lost, that carbon molecule has finished the game, and can add up points scored by being locked out of the atmosphere in different pools during the course of the game. The winning molecule is the one that has spent the longest time locked out of the atmosphere.



Figure 2. Young people working on the Carbon game activity.

### **Lichen Nitrogen Experiment (Ian Leith & Netty van Dijk)**

The aims of the lichen nitrogen experiment were to a) introduce the young people to the concept of using lichens as biomonitors of nitrogen pollution by using a simple chemical test and b) demonstrate that lichens can be classified into 3 main groups depending on their shape and size. Lichens have been used in the past as bioindicators of sulphur dioxide pollution. More recently, they have also been used to assess impacts of atmospheric nitrogen. Increased nitrogen (ammonia) is a serious problem for lichens biodiversity, especially around intensive livestock farms. Lichens can be divided into 2 main categories, those that like nitrogen and those that do not. The students were told that nitrogen-liking lichens have a higher thalli (leaf) surface pH than the nitrogen sensitive lichens. Using simple pH indicator sticks, the students were given five different lichen species and asked to determine which species liked nitrogen and which did not (Figure 3). The students were also asked to classify 6 lichen species as either fruticose, foliose or crustose type lichens. A number of the students had heard of lichens and biomonitoring through course work at school but had no practical knowledge of them. The session demonstrated the wide diversity of lichen types; it allowed the students to handle the lichens and also introduced the concept of lower plants as bioindicators of air pollution. The majority of students were able to identify successfully

the nitrogen liking and nitrogen sensitive lichens and also the different forms of lichens.



Figure 3. Measuring the surface pH of the lichen thalli (leaf) as part of the lichen nitrogen experiment.

### **Trading Game (Afternoon session)**

The entire afternoon session was a practical exercise called the Trading Game, led by Common Purpose staff with CEH staff (Bill Bealey, Ian Leith, Amanda Thomson, Mark Sutton and Netty van Dijk) providing expert advice.

The young people were split into 6 working groups. Each group were tasked with producing a campaign to raise young people's awareness of how nitrogen is linked to different environmental problems. The groups were encouraged to be creative in the type of campaign they designed. Each group were given some currency to help them complete their task, allow them to purchase items and services and also invest in the stock market. There was also a Bank which allowed the groups to carry-out transactions and bank money. At the end of the session each of the groups had to present their campaign to the other groups and to a judging panel (CEH Staff). The groups were assessed on the quality and creativity of their campaign and also the amount of currency they had accumulated.

The aims of the game were to;

- Heighten awareness of nitrogen excess in environmental issues
- Introduce some of the basic concepts of wealth creation
- Encourage work in teams and also create competition between groups

The six campaigns were;

1. **Recycle/reshape** – a TV advert – using a David Beckham character – Slogan: 'This isn't any world it is a recycling world'.
2. **Recycling – Social networking**- a TV campaign which would also raise money through the sale of tee-shirts. Campaign would give 20% to environmental research.
3. **Dual – fuel**; a poster campaign highlighting a new concept in recycling of energy resources. 'Produce cows – cows produce dung –eat cows and then use the dung to produce biofuel'.

4. **Eco monliho**; A poster campaign highlighting the environmental impacts of nitrogen pollutants especially nitrogen dioxide and vehicles.
5. **City-air**; Advertisement campaign at football matches using pitch-side advertising boards. Public transport means cleaner air. Campaign was aimed to target a range of environmental issues.
6. **Walk to school**; Reward scheme campaign –giving away free arm bands. Campaign to highlight child obesity and road accidents.

All the campaigns were imaginative and the young people worked enthusiastically within the groups. The groups each took different approaches to the wealth creation task; one group simply banked all their money; another’s successfully speculated on the stock exchange; one group obtained sponsorship money from one of the CEH experts; one group sold coloured paper to the other groups. The Trading Game activity was very popular with the majority of the children.

