GREEN CROSS Australia

FUTURE SPARKS

TEACHER RESOURCES

Basic inquiry: 1-16 lesson ideas

www.futuresparks.org.au

Future Sparks is a Green Cross Australia project in partnership with the Department of Climate Change and Energy Efficiency, CSIRO and Clean Energy Council.

working together for a clean energy future

Australian Government
Department of Climate Change and Energy Efficiency

CSIRO

Clean Energy Council

national science week

2012 INTERNATIONAL YEAR OF SUSTAINABLE ENERGY FOR ALL

Step 1: Engage with the project

Overview of the Future Sparks Clean Energy Future Show and Tell Competition (10 minutes)

Refer to the Future Sparks Clean Energy Future Show and Tell competition website and explore the requirements to submit a competition entry with the class. See www.futuresparks.org.au
Create a retrieval chart on which to show collected information and ideas e.g. what's needed, resources, time lines, judging criteria, prizes etc.

Explanation of the learning program (10 minutes)

Explain to the class that they will be using a range of activities and resources to develop an understanding of 'a clean energy future' and lead to the formation of a 'big idea' to be submitted as a 3 minute 'show and tell' video competition entry.

View the inspiration page and 'why we need clean energy' pages at www.futuresparks.org.au

Explore the student resources available for the competition and related classroom activities.

Check out the following sections: Hands-on activities, vodcasts, videos, readings, and websites.

Step 2: Explore a clean energy future

Investigate the clean energy map (40 minutes)

Using the Clean Energy Council's website at http://www.cleanenergycouncil.org.au/cec/resourcecentre/plantregistermapl locate and find out about Australia's renewable energy power plants.

Imagine (40 minutes)

Ask students to imagine that they were born today. In 20 years time, when they have grown into adulthood, many of the world's ecosystems will have changed.

Consider the following two scenarios;

Scenario one

Many ecosystems now provide fewer natural resources for humans. Due to climate change, excessive use of fossil fuels, high emissions of CO_2 and poor uptake of renewable clean energy technologies, the

natural resources we grew dependent on have been depleted. Technologies and actions to stabilise and reduce emissions have not been implemented globally.

Scenario two

Many ecosystems provide more natural resources for humans. Climate change has slowed and is better understood, and appropriate low emission technologies ensure we use our resources efficiently with minimal impact on the environment. A broad suite of technologies and actions have been used to stabilise and reduce emissions.

Support students to reflect on how our understanding of the use of the Earth's resources might differ to that of our parents' and grandparents' generation. Also, consider what factors have contributed to our changing understanding of the environment and sustainable living.

Ask students to discuss the differences between the two scenarios. Which would they prefer? What factors need to be considered for each to be considered realistic? Ask them to create a third scenario based on what they believe is a realistic goal for the future.

Adapted from: CSIRO CarbonKids Carbon in Action Curriculum Unit, page 5

Picture the future (20 minutes)

Explore how youth globally see climate change, low emission technologies and sustainable futures. Working in small groups, ask students to focus on the artwork from India, China, Brazil and Qatar. Have students distinguish between those which may stabilise and reduce global emissions of CO_2. See http://www.unep.bayer.com/en/International-Children_s-Painting-Competition-18.aspx

Discuss how climate change, low emission technologies and sustainable futures messages are communicated within the artwork, asking students to focus on what they think the young artists are trying to say.

Engage them in a hypothetical continuation of the artists' stories, encouraging students to evaluate these strategies for coping with potential changes to the climate. In groups, students discuss the types of decisions needed if these preferable futures are to eventuate.

Adapted from: CSIRO CarbonKids Agriculture in a Changing Climate Curriculum Unit, page 6

View videos (40 minutes)

View the inspiration page on www.futuresparks.org.au for possible sources of clean energy in the future.

See additional ideas at:

http://www.3pillarsnetwork.com.au/knowledge/behaviour_change/stories_sizzle_salience_and_social_proof/k181

View **You Tube Videos** for information and inspiration for the student videos:

http://www.youtube.com/watch?v=vO7UeSDNeX8&feature=related

http://www.youtube.com/watch?v=_s9dxc_jVlY&feature=related

http://www.youtube.com/watch?v=oTyWeW5MEio&feature=related

http://www.youtube.com/watch?v=FIs90kSkmps

http://www.youtube.com/watch?v=NaLBvHYYyUA&feature=related

http://www.youtube.com/watch?v=TUONjdmFqHI&feature=related

http://www.youtube.com/watch?v=qxd8YbyzKsM&feature=share

http://www.youtube.com/watch?v=kVskMh0Etcs&feature=related

Research what's new in the clean energy area (40 minutes)

Sustainability will certainly demand improvements to our current technology in order to reduce our reliance on non-renewable and non-recyclable resources. How we get our energy is equally as important as how we use it, which means we need innovative ways of harnessing those resources we have access to.

