TEACHER-SCIENTIST PARTNERSHIP GUIDE

VERSION FOR EVALUATION – SUMMER 2008

Contents

This publication has been funded by the EU, CarboEurope & CarboOceans Integrated projects
(contracts GOCE-CT-2003-505572 and 511176-2)

CarboSchools projects: key components

1) "the heart": Teacher-scientist partnership
2) A product as a final result : poster, article, website, talk...
3) Attempts to put science education in a citizenship perspective:
- "eco-schools" activities : actions to reduce CO2 emissions in school, family, community
- European dimension : cooperation with other schools from abroad

Twelve short steps to a successful CarboSchools partnership:
a partnership of equals between a researcher & a teacher

- ❖ T & S need to have commitment & desire to make the project work
- ❖ Pair T & S with similar interests and aspirations
- ❖ Activities should be driven by teacher needs
- ❖ Expect teacher to make first contact
- ❖ T & S need to appreciate & respect the work done by both parties
- ❖ Plan ahead & respect each others 'other commitments'
- ❖ See time as a positive; it is common-ground between T & S
- ❖ Establish most reliable & efficient method of communication
- ❖ Plan activities jointly, ahead of working with pupils, ideally within informal settings (eg. over coffee or in the pub)
- ❖ T & S need to agree & understand the nature of the activity and their different roles in its delivery
- ❖ Try to make frequent contact (direct/indirect), particularly initially
- ❖ Grow into your partnership: small goals, smart experiences

"*If both are giving something to the partnership, they should both get something out of it*"
Maxine Woods & Phil Smith (a TSN partnership)

1. Aims of this Guide

This document is intended as a practical guide to (i) secondary school teachers from all disciplines and (ii) scientists from the global change community (in the broad sense: research scientists, PhD students, technicians…) who would together like to implement a CarboSchools project.

A co-operation between teachers, students and scientists is a challenge for all parties involved. The most common problem is taking the first steps and avoiding the mistakes that often prevent new projects from getting off the ground. Here, practical advice is given based on experience gathered in co-operations between schools and research institutes in several European countries.

The ultimate goal of this guide is to foster new co-operations that are able to promote the science of global change in secondary schools in contribution to citizenship development.

2. What shall students do and gain with a CarboSchools project?

CarboSchools projects can be initiated at any moment for a duration between a few weeks and a whole school year with classes or groups of voluntary students (ages 12-20) under the supervision of a team of teachers, and in partnership with a climate researcher.

Every project is unique and has its own characteristics; however we suggest:

- One fundamental principle: the students are the main project actors (project teaching is not about “teaching” knowledge to a more or less passive class (top-down) but about putting groups of students in active situations where they “learn” knowledge & skills)**.** Depending on goals, constraints and curriculum flexibility, project work is spread between normal lessons, dedicated project hours in the timetable, and outside school hours.

- Five key objectives:

- discovering and better understanding scientific research, its methods and its results
- applying this knowledge to the problem of global change
- improving skills to deal with transdisciplinarity and complexity
- increasing the awareness of local implications of global change: how do you, your family, your school and your town contribute to the problem and to solutions? How global change may affect your life and your future?
- Acting in the society and sharing the results of your project with a wider public

To achieve this, you may propose various types of activity to your students:

- **ask yourself questions, and develop your own project focus** – i.e., your own way of tackling the question of global change, taking as a starting point what affects and concerns you directly;
- **get to know “your” scientist** through personal meetings and discussions
- follow his/her research, experiments, and try things on your own. **Take measurements and perform other hands-on experiments** on physical phenomena, greenhouse effect, climate & weather etc.
- **find and analyse information obtained** beside document-based sources (e.g. Internet) and resource persons (journalists, researchers, associations, elected representatives, technicians etc.)
- **cooperate with other schools & students in Europe,** for example to share information, experience, make penpals and why not, visit each other.
- **organise information and develop a product:** website, booklet, CD-ROM, newspaper article, game, play, presentation, debate evening, etc.
- **disseminate your results** around your school, in your town

- **take action,** i.e., thinking up and looking for solutions to contribute in reducing greenhouse gas emissions within your family, at your school or college, in your town, etc.

