



Teachers' preparatory notes for school visits to CAT

These notes give you some background about the site and what we have to offer. They also provide some insights into the misconceptions many young people have about sustainability issues, and offer some ideas of pre and post visit activities that you may find useful.

Teachers' pre-visit

Ideally, the teacher organising the visit should do a pre-visit, particularly if they have never visited before. Complimentary tickets are available, on request, from the education department (01654 705983).

The site is developing all the time so, if you have been before, check on what's new. Your worksheets may be out-of-date and we may be offering new tuition.

Book tuition

CAT education staff offer **free** introductory talks to set the scene by looking at environmental problems and explaining a bit about why we do things as we do. This provides students with a more personal learning experience and offers them the opportunity to ask questions.

We also offer a range of talks and workshops on issues of sustainability, renewable energy, rubbish and what to do with it, the ecological footprint, wind power, where our food comes from and much more. Please ask us for more details

Clothing

It can rain heavily in Mid-Wales and much of the site is outside so pupils need to be adequately dressed for the weather. They will also need plastic bags to keep their clipboards and notes dry.

Lunches etc

There are picnic areas for eating packed lunches.

There is a restaurant where pupils can buy snacks, cakes and drinks but if your group want to eat lunch in the restaurant **this must be booked** in advance.

Teacher/pupil ratio

Pupils need a certain amount of supervision on the site to remind them to treat exhibits carefully, and put their rubbish in the correct bins. We encourage a ratio of 1-6 for primary

pupils and 1:10 for secondary, with a member of staff always being available on the visitors circuit.

Work on the site for pupils

It is very important that pupils have a focus to their visit. This can be given through worksheets, through them having a particular task to complete, or by going round the site with an adult who can ask them questions to encourage them to observe and to acquire information. We feel understanding and inspiration is more important than collecting facts.

Using the worksheets

There are **FREE** worksheets available for all key stages which cover a wide range of curriculum requirements in **geography, science, design and technology, PSHE, and citizenship**. Feel free to adapt them to the needs of your group.

We also offer resources for **Key Skills** Communication, Problem Solving and Application of Number at level 1 and 2.

Guidebook

CAT's Guidebook is full of useful, concise information about the technologies you will see on the site. It is, in fact, a comprehensive introduction to renewable energy, organic growing and dealing with waste.

What children do and don't know

Nowadays some pupils will have a great deal of knowledge about environmental issues which they have picked up from parents and TV, as well as school, but there are all sorts of things which are basic to an understanding of environmental problems and solutions which many KS2 children do not know. Many of these things are not required to be taught in the National Curriculum and some of them are things which, as adults, we often assume that children understand without even thinking about it.

Fuels.

Many young pupils do not know what they are, where they come from or how they are used. Children are often heard saying "Gas comes from the sea" - not realising that it is coming from under the ground under the sea.

They seem to deal happily with adults referring to **natural gas** just as 'gas' and then talking about other gases, some by name, but there is certainly the potential for confusion there. Many children do not know what fuel is used in their **central heating system**. They sometimes think it is water because they know that that is used in some way.

Seeing the wood for the trees

Occasionally pupils will say that **wood** is a fossil fuel. It is worth spending a bit of time getting them to realise how trees fit into the picture of CO₂ production etc.

As a tree grows it absorbs CO₂, when it reaches maturity it absorbs and gives out CO₂ and when it starts to decay it stops absorbing it but continues giving it out. So the most effective way to use trees to absorb CO₂ is to cut them down when they reach maturity and replace them with new trees.

What is the best thing to do with the wood? If we keep it as wood, by using it in buildings or for furniture then we lock up that carbon and that's a good thing. If we use it as a fuel to replace fossil fuels then we reduce the amount of CO₂ given out because the new trees will absorb the CO₂ given out when we burn these ones. It would be interesting to discuss with pupils what the impacts are of the other ways that wood is used and where the carbon is likely to end up. (At CAT we either recycle paper and card or put it in compost heaps.)

Pupils need to realise that we cannot plant our way out of our environmental problems. There is not enough land around on this planet for us to plant enough trees to absorb all the CO₂ that we produce. There are all sorts of very good reasons for planting trees but it is not going to make much of an impact on climate change.

Some mature and ancient trees also have great value in all sorts of ways and they should not be cut down just because they are not net absorbers of CO₂ any more.

Electricity production

Pupils do not usually know how most electricity is produced in Britain. They do not know that coal, oil and natural gas are burned to generate 70 - 78% of it.

They often do not know now that 20% or more is produced by nuclear power.

They often think that wind or solar power are producing a lot of Britain's electricity - presumably because they've been told that that is what they are going to see at CAT. In fact water power has produced about 2% of Britain's electricity for decades and wind power so far produces much less than 1%.

Saving and producing energy

The difference between **saving energy** and ways of generating it is often misconceived by young people.

Environmental pollution

Many pupils get very confused about the **ozone layer**, the **greenhouse effect**, **acid rain** and which gases cause what. I have met some groups of Y6 who seem to understand this well and, in those cases, I am enormously impressed by their teachers.

I have met one Y7 pupil who thought it was 'Global warning'.

A very common confusion is to know that CO₂ is the big problem but to think that this is because it damages the ozone layer, rather than being the biggest contributor to the greenhouse effect and therefore the biggest cause of climate change.

It seems important that pupils should realise that CO₂ is not toxic or acidic, that it is not damaging in itself but simply because of the amount that we are producing. In fact, without CO₂ there would be no life on Earth, both because plants need it and because without any greenhouse effect the planet would be too cold for us.

Solar panels

About 40,000 houses in Britain have **solar water heating** panels on their roofs. Pupils (and adults) get confused because there has been quite a lot of publicity about **solar cells** (photovoltaics) which generate electricity because sets of solar cells are often called 'panels'. They then get confused about the information about the two.

