

SWEA's report on WP 4: Pupils' Pilot project in UK/Gloucestershire

1. Strategies and experiences to implement the YEP project in schools

a. Realisation

1. Acquisition of the schools (ways, criteria of selection)

Schools were invited to take part in the project following a process of criteria setting in conjunction with the steering group. Schools were first shortlisted to the top 20 with the highest energy spend. Schools from the list that were representative of the types of location within the region were invited to take part through face to face meetings with head teachers that explained the project work.

The following schools were recruited:

Name of the school	Address	School-type/ kind of school (secondary or?)	Names of cooperating teachers	Strategy for Social sciences, languages etc.
Cleeve School	Two Hedges Road, Bishops Cleeve, Gloucestershire, GL52 8AE	Secondary mixed comprehensive, 11-18	Jo Knott	Leadership, Languages, Technology
Severn Vale School	School Lane, Quedgeley, Gloucester, GL2 4PR	Secondary mixed comprehensive, 11-16	Suz McKinley	Technology
Stroud High School	Beards Lane, Cainscross Road, Stroud, Gloucestershire, GL5 4HF	Secondary girls grammar, 11-18	Carly Niedzwiecki	Science
Rednock School	Rednock Drive, Dursley, Gloucestershire, GL11 4BY	Secondary mixed comprehensive, 11-18	Rob Hemming	Science
Farmor's School	The Park, Fairford, Gloucestershire, GL7 4JQ	Secondary mixed comprehensive, 11-18	Simon Ditchfield	Business & Enterprise, Science
Tewkesbury School	Ashchurch Road, Tewkesbury, Gloucestershire, GL20 8DF	Secondary mixed comprehensive, 11-18	Dave Tyler	Technology, Languages

2. Model frame work (what did we plan to do and when did we plan to do it?)

SWEA then worked specifically with the School Energy Management Team (SEMT) to cover the following activities:

- a) Recruitment assemblies
- b) Interviews and feedback via letters. Initial questionnaire to students and teachers completed
- c) Event 1: Council Chambers Debate: Hired or Fired?
- d) **SEMT Session 1: Introduction to the project**
 - Consumption and emissions from schools and other sectors
 - Energy use from fossil fuels and renewable sources
 - Consumption from different appliances
 - Introduction to the school Energy Diary

- e) **SEMT Session 2: Survey Day**
 - *Consumption in different areas of the world and one world living*
 - *Analysis of the Energy Diary over a year period*
 - *Training in undertaking an Energy Survey*
 - *Energy Survey of the school completed*
- f) Energy Report completed and submitted by students
- g) **SEMT Session 3: Internal Action Planning session**
 - *Student assessment of recommendations*
- h) **SEMT Session 4: Action Planning session**
 - *Formalising and prioritising recommendations*
 - *Setting targets*
 - *Implementing an Energy Policy*
 - *Planning the Next Steps*
- i) Event 2: Sharing Session and Sustainable Build
- j) **SEMT Session 5: Marketing session**
 - *Planning a campaign*
 - *Using suitable language*
 - *Assessment of websites, press releases, paper materials*

At the end of April, all schools met for a Progress Meeting with SWEA to formalise their campaign plan until the end of the academic year and to review progress and consumption in each school. Energy efficiency campaigns began to be implemented in July 2009 and have continued into the new academic year.

3. Contact & Communication with the teachers (how did you find your contact?)

Continuous communication between SWEA and the link teacher at each school has been very successful. This is primarily via email and telephone. The link teachers in each school are really appreciative of the support SWEA provide.

The staff are seeing the benefits of the project with the students and many of the senior staff are now fully on board. The staff sometimes find managing the workload or getting the students together a challenge and some of the teachers have faced difficulties due to poor communication channels within their school. It has become apparent that the schools who have the full support of the Business Manager have found the project far easier to undertake and the necessary information has been easily accessible. Within schools, the teacher responsible for the project has liaised with work experience staff, the senior team and the finance team. The success of these communication channels has varied and SWEA have facilitated these links in some schools.