The winning group was **Recycling –Social networking**. They produced an imaginative campaign, presented it well and also had the largest wealth creation.

### Event evaluation

CEH distributed a participant feedback form which was completed by 31 of the 34 young people. The form template can be found in Annex 2. The form is comprised of 4 sections 1; general question on environmental issues 2; NitroGenius; 3; Carbon Game and 4; the lichen experiment.

### Environmental Issues

This general question was included to gauge the level of importance of environmental issues to young people. The results show that environmental issues are important to them. Although there was nobody who thought they were not important there was around 30% that were not sure. Last year a much more detailed introduction into nitrogen pollution and environmental issues in general was given at the start of the day. Due to the programming this was not possible this year and the question results possibly reflect this. The young people appear to have knowledge of environmental issues but are more familiar with recycling type issues and this came across in their chose of campaign topics (Figure 4).

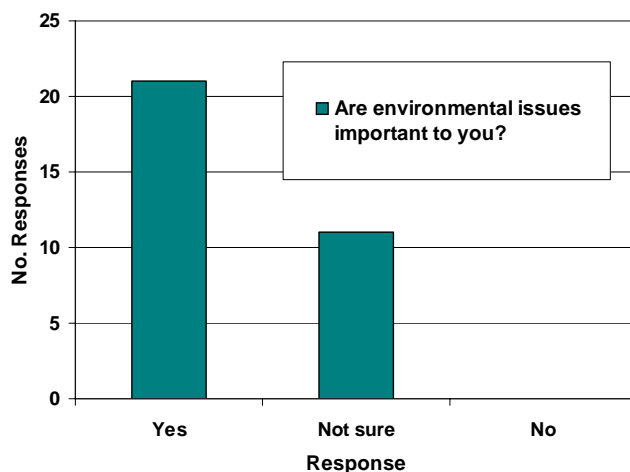


Figure 4. Evaluation response to the question ‘are environmental issues important to you’.

## Nitrogenius

The responses show (Figure 5) that the young people thought the game was well explained and they knew enough about the subject. From the comments form, it was clear that some of the young people required more of an introduction to the subject. Last year, the introductory talk which included some information on the game at the beginning of the day did provide this additional background. The allocated 35 minute session for each group was probably too short to give a general introduction to the subject, explain and play the game. The game was not specifically designed for children and is sufficiently powerful to be used by both scientists and policy-makers.

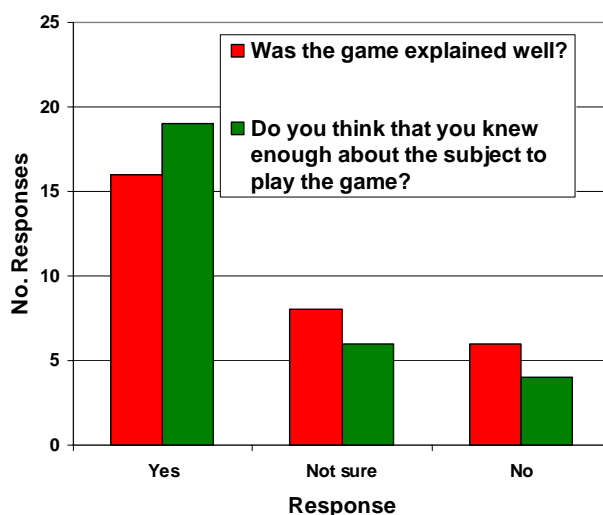


Figure 5. Evaluation response to the Nitrogenius computer activity.

## Carbon Game

Figure 6 shows the results of the response to two questions. The majority of the young people understood the game. This game was developed for younger children, and so our teenage visitors were invited to play the game, and then to feed-back on how it could be improved for their own age-group. We were pleasantly surprised that the young people thoroughly enjoyed this very “active” game, and had only few suggestions to make it more suitable for their age-group. We asked whether the messages of the game fitted in with what they had learnt at school. Responses varied from “they had learned nothing new, but the game had reinforced what they had learned in an enjoyable way” to “they had not studied this material at school”. There were some comments from the children that the game could be adapted for older children but overall, we feel that this activity was successful with this age-group, and that most of the young people found it was a worth-while participatory activity, whether or not they had covered the subject matter in school science classes.