Invite students to download and read the articles about existing clean energy technology, emerging and new clean energy technologies from www.futuresparks.org.au

Engage students individually or in pairs to choose a topic and define their investigation as '*Sustainable Clean Energy Futures*'. Explain to them that they are to research a topic of their choice and engage in an investigation that is related to their topic.

Adapted from: CSIRO CarbonKids in Action Curriculum Unit, page 10

Explore futures ideas (30 minutes)

Take a 'futures walk' by imagining and envisioning clean energy options for the future. Talk with the students about:

- Possible futures
- Probable futures, and

- Preferable futures (hopes, dreams and visions).

Encourage students to formulate their own questions and then illustrate and describe their clean energy possible, probable and preferable future ideas.

For example:

- A possible clean energy future includes…
- A probable clean energy future might include…
- I hope a preferable clean energy future can include….

Discussing futures (15 minutes)

Ask students to talk about what are issues for them in relation to:

- energy sources in the present
- possible clean energy sources and
- probable clean energy sources.

Expand on these thoughts and ask students what might be done about these issues. Synthesise ideas and write a recount of ideas collected.

Step 3: Explanation

Decide on what to present and how to do so (10 minutes)

Re-state the purposes of the investigation and ask students to consider how they are going to bring their information together and present it so that the main points come across clearly. Model the construction of the storyboard genre. Students now use the information they have gathered to construct a storyboard for the Future Sparks Clean Energy Show and Tell competition or a related piece of work of their choice.

See http://www.slideshare.net/slayas/storyboard-genre-ideas for ideas.

Check out (10 minutes)

Check out some amazing videos created by students in NSW Public Schools and focus on the video techniques used post creation of a storyboard.

See http://www.youtube.com/watch?v=tKmB2gYViCU and http://www.youtube.com/watch?v=I7oh-7BZUZE

Similarly, view winning video entries in a Geoscience Australia video competition for ideas.

See www.ga.gov.au/education/public-events/geologi-short-film-competition/geologi-winners-2011.html

Bringing it together (10 minutes)

Focus student's attention on:

- What we know;
- What we want to find out;
- What the class now knows;
- What other things we would like to find out.

Use 'What we know' as a source for class, small group discussion and use other prompts to plan the way forward.

See http://office.microsoft.com/en-au/templates/kwlh-chart-TC101887896.aspx

Step 4: Extension

Consequence wheels (30 minutes)

Invite students to develop a ‘consequence wheel’ to explore the consequences of decisions and choices relating to carbon dioxide emissions from energy plants. In groups, encourage students to decide what issue they wish to explore.

The issue is written in the centre of a sheet of paper and a series of concentric circles are then drawn lightly around it. The first question asked is “What are the immediate consequences?”

Ask groups to discuss what the repercussions might be and briefly write them around the first circle. Ask groups to link each statement to the central point by a single line. Next, students discuss what consequences may follow on from the first ones. Following on, third and fourth order consequences can be explored and marked in a similar way.

Share consequence wheels and explore the difference between intended and unintended consequences for a range of issues.

Encourage the students to ask critical questions of one another's work. For example:

- What do you feel, hope and fear in relation to this particular issue?
- Do you think everybody agrees?
- Why might other people think and feel differently?
- How did the issue come about?
- Who do you think influenced your opinions?
- Who gains and who loses?
- Who has power in this situation and how do they use it?
- Is it used to the advantage of some and the disadvantage of others?
- What values can we use to guide our choices in the way the environment is used, managed and conserved?
- What are the possible courses of action open to us?
- What are others already doing?
- How might industry and energy plants implement a plan of action to stabilise or reduce emissions of carbon dioxide?
- How might we work together?
- Whose help might we need?
- How do we measure our success?

Adapted from "Education For The Future – a practical classroom guide, D.Hicks, WWF, 1994, p.10

Step 5: Elaboration

Presentation planning (30 minutes)

Invite students to confirm the ‘big idea’ planned for their video competition entry in a single sentence or a series of words like a newspaper headline.

In small groups, discuss the possible ways to present the big idea in an interesting and engaging format.

Create a final plan for completing the presentation requirements for the competition entry. Students may need to document their key messages, create an image bank and their props and collate references and acknowledgements for their work sample.

Students work in groups, pairs or individually to create a video presentation and map their ‘big idea’ about a clean energy future.