All teachers are very pleased with the progress the project is making in the school and are particularly proud of the role the students are taking and the staff have found the opportunity to network at the Sharing and Sustainable Build Events beneficial.

SWEA have also had the opportunity to network with other schools at external events and some schools have heard about the project via other sources. As a result, there is a keen interest from other schools to become involved in the dissemination phase. 15 further schools were recruited to take part in YEP! in January 2010 as a result of funding from Gloucestershire County Council.

4. Help needed (teachers' questionnaires)

100% of teachers surveyed already taught Energy related topics (but these are generally global or at least UK patterns and students struggle to make links between the global and local picture)

Figure 1 shows that teaching focuses on Renewable Technologies and very little is done regarding Energy Efficient behaviours or links to buildings. However, teachers suggest the

focus of teaching should shift to Energy efficient behaviours and building design. This may be because they are more directly influenced by students' lifestyles and students can make a more immediate difference in these areas.

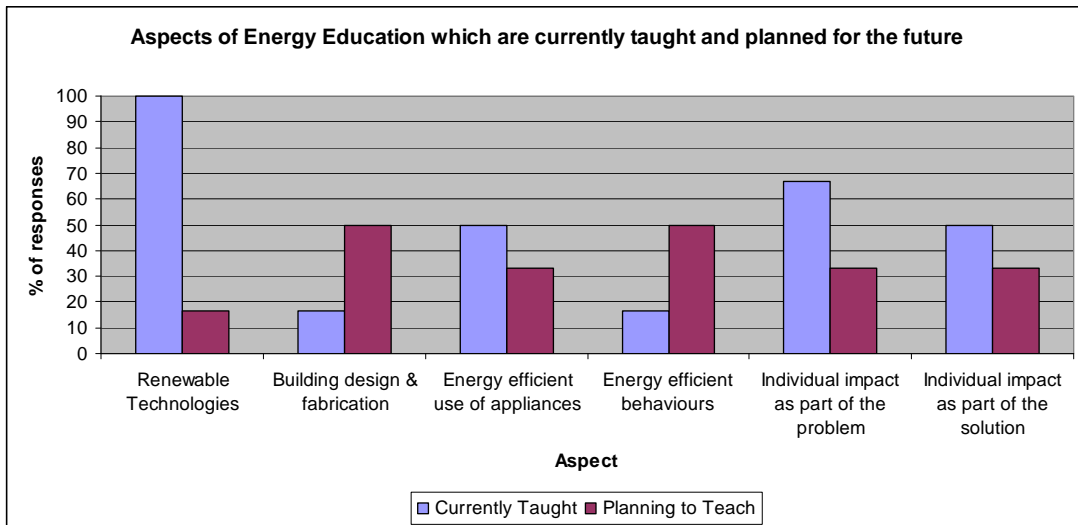


Figure 1: Aspects of Energy Education which are currently taught and planned for the future

Whilst all teachers felt they had at least an average understanding of energy issues (mean=3.67, min=3), 83% of teachers had had no specific training or opportunity to work closely with experts on sustainable energy issues. Only 17% of teachers had had any training and this was during Initial Teacher Training. It appears that teachers felt reasonably confident about delivering aspects of energy education (Figure 2) with less confidence in aspects of Building Design & Fabrication and Energy Appliances compared to Renewable Energy Technologies. It should be noted that upon reflection, teachers may have rated their confidence lower than this if they had known the extra depth of understanding they would gain through this project, particularly in Building Design & Fabrication, Energy efficient use of appliances and Energy Efficient Behaviours.

SWEA have provided extensive support in all areas but have spent less time focusing on Renewable Technologies as there appears to be more confidence in this area. Teachers also felt that there was little guidance available in school concerning sustainable practices for energy use with a mean rating of 2, where 5 represents detailed guidance. However, 2/3rds of teachers felt that they behaved sustainably sometimes in their practice in school, with 1/3rd consistently behaving in a sustainable fashion. It should be noted that the teachers surveyed have all signed up to the project, hence they must have some existing interest in these issues and their practice may reflect this.