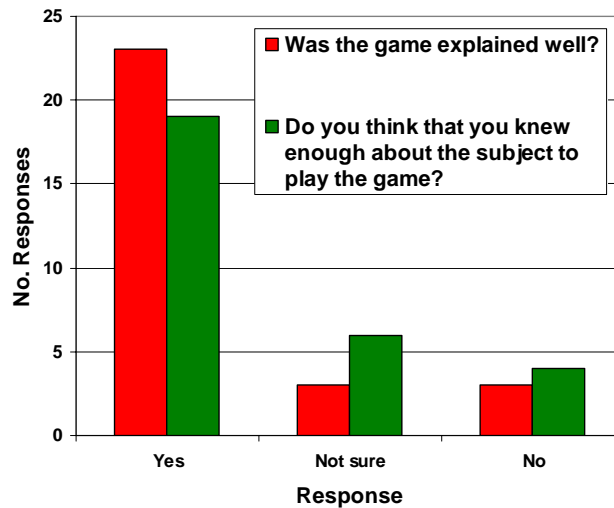


Figure 6. Evaluation response to the Carbon Game activity

### Lichen Nitrogen Study

The responses show (Figure 7) that the majority of the young people understood clearly what the task was about and did learn about lichens, lichen diversity and their use as bioindicators of nitrogen. From the responses, some of the young people found it too scientific and did not find it interesting. Some young people questioned why they could not go outside and look at the lichens on the trees. This raises an interesting point; should more be done to perform these science activities in the field as the majority of the young people on the programme were from an urban environment and may have limited experience of the countryside?

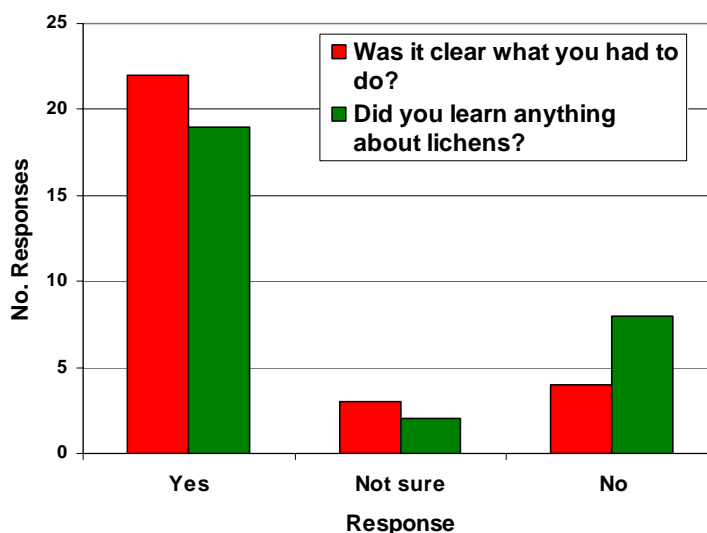


Figure 7. Evaluation response for the lichen nitrogen experiment.

### Overall

Figure 8 shows the sum of all the responses and gives an overview of the event. The majority of the responses were positive. The “not sure” responses were probably due in part to the day being a mixture of introduction and scientific activities and there not being sufficient time to fully introduce the topic of nitrogen pollution. The general comments from the response form were positive and show that the young people enjoyed themselves and learned both academic and life skills (Figure

9).