At the beginning, some students may find project work heavy and not easily related to the curriculum; but in a successful project, students progressively develop ownership, become very eager and can achieve incredible things. You may highlight many opportunities of benefits for them:

- do experiments;
- learn about scientific discovery process;
- participate in "real" scientific research;
- learn about careers and what scientists do;
- test if science "suits" you;
- make learning fun;
- sense of accomplishment - feel proud of what you achieve;
- gain in self-confidence by being taken serious by scientists;
- apply foreign language skills;
- encounter and understand science that is relevant for society; prepare for making informed choices on policy decisions as adults.

3. What does "Teacher / Scientist partnership" mean?

A partnership between school and research might take many possible forms depending on persons and projects involved, material constraints, etc.; but in all cases, the idea is to *create a relationship* between scientists and teachers to enable young people to gain *practical experience of research* (whether in a laboratory, through field work where possible, or simply in discussion sessions). Ideally, this partnership should be as direct as possible, avoiding bureaucratic obstacles and hierarchies.

Preparation, planning, definition of objectives, definition of age group are done as much jointly as possible. When working well, a teacher-scientist partnership may be used over several years with different groups of pupils.

Examples of activities that can be conducted:

- Real-time experiments (in lab, on field or at school)
- Site visits (but real visits with scientists, not through public relations)
- Topical lectures, debates
- Access to research results (e.g. real data on the internet)
- Follow-up communication by e-mail (question/answer with students)

It should be stressed, however, that partnership means *contributions from* but also *benefits for* <u>all</u> parties, as shown below; it should be balanced, otherwise it will not last.

3.1 Contributions: who does what?

Roles of teachers:

- project *coordinators* – shape & structure contents and methods;
- prepare students with the required background knowledge;
- mediators between students (and their syllabus-requirements) and scientists (and their specific scientific agendas);
- assess the students' work as much as possible as part of their formal school results
- invite scientists to participate;
- evaluate the success of the project by gathering feedback from the students and evaluating the project's impact on their performance in the classroom;
- mediators between information/knowledge and data/facts from experiments
- need to identify + communicate to students the relevance of the project within the curriculum

Roles of scientists:

- provide the state-of-the-art science and explain the research background of the project work;

- ideally: the "real life" enthusiastic example, "role model" for students;
- project partners (do not replace the teacher);
- provide resources (apparatus, equipment, publications, figures), publish new ideas/results and offers on website
- encourage students to formulate their own ideas and to discuss their work;
- set examples (how to give a good talk/presentation; how to write an experiment-protocol, ...)
- need to identify + communicate to students the relevance of the project (general relevance for society)

3.2 Benefits: who gains what?

Benefits for teachers

- gain access to experiments and demonstrations that would not have been possible in the classroom; in some countries there is little chance for doing practical experiments in the classroom, or if there is, the equipment may be outdated. By teaming up with a research institute, avenues for work in the laboratory or in the field are opened.
- bring “fresh air” in the classroom; for the students, scientists have a different status than the usual teacher;
- increase the students’ motivation in science classes and add life to the dry theory of textbooks
- fulfil new curriculum requirements (eg transdisciplinarity, project work)
- increase the relevance & quality of your teaching, put more in evidence the links between syllabus & society issues
- Learn more about research process and the scientific method, access research quality data, satisfy research interests, update factual knowledge;
- train the students’ social skills (making and keeping appointments, working in teams, ...)
- increase the attractiveness of your school both for students and parents by offering "added value";
- gain experience in interdisciplinary group work with other teachers
- through European cooperation, learn from teachers from other countries and make your pupils learn foreign languages in the frame of real communication situations
- as an overall result, enjoy an enthusiastic and motivated student body to work with

Benefits for scientists

- fulfill outreach obligations by EU or national projects;
- demonstrate active outreach work as basis for new research proposals requiring public funding;
- fulfill an educational obligation of your institution;
- recruit students;
- help to improve the training of students entering undergrad programs;
- in some research areas, students can help you to collect data, samples, make field observations;
- gain voluntary help for open days or exhibitions of your research institution, or a web-site;
- refresh your memory on the basics (and be surprised to find out how much you have forgotten);
- increase your understanding of the needs/constraints of teachers;
- promote the idea that “science is part of life”;
- bring diversity to your institution’s programme;
- Professional development:
  - improve your communication skills related to a specific target audience (here young people) with the help of teachers; learn from the pupils’ spontaneity to identify the key questions for normal people.
  - improve your teaching at all levels; profit from the teacher’s experience in motivating students, in producing teaching resources (eg small experiments etc.) that you can then use in university teaching
- escape the routine and have fun;
- profit from teachers and students as multipliers for your scientific message;
- In the frame of a well structured school project, gain in relevance and efficiency: you are not just giving a punctual talk to more or less interested & prepared pupils, you are supporting a process in

which young people will be not only beneficiaries of this exchange, but also *intermediaries* for a wider public to which they will pass on what they have learnt.