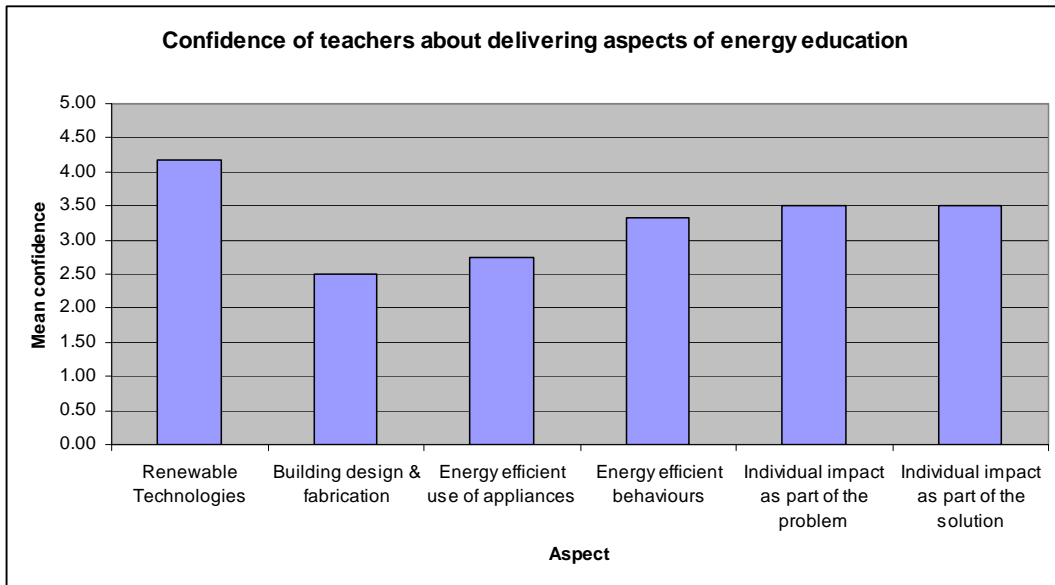


Figure 2: Confidence of teachers about delivering aspects of energy education (5 = total confidence, 0 = no confidence)

5. The pupils' knowledge before the action (pupils' questionnaires)

At the start of the project each member of the SEMT completed a questionnaire to assess the students understanding of energy issues.