For more detailed video production lessons, have a look at this website, which includes storyboards, scripting, shooting, editing and assessing.

See http://kidsvid.4teachers.org/index.shtml

Make the video and peer review it (unknown minutes)

Using an iPod, MP3 Player, video camera or iPhone, ask students to capture the video footage as required for their clean energy future video.

Using programs like Movie Maker and iMovie invite students to create and edit video sequences. Add special effects, headings, captions, acknowledgements and any copyright information that may be required.

Share videos with class peers seeking their critique before submitting to the Future Sparks Clean Energy competition. The class should consider how well the video meets the judging criteria:

- **The video includes creative and novel ideas, for new technology, application of technology, and/or changes in behaviour that result in less greenhouse gas emissions**
- **The entry demonstrates an excellent understanding of clean energy and the need to transition towards clean energy sources**

- **The presentation in the video has impact, is engaging, original and creative**
- **The video is highly effective at communication its message**
- **The video production is sound, with can be clearly heard and seen**
- **The video does not exceed 3 minutes**
- **PowerPoint presentations will not be accepted. The video should contain only props and material produced by the student and be free from copyright restrictions**

Review checklist and submit the video (unknown minutes)

Invite students to reflect on feedback shared in the earlier activity, revise and fine-tune the video to meet entry requirements.

Ensure Parental Consent form has been completed and posted to Green Cross Australia. Upload the competition entry via www.futuresparks.org.au and look out for the People's Choice vote from Monday 23 July to Sunday 29 July.

Consider hosting a 'Community Show & Tell' to showcase the students work to the school community and beyond. A small amount

of funding is available to assist with this activity. Send in a request via the link in the Teachers' section of the Future Sparks website.

Educational Resources

Acknowledgements

The *Future Sparks Our Clean Energy Future Show and Tell* educational materials project is being undertaken by CSIRO Education for Green Cross Australia.

These educational resources are designed to introduce teachers and students to Australia's use of 'clean energy' as one of the carbon dioxide mitigation options available for achieving significant reductions in atmospheric carbon dioxide emissions. Whilst not an exhaustive educational resource, it is intended to raise the awareness of school-aged students about our changing climate, clean energy practices and applications and the other alternative energy technologies that reduce greenhouse gas emissions.

The materials in this educational resource have been developed by Angela Colliver from CSIRO Education.

Where experiments are involved, you are advised to carefully follow all instructions and heed all warnings. Experiments should be conducted only under adult supervision.

While reasonable efforts have been made to ensure that the contents of this educational resource are factually correct, CSIRO does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this educational resource.

Climate change is one of the most challenging issues facing the world today. Our climate is already changing. Our temperature increased over the last century and will continue to do so in the foreseeable future – the question is by how much?

New clean energy technologies and behavioural changes will be needed to modify the impact human activity has on atmospheric greenhouse gases. Improvements to the efficiency and reliability of renewable energy sources, efficiency of energy usage, and other novel ideas and unforeseen technology will also need to be considered as potential courses of action.

The effects of human-produced greenhouse gases are intergenerational. It is going to take years – even decades - to reverse the trend. We need to begin the process of change now.

This is where the *Future Sparks Our Clean Energy Future Show and Tell* comes into play. We want to encourage our youth to understand the range of clean energy, renewable and low emission energy technologies being explored as options in managing the risks of climate change by reducing greenhouse gas emissions, particularly carbon dioxide.

How can teachers be part of the process?

As teachers, there is an opportunity to place climate change and clean energy technologies high on the school and classroom agenda – to give all students opportunities to explore the current understanding and science that can reduce greenhouse gas emissions.

This resource has been developed to help teachers:

- Initiate a learning program about clean, renewable and low emission energy technologies and climate change

- Support student's learning for the *Future Sparks Our Clean Energy Future Show and Tell* video competition.

This resource provides information in three parts.

Section 1

Contains an extended learning inquiry of 1-22 x 40 minute lessons/workshops.

Section 2

Contains a basic learning inquiry of 1-16 x 40 minute lessons/workshops.

Section 3

Contains a learning inquiry of a 90 minute lesson/workshop.

Curriculum links

The lessons/workshops are designed to be integrated into learning areas in the Curriculum in:

- Science,
- English, and
- Technology.

The lessons/workshops have links to the following general capabilities:

- Literacy
- Information and communication technology (ICT) capability
- Critical and creative thinking
- Ethical behaviour
- Intercultural understanding.

The lessons/workshops have links to the following cross-curriculum priority:

- Sustainability.

The lessons/workshops can be used in a number of ways. There is much choice in each of the inquiry stages and teachers can select, adapt, add to or modify these.