- raise environmental awareness through young generations, not just through policy-makers

3.3 Time & multiplying effect

Time will always be a limiting factor. Teachers and scientists have in common that they have little time to spare and that involvement in a project of this kind goes beyond their respective basic duties. The minimum amount of time to spend will really depend on both partners. Most scientists, when not already engaged with a school, will be happy to spend a day or two per year. PhD students may sometimes give more. A few scientists may be able to spend more time on these projects. Some activities may be short and intensive (eg 1 day in the field), others more sustained for a longer period (e.g. monthly meeting and follow-up through e-mail or phone).

The multiplying effect is therefore crucial: if the project involves local communication activities (eg exhibition, website, cd-rom, newspaper, conference…), many more people will benefit (families, rest of the school, city etc.), giving higher impact for the time spent by scientists & teachers. Make your results visible and recognised by parents, school authorities, research institution, press etc. Use existing channels & opportunities: open days of school & institute, shops, local science museum etc. Make pupils inform the local media, invite journalists on special occasions etc.

3.4 Funding

In most places local funding is available for science education projects (from municipalities, regional authorities etc.). If you get funds, making a separate bank account can be a way to limit accountancy complications.

To promote European school partnerships, the EU offers Comenius funding for preparatory visits and cooperation projects (see appendix 4).

Scientists are quite used to apply for money and can be very helpful in raising funds for your project.

Other opportunities worth to mention:

- Make an agreement that energy savings resulting from your project will benefit your project budget.
- Use of equipment: basements of research institutions often hide good equipments no more used which can be lend (sometimes even given) to schools
- Propose an agreement with the public relations department of your partner scientist's institute to sell them (or make them finance) the products from your project: eg exhibition, brochure…
- In special cases, scientists may be interested to pay a group of students in exchange of a specific job useful for science- like observation or data acquisition activities.

4. Educational goals & link with the curriculum: interdisciplinarity, science and citizenship

Experimental research links up biology, chemistry, physics etc. and is therefore cross-curricular by nature: dealing with contemporary research automatically involves interdisciplinary approaches throughout science subjects. Furthermore, in the context of global change, interdisciplinarity goes far beyond linking up science subjects with each other: the whole issue of relationship between human societies and the environment, and between industrialised and developing societies is at stakes. **Global change is much more than an scientific issue: it is a complex society issue which concerns and affects us all.**

CarboSchools projects are therefore deeply interdisciplinary and may be referred to science education, environmental education, sustainable education as well as citizenship education.

- **in scientific subjects,** they provide occasions for discovering and practising scientific method, for promoting the human dimension of science through meetings with researchers, and for strengthening disciplinary learning by putting in evidence the links with one of the major stakes of the 21st century. Appendix 2 shows the specific links between syllabus in chemistry, physics & biology and CarboEurope/CarboOcean science.

- **in other school subjects,** they provide opportunities for articulating field investigations, analysis and production of documents, oral and written expression in mother and foreign tongue with scientific, economic, social and political issues.
- **in a transversal way,** they strengthen critical and reflective thinking as well as horizontal skills (autonomy, team work, initiative, oral & written communication etc.)

Learning science is thus here far from being the only goal. Projects may be structured around a variety of learning goals, from disciplinary/knowledge-based to interdisciplinary/skills-based:

Science education in a citizenship perspective

Disciplinary goals ***SCIENCE / KNOWLEDGE*** ***Rather top-down & transmissive*** ***Content-based***	**Learning scientific notions** **Changing representations of science** **from boring to exciting, from theoretical to practical, from abstract to concrete, from irrelevant to society-relevant, from instrumental to human enterprise**
. . . . . .	**Connecting notions with a big society challenge: global change**
Interdisciplinary goals ***CITIZENSHIP / SKILLS & SYSTEMIC THINKING*** ***Rather bottom-up & constructivist*** ***Process-based***	**Understanding complexity** **Developing the desire and capacity to learn by oneself, to understand the world, to act in the society**

CarboSchools goes beyond learning science in a different way and transmitting new information to young people from research: the ultimate goal is to provide students with knowledge and skills for "informed choices" as consumers and future citizens.