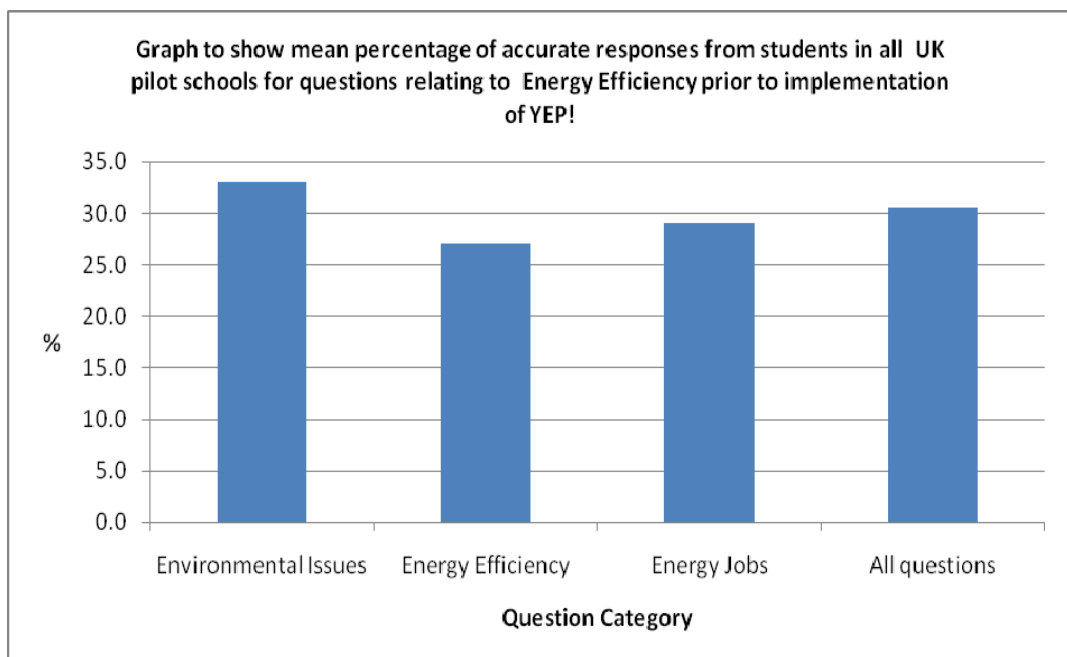


Figure 3: Percentage of accurate responses given by students to questions relating to energy efficiency pre-project

Less than half of all of the students surveyed answered questions relating to energy issues correctly. Questions relating to environmental issues scored the highest at 33%. This is likely to be due to the fact that environmental issues are covered throughout the curriculum in subjects such as science, geography and citizenship. Questions relating to energy efficiency scored the lowest overall.

6. Energy education in school (energy team, energy day, classes etc.)

Following an assembly to targeted year groups interested students were required to complete an application form to express their interest in a specific position on the SEMT. Students were then invited to attend a formal interview with SWEA staff who assessed their suitability for the SEMT and a specific role. Following the interviews students were sent a formal offer letter with feedback on their interview. SEMT number ranged from between 15 -29 pupils mainly from year groups 10 and 12. In one schools case the project was aimed at students in years 9 & 10.

- Severn Vale School: 29
- Rednock School: 13
- Tewkesbury School: 13
- Cleeve School: 15 (active 5 and now recruiting younger students)
- Farmor’s School: 20
- Stroud High School: 25

7. Reducing energy consumption (change of behaviour, tune valves, etc.)

Below are some of the key recommendations made to each school. The School Energy Management Teams have completed a detailed report for each school. SWEA have focused on heating and electricity rather than water consumption.

Cleeve School	Size: 13808m ²
<p>Key recommendations:</p> <ul style="list-style-type: none"> ○ Boiler plant and control replacement plus install weather compensation controls and insulate pipework and valves ○ Ensure boiler time settings are appropriate ○ Install and use Thermostatic Radiator Valves throughout the school ○ Replace single glazed windows with uPVC double glazing or secondary glaze these windows ○ Fit timers to water heaters ○ Reduce and control the use of interactive whiteboards and projectors ○ Install cavity wall insulation and internal wall insulation in necessary areas and repair cracks in the building fabric ○ Install 100mm foam insulation to all flat roof areas ○ Use daylight sensors and occupancy detectors in all necessary areas and replace T12 and T8s with T5 fluorescent tubes ○ Ensure equipment is switched off overnight and at weekends or holidays ○ Improve behaviours towards the use of lighting and appliances, particularly PCs ○ Establish a Procurement Policy to ensure appliances are of the highest possible efficiency 	

Farmor’s School	Size: 8647m ²
<p>Key recommendations:</p> <ul style="list-style-type: none"> ○ Boiler plant and control replacement plus install weather compensation controls and insulate pipework and valves in some areas. 	