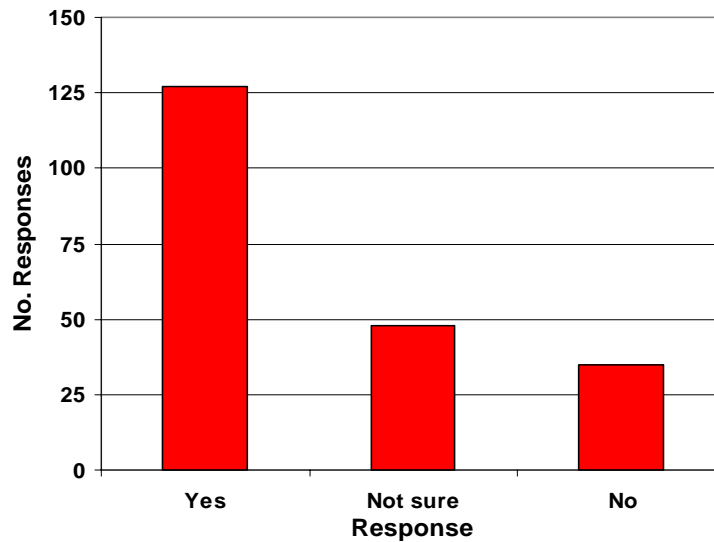


Figure 8. The sum of the assessments showing a clear positive response to the days activities.



Figure 9. Summary of evaluation responses.

## Summary

- Overall the programme day was a success.
- The majority of the young people appeared to enjoy and benefit from the experience.
- A more detailed introduction to the nitrogen and carbon cycles would have been beneficial to the young people.
- Combining the required first day tasks with the scientific activities resulted in less time to introduce the subject areas and also carry-out the scientific activities.
- Having at least one of the activities outside should be considered for future events. The lichen nitrogen experiment could be adapted as a field based activity.

## Acknowledgements

Many thanks to all those at CEH who contributed to the organisation of the event.



## Annex 1- Your Turn Programme 24 October 2007

Day 1: Wednesday, 24<sup>th</sup> October

Venue: Centre for Ecology and Hydrology

- 9.00 am **Arrivals and registration. Common room**
- 9.15 am **Welcome from venue Common room**
- **Mark Sutton**
- 9.20 am **Welcome - What is Common Purpose Common room**  
Why are we here and what will we be doing on the Your Turn Programme?
- 9.25 am **Ground rules, expectations and conventions Common room**  
How will we work together on the Programme?
- 9.45 am **Introductions of participants Common room**  
Getting to know each other. Who are we and where have we come from?
- 10.10 am **Asking good questions** Team building and chance to practice asking good questions.
- **Andrew Baird**, Head of News, Scottish Government **Common room**
- 10.55 am **Break Link**
- 11.10 am **Visits**
- Visit 1 Nitrogen Challenge – This is a game to reduce Nitrogen emission in the city
- **Bill Bealey Library**
- Visit 2 Carbon Game – This is a board game to learn about Carbon cycle
- **Amanda Thomson, Sue Owen Common room**
- Visit 3 Lichen Experiment
- **Ian Leith, Netty van Dijk Extension Conference room**
- 12:50 pm **Lunch Link**
- 1.20 pm **Trading Game Common room**  
Young people to create a campaign to raise awareness of Nitrogen problems and at the same time increase their wealth by using financial service
- 3.15 pm **Reflection and review of the day and Evaluation Common room**
- 3.30 pm **Close**