In this respect CarboSchools projects are highly encouraged to work in two specific directions of citizenship development:
1) taking action for reducing CO2 emissions. Learning the facts about climate change can be very depressing and leave pupils with feelings of guiltiness and powerlessness. Quite on the contrary, a responsible educational project on that topic should give young people the stimulus and confidence in their capacity to act for shaping a different future. We believe that this can be cultivated through undertaking real experience rather than just learning the theory and principles of sustainable development. Motivated young people can be very powerful agents of change. The methodology of school agenda 21 applies particularly well to that. A practical illustration is given through the Eco-schools approach described in Appendix 3.
2) getting involved in European cooperation with other schools abroad through Comenius partnerships. European cooperation is a source of richness and opening in science but naturally also in education – but so far much less common in education than in science. Making a genuine experience of Europe, through active contacts and meetings with partners abroad, can boost and broaden educational projects. The EU is financially supporting this through Comenius school partnerships, described in Appendix 4. An ultimate achievement for a carboschools project would be to involve participating pupils in a physical exchange with a partner school abroad.

5. A few practical tips

5.1 For teachers

•Try to involve language – humanities - economics teachers (explain the benefits to your colleagues)
•Before timetable are made (generally June), raise institutional support by proposing this project among the priorities of your school. It will help to secure some flexibility and space in the timetable, to obtain school hours from your headmaster
•Organise yourself in advance to be able to acknowledge project work in students assessment (otherwise project work will be regarded as a peripheral, out-of-school activity)
•Use specific curriculum requirements for project work (eg professional practice)
•Give scientists some information about curriculum and how own their research fits in
•Prepare your students to the sessions with the scientists, and take part actively yourself (you are co-educating, not transferring your education responsibility to someone else)
•Give feedback to scientists after their interventions (was it satisfying, useful?)

5.2 For scientists

•Involve PhD students when possible: they are closer in age, deeply involved in experimental science, and need to develop their communication skills as part of their training.
•Remember that what schools mostly need/want is not your scientific knowledge, but your skills in doing science / i.e. in experimenting: planning– obtaining evidence – analysis – evaluation
•If useful for institutional backup, ask a support letter from CE/CO/EPOCA coordinator
•When you work with school students:
  - Tell stories, make it fun!
  - Treat the students like young colleagues, take them and their work serious
  - Don't be transmissive. Remember the old Indian saying: "what my ears hear, I forget it; what my eyes see, I remind it; what my hands do, I understand it". Try to link notions (what one needs to know to understand) with action (what we do concretely on the field)
  - Avoid scientific words and in any case don't use them without explaining them; try to use everyday language as much as possible. Train yourself with a non-scientist before speaking with pupils!
  - Try to articulate the specific with the general, put in evidence why your own specialised research is relevant & important to the wider global issue. Three key-levels may be considered:
    a) General overview of global change research: what we know and what we don't know;
    b) European Integrated Project-level: what is CarboEurope (or CarboOcean or EPOCA)? What are the big questions behind & related activities? Why doing research at the European level?
    c) Your own research: what specific question are your working on? How do you look for answers? How do you collect data? How do you analyse & exploit results?
    (the CarboSchools educational booklet may help you for the two first levels)

5.3 For both

•Start small, keep it simple, prefer limited things you are sure to achieve rather than big things you may well not manage – and when you get experience and established links with enough resource persons, you may do more.
•Remember that school projects planning is always easier between Christmas & Easter for the next school year.
•To develop a successful relationship:
  - start with a briefing of specific roles and respective expertise (who is expert of what among teachers & scientists)
  - Agree appropriate ways of communicating with each other during the project
  - Be careful that both are active (avoid situations where teachers stay aside when scientist is with pupils)
•For a successful start:
  - Bring examples from past successful projects you've been involved in
  - use the natural fascination of students (children) for some subjects (eg ocean, animals etc.)