- Consider replacing oil heating with biomass boiler or efficient gas fired boilers
- Install and use Thermostatic Radiator Valves throughout the school
- Replace single glazed windows with uPVC double glazing or secondary glaze these windows
- Fit timers to water heaters
- Reduce and control the use of interactive whiteboards and projectors
- Install cavity wall insulation in empty cavities
- Ensure flat roof foam insulation is at 100mm when coverings are renewed
- Use daylight sensors and occupancy detectors in all necessary areas and replace T12 and T8s with T5 fluorescent tubes
- Ensure equipment is switched off overnight and at weekends or holidays
- Improve behaviours towards the use of lighting and appliances, particularly PCs
- Establish a Procurement Policy to ensure appliances are of the highest possible efficiency

Stroud High School	Size: 8168m ²
<p>Key recommendations:</p> <ul style="list-style-type: none"> ○ Set boiler timers appropriately and ensure site staff can operate timers. Insulate pipework and valves. ○ Install and use Thermostatic Radiator Valves throughout the school ○ Secondary glaze sash windows ○ Fit timers to water heaters ○ Reduce and control the use of interactive whiteboards and projectors ○ Draught proof sash windows ○ Increase loft insulation to 270mm on pitched roof areas and install 100mm of foam insulation to flat roof areas when coverings are renewed ○ Use daylight sensors and occupancy detectors in all necessary areas and replace T12 and T8s with T5 fluorescent tubes ○ Ensure equipment is switched off overnight and at weekends or holidays e.g. Television screens. ○ Improve behaviours towards the use of lighting and appliances, particularly PCs ○ Ensure adequate control of the supply fan system in the Sports Hall ○ Establish a Procurement Policy to ensure appliances are of the highest possible efficiency ○ Consider future plans for Junior School site and avoid unnecessary energy expenditure in this area if it is unused 	

Rednock School	Size: 14130m ²
<p>Note: Rednock School is building a new school to be opened in September 2009. The old buildings will be removed hence capital investment is not possible. The group are working on behavioural aspects and ensuring that the recommendations are employed in the new building.</p> <p>Key recommendations:</p> <ul style="list-style-type: none"> ○ Set boiler timers appropriately and insulate pipework and valves in all boiler rooms ○ Lower the temperature of hot water or install localised hot water heaters to overcome the issue of piping water long distances ○ Install and use Thermostatic Radiator Valves throughout the school ○ Replace single glazed windows with uPVC double glazing or secondary glaze these windows ○ Fit timers to water heaters ○ Reduce and control the use of interactive whiteboards and projectors ○ Draught proof windows and doors ○ Increase loft insulation to 270mm on pitched roof areas and install 100mm of foam insulation to flat roof areas when coverings are renewed ○ Use daylight sensors and occupancy detectors in all necessary areas and replace T12 and T8s with T5 fluorescent tubes ○ Ensure equipment is switched off overnight and at weekends or holidays ○ Improve behaviours towards the use of lighting and appliances, particularly PCs ○ Establish a Procurement Policy to ensure appliances are of the highest possible 	

efficiency

Severn Vale School	Size: 10037m ²
Key recommendations: <ul style="list-style-type: none">○ Insulate all pipework and valves in boiler rooms. Although some burners have been replaced, upgrade the remaining burners○ Install and use Thermostatic Radiator Valves throughout the school○ Replace single glazed windows with uPVC double glazing or secondary glaze these windows○ Fit timers to water heaters○ Reduce and control the use of interactive whiteboards and projectors○ Increase loft insulation to 270mm on pitched roof areas and install 100mm of foam insulation to flat roof areas when coverings are renewed○ Use daylight sensors and occupancy detectors in all necessary areas and replace T12 and T8s with T5 fluorescent tubes○ Ensure equipment is switched off overnight and at weekends or holidays e.g. Television screens.○ Improve behaviours towards the use of lighting and appliances, particularly PCs	

Tewkesbury School	Size:16425m ²
Key recommendations: <ul style="list-style-type: none">○ Regularly maintain boilers and replace boilers once they reach 15 years of age. Insulate pipework and valves in all boiler rooms○ Ensure hot water is only heated to 60°C rather than 65-70°C.○ Move the thermostat from the corridor to an appropriate area and set to the recommended temperature○ Install and use Thermostatic Radiator Valves throughout the school○ Replace single glazed windows with uPVC double glazing or secondary glaze these windows○ Install cavity wall insulation○ Fit timers to water heaters○ Reduce and control the use of interactive whiteboards and projectors○ Increase loft insulation to 270mm on pitched roof areas and install 100mm of foam insulation to flat roof areas when coverings are renewed○ Use daylight sensors and occupancy detectors in all necessary areas and replace T12 and T8s with T5 fluorescent tubes○ Ensure equipment is switched off overnight and at weekends or holidays e.g. Television screens.○ Improve behaviours towards the use of lighting and appliances, particularly PCs	