**Day 2:** Thursday, 25<sup>th</sup> October

**Venue:** Edinburgh leisure

- 9.00 am     **Arrivals and welcome**
- 9.10 am     **Welcome and Briefing for the day**
- 9.20 am     **Teambuilding**
- 9.40 am     **Keynote: Climate Change**
- **Evan Williams**, Head of Economic and Sustainable Development, SEPA
- 10.40 am    **Visit preparation** – plan and prepare questions and approach to make the best use of time on visit.
- 11.00 am    **Visits** - Group will be split into small groups to go and investigate different aspects of challenge.
- Visit 1    **Henry Jeffrey**, Institute for Energy Systems, University of Edinburgh  
**Jamie Taylor**, University of Edinburgh **confirmed**  
Wave as a source of power
- Visit 2    **David Somervell**, Energy & Sustainability Manager, University of Edinburgh  
Sustainability, reuse 80% of power **confirmed**
- Visit 3    **Antje Branding**, Soil Policy Coordination / Water, Air, Soils & Flooding  
Division / Environmental Quality Directorate, Scottish Government  
**Alison Caldecott**, Climate Change Communications
- Visit 4    **Anne Crawford**, Property Manager, City of Edinburgh Council  
**Stephen Salter**, Professor of Engineering Design, University of Edinburgh  
**Duncan McLaren**, Chief Executive, Friends of the Earth  
**Oil Industry / BP ED Officer@grangemouth, M&S**  
**Global Trees**
- 1.30 pm     **Return to Venue: Feedback of visits**
- 2.00 pm     **Group Debate**
- 3.15 pm     **Evaluation**
- 3.30 pm     **Close**

**Day 3:** Tuesday, 30<sup>th</sup> October

**Venue:** Malmaison

- 9.00 am      **Arrivals and welcome breakfast**
- 9.15 am      **Briefing for the day & Welcome**
- 9.30 am      **Warm up and ice breaker** To energise and prepare for the day, build the group and have fun
- 9.45 am      **Leadership and campaigning**
- **Tam Hendry**, Director, Streetwork **confirmed**
- 10.30 am     **Break**
- 10.45 am     **Working with issues and challenges**  
Young people to discuss their issues in depth and create key questions
- 11.15 am     **A personal perspective on leadership - Café conversations**
- **Confirmed: Steve Plummer**, Commercial Director, Elastic Creative Ltd.
  - **Confirmed: Nathan Goode**, Partner, Grant Thornton
  - **Confirmed: Andrew McGoff**, Associate Finance Director, The Miller Group
  - **Confirmed: Mike Groves**, Director, Great Circle Communications Limited
  - **Monica Wilde**, Operations Director, Gleneagles of Edinburgh **penciled**
- 1.00 pm      **Lunch**
- 1.30 pm      **Next step!** - Campaigning workshop: How do I make a difference in my world.  
Come up with 1 or 2 realistic action plan and prepare a presentation
- 2.10 pm      **Your Shout!**  
Introduce the challenges you are working on and present action plans
- 2.50 pm      **Adviser's feedback (same above)**
- 3.00 pm      **Evaluation**  
Reflection and review of the programme
- 3.30 pm      **Close**

## Annex 2 – CEH Evaluation form



**Centre for  
Ecology & Hydrology**  
NATURAL ENVIRONMENT RESEARCH COUNCIL

**What did you think?**

What? **Your Turn**

Where? **Centre for Ecology and Hydrology**

When? **Wednesday 24 October 2007**

Please take a few minutes to tell us what you thought about the activities so that we can improve them for next time.

Your Name: \_\_\_\_\_

Your School: \_\_\_\_\_

### Environmental Issues

(please circle)

- Are environmental issues such as climate change important to you? **Yes** **Not sure** **No**

### Computer game: NitroGenius

(please circle)

- Was the game explained well? **Yes** **Not sure** **No**
- Do you think that you knew enough about the subject to play the game? **Yes** **Not sure** **No**

Is there anything that you didn't understand or do you have any suggestions for how the game can be improved?

More on other side.....

### Carbon game

(please circle)

- Was the game explained well?      Yes    Not sure    No
- Do you think that you knew enough about the subject to play the game?      Yes    Not sure    No

Is there anything that you didn't understand or do you have any suggestions for how the game can be improved?

### Lichen experiment

(please circle)

- Was it clear what you had to do?      Yes    Not sure    No
- Did you learn anything about lichens?      Yes    Not sure    No

Is there anything that you didn't understand or do you have any suggestions for how the experiment can be improved?

..and finally, tell us what you thought about the day overall

**The End !!!!**