- start from what the people understand or witness directly, to come to global change & complexity progressively
- Use the means you have and don't wait for eventual funding, things can get more elaborated later on
- Get concrete, go out and do real measurements as early as possible in the process
- Allow individual student(s) to follow your work for a couple of days

6. An additional possible actor: university students

When relevant and possible, university students can play a very useful role- be it science students interested to get an experience of research as well as of teaching; communication/journalism students interested to experience research; future teachers and educators, etc.

By their age and function, university students are at the cross between teachers, scientists and school students; and with potentially more availability than the scientist and the teacher.

Their supervisor can be someone from the lab (in particular when involved in teaching themselves) / from the staff (eg public relations people), or from another university department (eg. didactics) or teacher training institute.

With an Erasmus grant, when language is not too much an obstacle university students could even be sent to carboschools projects with other CE/CO partners in Europe.

The task listed below have initially been designed with the environmental education degree of the University of Tuscia, Italy- but may be of use or inspiration in other contexts.

6.1 Main tasks of university students

- Fundamental role: to develop the educative message behind the scientific content (i.e in the table p.6, "going down" from science to citizenship)
  - try to involve teachers from other subjects (organising meetings, identifying links with the curriculum in various subjects & activities relevant to these links)
  - evaluate the project from the environmental education point of view: behaviours & skills
  - thesis: the memory of the project (can be used in subsequent years to make comparisons)
  - coach the European cooperation on a day-to-day basis
  - make sure that "taking action" is included in the students' activities
- Help with the "end-product" (coordination, activation of pupils, technical finalisation)
- Help with fund-raising for the school project they're involved in (finding relevant sources & writing proposal)

6.2 Main tasks of supervisor

- Inform & recruit university students
- Follow them, give advice
- Organise teacher training for the teachers involved- to make respective roles clear + planning the project
- Fund-raising
- Keep tracks of the thesis/projects results
- Make European cooperation between projects happen / give the initial impulse
- Promote Erasmus projects

6.3 Economy

- university students basically cost nothing (this is part of their training)
- living costs (local travel & meetings)
- some materials/equipments (games…)

Appendix 1- **CARBOSCHOOLS PROJECT IDENTIFICATION**

To be filled in during the initial planning meeting - one copy for each partner
NB- add lines wherever necessary!

Date, hour & place of initial planning meeting (without students):

Name of school: Type of group (class, club, individual project …): Number of pupils: Average age: School level: Name, e-mail & phone of teacher: Subject taught: Languages spoken: Other subjects involved: Main expectations from the teachers: -

Name of research institution: Name, e-mail & phone of scientist: Main expectations from the scientist: - Main activities offered: -

Title of project: Starting date: Ending date: Main goals: - Summary of activities: - Links with the curriculum: -

Students preparation: (i.e. pupil's tasks under teacher responsibility before the first meeting with scientists, like: materials to read, films to see, introductory lesson, division in sub-groups etc)

Calendar of meetings involving the scientist (to be updated when relevant):

Date & hour	Place (lab, school, site visit…)	Goal	Pupils' task	Teacher's task	Scientist' tasks

Type of follow-up expected between meetings: (communication means, frequency…)

End-product expected (eg. newspaper article, ppt presentation, exhibition, conference…):

Target audience & means of dissemination:

Citizenship dimensions:
- Which actions to reduce CO_2 emissions do you think your students could try:

- Which expectations would you have for contacts with other schools abroad:

Economy:
- Are there specific costs involved? Who is paying what?

- Is it necessary to apply for funding? Where? By whom? If yes, which part of the project are fund-raising dependant, which are not?

XXXXFORMER VERSION!!!

End-product expected (eg. newspaper article, ppt presentation, exhibition, conference…):
Target audience & means of diffusion:

Economy:
- Are there specific costs involved? Who is paying what?
- Is it necessary to apply for funding? Where? By whom? If yes, which part of the project are fund-raising dependant, which are not?

Citizenship perspective
(Mention here attempts to introduce activities towards changes of behaviour & reduction of CO_2 emissions, e.g. eco-schools)

European co-operation
Are you interested to meet partner schools in other EU countries and develop Comenius school partnerships ?