8. Tools

The following tools were used during the course of the project:

- Pre & Post Project Students and Teacher Questionnaires
- School Energy Diary
- Energy Survey Booklet
- Energy Survey Report Template
- Information pack for school teachers
- Action planning templates
- School Energy Policy Template
- Energy Reduction Targets Template.
- List of websites links & Film clips and other useful resources
- Energy Efficiency Campaign Ideas Pack
- Marketing materials e.g. example leaflets, press releases for analysis
- Work Placement Energy Record

9. Experiences

The School Energy Management Teams have:

- Analysed consumption, cost and emissions data and benchmarked the school performance against other schools
- Collected data during the Energy Survey and analysed the results
- Written an Energy Report, suggested and prioritised recommendations and developed an Action Plan
- Set energy reduction targets over the next 5years
- Presented the findings and recommendations to other schools, the School Leadership Teams and Governors
- Developed their Energy Efficiency Behaviour Campaigns in school to encourage all students and staff adopt energy saving behaviours
- Recruiting other members of the school to monitor temperatures and behaviours on a regular basis
- Liaising with the school leadership to ensure the schools sign up to the Energy Policy and Action Plan
- Collecting meter readings monthly, updating the Energy Diary and monitoring progress
- Some teams are presenting their work to external bodies such as Business Groups or at Sustainable Schools meetings

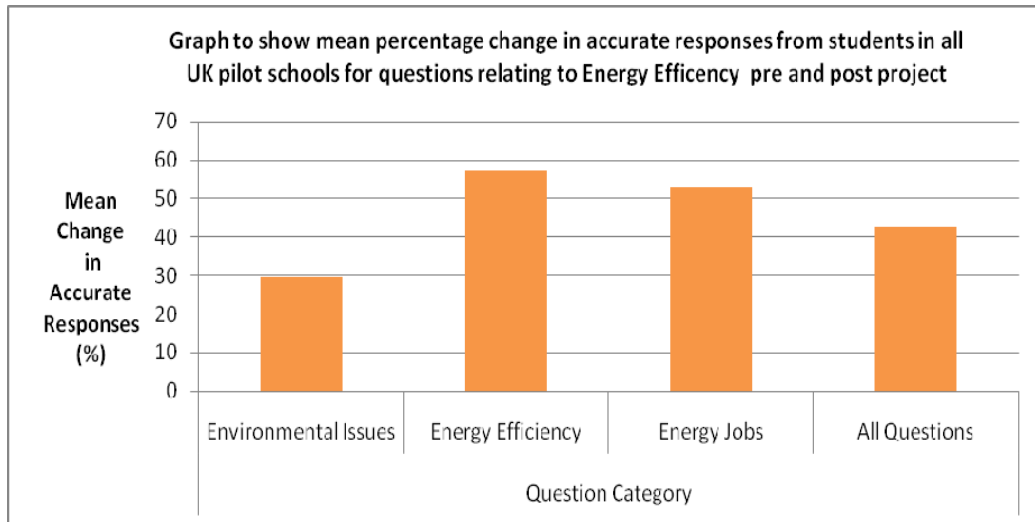
Throughout the project work all of the schools also participated in a number of inter-school events including:

- **The Threatened Islands Debate:** students presented their ideas for producing energy from renewable sources
- **Inter-school Guest Speaker & Sharing Events:** students were given the opportunity to listen to an Architect about her role in order to provide an insight into future employment opportunities. In addition SEMT's came together to share their findings from the energy survey days.