Solar cells are a very expensive way of generating electricity and there are only a very few houses in Britain which use them. Solar water heating panels, which the pupils may have seen on roofs (and may have assumed they were windows in the loft) heat water directly and have nothing to do with electricity. They are also much more efficient and cheaper than solar cells. They are, in fact, the one type of renewable energy that it is worth anyone in Britain thinking about using themselves.

Animals and vegetarianism

There are animals in the smallholding. At CAT we do not promote vegetarianism, but a **low meat diet**. These animals are there to be eaten and/or produce eggs and milk.

Food

Many pupils do not know where the food they eat is grown, what can grow where and in what season. Such a variety of fruits and vegetables are imported all year round that they have lost any sense of seasonality. As a result, many pupils do not realise how far this food must have travelled and how it has been transported.

Issues

Some important issues for pupils to understand are

- what is sustainability
- what we can do to improve the world around us
- how we prioritize our actions
- what the future could look like

What is sustainability?

This now appears in PSE, Citizenship Geography, D&T and Science because it is recognised as such an important issue. It is often linked with development and the term "Education for sustainability" is becoming widely used.

We are offering talks for school groups on what sustainability is for KS2 upwards. KS2 children do not seem to have much trouble understanding the basic concept.

What we can do and how do we prioritise

It is through action that children learn most effectively and there are many things that they can do in school to improve the environment. Some of these could make a real difference, such as reducing the amount of car transport bringing pupils and staff to school or finding ways to use less energy to heat the school. Some will make little or no difference to the global issues but they may make the local environment of the school a pleasanter place to be in. Something like dealing with litter is not a sustainability issue but there may be a great value in pupils getting into habits of care of the environment around them. Hopefully they will move on from the insignificant issues to the significant ones.

Visioning the future

The essential feature of CAT is that it is presenting positive possibilities for the future. It is important for pupils to understand the environmental problems but vital that they do not end up feeling hopeless and helpless.

CAT is not a blueprint for a sustainable future. We are not suggesting that everyone should go off and live in small communities in rural areas. In many ways that would probably not be sustainable because it would, almost certainly, increase car use. What CAT tries to present is ideas of technologies and ways of doing things that can be applied to a variety of situations where they are appropriate.

We are here to inspire and inform, not to be copied.

Areas to cover in school before or after visiting

Energy

What are the fossil fuels and what are the impacts of using them

How we use energy in our lives -

Transport

Heating homes

Electricity in homes

In school

Producing the things we consume

Environmental damage

How we produce CO₂

The Greenhouse effect

Climate change

The damage to the ozone layer - what causes it and what is the effect?

Food

Where does it come from, how far has it travelled

How has it got to us - plane, boat, lorry? / frozen?

How was it grown?

Rubbish

What rubbish do we produce - how much and what sort?

What recycling opportunities are there locally?

What things amongst our rubbish should we never have bought in the first place?

Pre-visit activities

The low impact packed lunch

Pupils can plan their packed lunch to

1] produce as little rubbish as possible

re-usable sandwich boxes and drink containers

no aluminium foil, clingfilm or plastic bags

no little processed snack packs

paper bags are fine - they can be composted

2] have as low food miles as possible

list what they would usually have in a packed lunch and find out how far that would travel

discuss what they could eat which could have low food miles

discuss what large food miles products would be reasonable to have

Explore your heating system

What heats your home? If you don't know then go around and look.

Are there radiators?

If so there will be a boiler which burns a fuel to heat water which goes around in the radiators.

What fuel is burned in the boiler? (Ask your parents if it's not obvious).

There should be a thermostat to control the temperature.

Go and find it and have a look at it.

Get your parents to explain what it does and how you use it.

What temperature is it set at?

There may be thermostats on each radiator.

Go and have a look and make a note of the temperature on each.

If there are no radiators there will be fires.

What sort of fires are they?

What fuel do they use?

What rooms are they in?

If they are electric it will say on the back or base how much power they use. This will be shown as watts (W) or kilowatts (kW).

Is the house ever hotter than necessary?

Where does the heat escape?

Heat can escape through gaps around outside doors, windows or loft hatches, through cat flaps, letter boxes, keyholes, between floorboards, up old chimneys and all sorts of surprising places sometimes.

Go round your house looking for draughts in all these sorts of places.

Make a note of where they are and advise your parents of how they could do something about it.

Ask your parents if there is any insulation in the loft, how thick it is and what material it is. Are the curtains thick or thin? Do they fit closely to the window so that they keep warmth in?

Saving electricity

Go round and check the lightbulbs.

Are there any low-energy bulbs? How many?

Are there lights where you need them?

Which electrical devices get left on when they are not being used?

Follow up workshops on renewable energy

For model making use CAT's Teachers' Guides to Wind Power, Water power, Solar Electricity and Solar Water Heating

and CAT kits for windpower and solar electricity (see Educational Resources leaflet for details)

For KS2 - Teaching about Energy (published by CAT and Southgate publishers)

To build real size windmill and solar water heating system - Energy post 16

All the above are available from CAT mail order 01654 705959

Moving the school towards sustainability

Saving energy (and money) in the school.

There are free advisory materials available from BRECSU (01923 664258).

There is a scheme called *School Energy* through which there are grants available.

Contact CREATE (01942 322271) for this and details about grants to save light energy.

Reducing car use to and from school

Contact Sustrans for details of *Safe routes to schools* (0117 929 0888).

Developing the school grounds

Contact Learning Through Landscapes (01962 846258)

General - Eco-Schools have a scheme which covers various aspects (01942 824620)

Or, bring a group to stay at CAT for a residential and explore how you could change your school.