Appendix 2. General principles about science education

(text courtesy of Sherri J. Wormstead, University of New Hampshire)

Authentic Science Learning

Authentic science learning involves students in science learning by engaging them in actual science research currently being conducted.

Cooperative Learning

Cooperative learning involves students in group projects and learning activities, whereby they can develop the skills needed to work in cooperation with others.

Hands-On Learning

Hands-on learning engages students in learning through first hand experience, rather than by text book lectures or rote memorization of facts. In science education, this refers to involving students in the science process skills of observing, measuring, recording, classifying, interpreting data, inferring, predicting, investigating, and making models.

Inquiry Based Approach to Science Learning

The inquiry based approach to science learning engages students in the full process of science, whereby students choose and conduct science research projects guided by their own inquiry. With this approach, hands-on learning is strengthened, as students initiate research questions, collect data, interpret data, and present the results. This approach is intended to reflect the process of science as it is practiced.

Appendix 3. The Eco-schools seven steps

(source http://www.eco-schools.org/aboutus/howitworks.htm)

The Eco-Schools programme involves seven steps that any school can adopt. Based on the elements of an environmental management programme, the process involves a wide range of stakeholders but it is pupils who must play the most important role. Although Eco-Schools may be awarded a Green Flag after a period, the process is on-going and schools must continue to work towards their objectives and re-apply for the award in the future.

Establishment of the Eco-School Committee: The core of the Eco-Schools process, the Committee organizes and directs the school activities and consists of the stakeholders of the school environment, namely pupils, teachers, custodial staff, caretakers, parents and even representatives of the municipality or local authority. The sense of democracy involved, and the motivation in resolving initiatives brought forth by the students themselves are products of this process.

Environmental Review: Work commences with a review or assessment of the environmental impact of the school. Pupils are involved in this work, ranging from assessing the level of litter on school grounds to checking infrastructure for inefficiencies.

Action Plan: The information from the review is used to identify priority areas and create an action plan, setting achievable and realistic targets and deadlines to improve environmental performance on specific issues.

Monitoring and Evaluation: Ensures that progress towards targets is followed, that any necessary changes are made to the action plan and that achievement is celebrated. It further ensures that environmental education and care is an on-going process in the school.

Curriculum Work: Classroom study of themes such as energy, water and waste are undertaken by most students. The whole school should be involved in practical initiatives, for example, saving water, recycling materials and preventing litter. Where environment and sustainable education is not part of the national/regional curriculum, recommendations are made as to how this can be incorporated. Efforts should be made to involve environmental education throughout the curriculum, in addition to the more evident areas of study such as science and geography.

Informing and Involving: This directly brings Local Agenda 21 into schools, as parents, local authorities, businesses and the wider community are involved in the Eco-Schools process. Schools are encouraged to make ties with external organisations in order to benefit from their experience and expertise. Eco-Schools are also encouraged to consider the wider community when preparing action plans. Schools can keep the wider community informed of actions taken through classroom displays, school assemblies and press coverage.

Eco-code: Each school produces its own ‘Eco-code’, a statement of values and objectives, outlining what the students are striving to achieve.

After a period of participation, an evaluation of the success of these initiatives and the methodology is undertaken, and the whole Eco-Schools programme for each school is assessed. Successful schools are awarded the **Eco-Schools Green Flag**. Whereas there is flexibility as to the ceremony and awarding process, the criteria for assessing schools for the award should be faithful to the guidelines agreed. Following are the most elementary criteria for assessing Eco-Schools for the Green Flag, though National Programmes often have further quantitative, qualitative or procedural requirements.

- The Eco-Schools Process, sometimes referred to as the 7-step process, is the central, underlying approach that Eco-Schools offers. Some national programmes go beyond this process, but the successful implementation of this process will be common to all schools, which have been awarded;
- Eco-Schools should involve the whole, or the greatest part, of the school. It should not be a programme for an Eco-Committee only. National Programme Managers will consider evidence of whole school activities in their assessment for awards;
- Eco-Schools should achieve at least 2/3 of the objectives in their Action Plan, in order to qualify for an award. This should be demonstrable;
- The school should demonstrate an active communication strategy, to inform the whole school and community of its activities;
- The Local Authority (ies) should be involved in some capacity - this is a required element of Local Agenda 21, which characterizes Eco-Schools;
- Regardless of the approached themes, schools should concentrate first on understanding and implementing the seven steps of the

programme to change the school and its environment;
• Schools are recommended to establish links or contacts with other schools in different regions or countries, using the Eco-Schools linking project or any other means;
• While national programmes and schools specifically can, and should be encouraged to, participate in various themes and issues of relevance to Local Agenda 21, the core themes of Eco-Schools are Water, Energy and Waste.