- **Inter-school Energy Quiz:** All SEMT's came together to take part in a quiz style game show event to win prizes and become the 2009 energy champions.

10. Pupils knowledge after the action (pupils' questionnaires)

In July 2009 the same questionnaire was issued to each SEMT to show the percentage change in accurate responses pre project compared to post project. Responses have been collated and analysed using a spreadsheet template and graph as follows:



Overall there has been a 43% increase in accurate responses from students to all questions following the implementation of YEP! in the UK pilot schools. Students answers to questions about energy efficiency improved the most with a 53% increase in accurate responses post project, with knowledge on environmental issues relating to energy efficiency improving the least by 30% overall.

The results have been taken into consideration in planning YEP! 2010 and an additional (optional) session has been incorporated at the start of the project to give students a more in depth overview of environmental issues relating to energy use. The additional will be of most benefit to KS3 students who in line with the National Curriculum will have not covered the energy topic in much depth until the end of Year 9.

b. Goals

1. Emphasis of the pupils

Students enjoyed carrying more practical activities such as carrying out the energy survey and developing presentations and other materials such as posters and logos for the energy efficiency campaign, In addition the positive reception students received from senior leadership teams and governors really boosted their confidence and gave them the motivation to implement the changes they had recommended.

2. Emphasis of the teachers

It was an aim that teachers would be confident with the resources and methodology so that they would continue to support SEMT's once funded action was complete. We are pleased with the outcome that to this day we still receive updated monitoring information from the schools and are able to organise events were experienced SEMT students mentor new schools recruited under the new funding received.

3. Knowledge through energy education

The knowledge and understanding of all participants; students, teachers and work place professionals has increased in the project as shown by the questionnaire results. Perhaps more importantly the attitude to engaging with energy issues has become more positive, particularly amongst pupils who see YEP! work as interesting and fun.

4. Energy topics in the curriculum

The Energy Topic is currently part of the Key Stage 3 Science curriculum, but mainly looks at what energy is, how it is transferred and energy sources. Currently there is little focus on energy efficient behaviours.

Some of the schools involved are working towards Eco-schools status or have gained an Eco-schools award. It is clear that the schools are at very different stages with one school allocating time for one teacher to work on Sustainable schools activities and others are using the YEP! Project as the first stage towards improving their work. Schools have tended to focus on waste issues in the past and usually focus on one specific aspect at a time due to the complexity of the situation and time constraints. As yet, none of the schools have made strides in all areas.

5. Reduction of Energy consumption

The UK schools all have an Energy Diary to monitor the consumption, cost and emissions from each meter. The diary allows the school to benchmark their performance against good practice, to see annual and monthly patterns and calculate annual savings made. The schools are taking this more seriously now as each school now has to display an Energy Performance Certificate. Below are the 4 schools for which we have savings data (noting that Cleeve and Rednock made significant alterations to their building use, and as such the post project data is not comparable against the base line).

School	2008 co2 emissions (tonnes)*	CO2 reduction in 2009 against 2008 emissions (tonnes)*	Percentage reduction
Farmors	400.01	39.23	9.8
Stroud High	482.85	8.34	1.7
Severn Vale	407.29	70.40	17.28
Tewkesbury	828.37	122.29	14.76
Average	529.63	60.07	10.89

*this data has used heating degree days to normalize weather conditions for heating fuel to give a more accurate view of the impact of the project and consumption figures are taken from the school records in their Energy Diaries

As can be seen from the table above, 3 of the 4 schools have performed in line with or above expected results, and only 1 school has made marginal savings. There are a number of reasons for this: shared metering with Marling school (not involved until the 2010 round of YEP!) and less attention given to the ongoing energy campaign as the students involved in the project were going through GCSE mock exams and preparing for GCSEs (which provides a valuable lesson learned in terms of the appropriate age group to deliver the project through).

6. Special qualification of the pupils for the labour market

There was no special accredited qualification bought about by the project work but the whole pupil programme in the UK was built around the principles of work related learning. Students would developed the necessary skills (interview, planning, communication, delegation, innovation, enterprise, competitiveness, etc) through their YEP! training and had the opportunity to apply them, alongside their energy management expertise in a workplace.

7. How did energy efficiency campaigns in the schools work

Into the new academic year additional support sessions with SWEA have taken place in pilot schools to aid campaign planning and implementation. A member of SWEA staff has visited the schools on a regular basis to provide support to the SEMT in implementing their energy efficiency campaign. In addition support has also been provided in to assist schools with updating their energy diaries as and when problems have been encountered e.g. when changing fuel supplier or where an existing building has been extended/demolished.

In the case of Rednock school which opened a new facility in September 2009 a new SEMT have been recruited. SWEA organised a session for Severn Vale School SEMT to visit Rednock school and assist them with planning an energy efficiency campaign in the new build. A new energy diary is being set up for the school as they now have a number of renewable in place including solar PV panels, thermal solar heating and a biomass boiler. As such a comparison of energy consumption is unavailable at this time, however CO₂ emissions are likely to have decreased as a result of the renewable technologies installed.

During June 2010 to provide an opportunity for each school to showcase it's YEP! achievements at a local conservation centre. The exhibition ran over the course of a week during the school holidays and was open to members of the public. The exhibition was advertised to all participating YEP! pilot schools, YEP!2010 schools as well as the general public.

Following the success of YEP! Gloucestershire County Council have approved funding for SWEA to work with a further 15 schools in the region. The 15 schools have been recruited and project activity is currently underway. YEP! 2010 will not involve the work placement aspect, however of schools wish to undertake energy surveys in local businesses additional support can be made available at an additional cost. It is anticipated that students involved in the pilot phase of YEP! will support delivery of YEP! 2010 during autumn term.

In additon as a result of YEP work we have also successfully seized the opportunity to build on the energy saving work at Tewkesbury school in the DCSF funded 'Towards Zero Carbon School'

8. What did the students do

Each SEMT has recruited younger students to assist with their energy efficiency campaign and over half are in the process of training younger members of the team to take on some of the workload as their academic commitments increase. Posters, notice board, assemblies and PSHE and Citizenship sessions have been delivered by the SEMT in each of their schools to raise energy awareness amongst staff and students with noticeable savings in energy consumption being made.

c. Obstacles.

Although students enjoyed carrying out the survey writing the report proved to be more challenging. The campaign spanned two academic years and following the long

summer holiday and in some cases it proved difficult to re-engage older students and in some cases teachers in the project who felt the project had come to a natural end at the end of the summer term. Teacher engagement is absolutely vital to ensuring continuity to the project. In schools where the key member of staff has remained enthusiastic and committed to the project, SEMT's have grown from strength to strength and energy savings are starting to be realised and energy efficiency measures have been implemented.

The level of understanding of the caretaker has varied significantly between schools. It is clear that some caretakers have a sound understanding of the workings of the boilers and the energy supply to different areas of the school. However, in some schools it is evident that there is a lack of understanding of new boilers and equipment, particularly where optimisers have been installed.

d. Suggestions and Notes

1. Lessons learned

A good methodology for

- ⇒ Integrating energy education into a school delivery need (e.g. work related learning)
- ⇒ Structuring focused energy saving based on the context and technical status of the individual school
- ⇒ Raising awareness of energy issues to school managers and business people.

2. Suggestions for the future

- ⇒ SWEA have found that the caretakers are fundamental in the success of the project as they are involved in reading meters and making some of the alternations to controls. The caretakers are all managed by the Business Manager and the support of the Business Manager has had a significant influence on the activities of the caretaker.
- ⇒ Incentives for students such as inter-school events, opportunities to present their work both in school and out of school keep them motivated and engaged.
- ⇒ Whilst the YEP resources do allow schools to maintain an energy educational process independent of external support, it is felt that the initial year of implementation benefits from technical expertise that is more specialist.