For more information: contact your Eco-schools national operator (European list here: www.eco-schools.org/countries/europe.htm)

Appendix 4. Comenius schools partnerships

(source http://www.britishcouncil.org/comenius.htm)

1. Multilateral partnerships are cross-curricular projects that involve at least three schools or colleges from at least three European countries. They enable staff and students to work together with partners in other Comenius eligible countries (27 EU members + Norway, Iceland, Liechstenstein & Turkey) for a duration of two years.

WHAT ARE THE BENEFITS?

In addition to learning more about other cultures and gaining an insight into other teaching practices, participating staff have reported increased enthusiasm and motivation from colleagues and children alike, often resulting in raised standards across the curriculum.

The benefits to the school include valuable opportunities for staff and students to work together, develop focused approaches to problem-solving, and build pedagogical programmes. Pupils and students also have the possibility of visiting their partner institutions through the funding available.

The partnerships can provide a great opportunity for in-service training, through mobility activities such as teacher exchanges, head teacher study visits, teacher placements and project meetings.

WHAT FUNDING IS AVAILABLE?

Funding is awarded as a fixed lump sum amount, based on the number of mobilities (staff and/or pupils travelling abroad). Partnerships will be defined as small or medium, according to the number of mobilities.

2. Bilateral partnerships involve secondary schools from two countries for two years and include a reciprocal exchange, each lasting a minimum of ten days. Students need to be over twelve years of age and at least ten students from each school need to participate in the exchange.

WHAT ARE THE BENEFITS?

The partnership benefits include increased motivation for, and skill in, language learning coupled with valuable exposure to other European cultures and education systems. Working towards the creation of an end product provides a great opportunity for team-building and results in real friendships between staff and students.

WHAT FUNDING IS AVAILABLE?

Funding is awarded as a fixed lump sum amount based on the number of mobilities (staff and pupils travelling abroad). Partnerships will be defined as medium or large, according to the number of mobilities.

3. How to apply?

You will need to find partner schools to work with [CarboSchools can help for this]. You may then wish to set up a preparatory meeting with your partner schools before making your application. You can apply for funding for a preparatory visit at any time to your Comenius national agency (list here: ec.europa.eu/education/programmes/llp/**national**_en.html).

Applications for partnerships (multilateral or bilateral) can be submitted once a year, usually in January or February depending on Comenius national agencies. Preparatory visits should therefore preferably happen in autumn for submitting in the winter, and implementing the next two school years.

Appendix 5. Examples of links between CarboEurope / CarboOcean science & syllabus

Curriculum/Syllabus Science (14-18 years)

- *0Biology*
  - –0Ecology
  - –1Plant Physiology
  - –2Biochemistry
  - –0Microbiology
- *0Chemistry*
  - –0Equilibria
  - –0Radical reactions
  - –0Gas Phase reactions
  - –0Thermodynamics
- *0Geography*
  - –0Climate(change/impact)
  - –0Oceans
- *0Mathematics*
  - –0Statistics
  - –0Differential equations
  - –0Numerical methods/modelling
- *0Physics*
  - –0Energy production
  - –0Optics
  - –0Waves
  - –0Isotopes

CarboEurope-Ocean Topics/ Methods

- Phytoplankton and carbon export
- Oceanic uptake: biological pump
- Terrestrial uptake (sequestration)
- Soil Respiration
- Gas exchange/fluxes
- Chemical buffers
- Purposeful carbon storage in the oceans
- Gas exchange ocean/atmosphere
- Ecosystem modeling
- Ocean circulations modeling
- Analysis of oceanographic data
- Global carbon cycle
- Global oxygen cycle
- Inventory of anthropogenic carbon in the oceans
- Oceanic measurements of carbon and oxygen
- Oceanic uptake: Physical pump
- Remote Sensing
- The marine CO_2 system
- ^{14}C

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