energy for a sustainable future P–10 overview

Big Understandings

1. **Energy is an essential resource.**
2. **There are renewable and non-renewable energies.**
3. **Human consumption has a major effect upon energy resources.**
4. **We can reduce our energy consumption and lessen the environmental impact.**
5. **Sustainable practices will ensure energy for the future. Sustainable practices will extend our existing energy resources.**

Unit Description

Early Childhood P-2

This unit of work is designed to raise awareness in early childhood students that energy:

- from fossil fuels is a finite resource
- from fossil fuels is the leading cause of emissions in the ACT and in Australia
- reduction in consumption can make a difference

Students will be introduced to the key components of energy.

The students will explore central issues of:

- what is energy?
- why do we need energy?
- where does energy come from? (assumptions about energy)
- how was energy used by different people in the past?
- how do we use energy today?
- how much energy do we use?
- how can we conserve energy?

Later Childhood 3-5

This unit of work is designed to raise awareness in later childhood students that:

- energy from fossil fuels is a finite resource
- energy produced from fossil fuels is the leading cause of emissions in Australia and the ACT
- reducing personal and national consumption can make a difference

Students will be introduced to the key understandings about energy sources, reserves and patterns of consumption.

They will explore:

- what energy is?
- what are the different forms of energy?
- where energy come from?
- how people use energy for different purposes
- conserving energy
- how to use energy resources more effectively
- the global impact of energy

Early Adolescence 6-8

This unit of work is designed to raise awareness in early adolescence students that energy:

- from fossil fuels is a finite resource
- from fossil fuels is the leading cause of emissions in the ACT and in Australia
- reduction in consumption can make a difference

Students will be introduced to the key components of energy.

The students will explore central issues of:

- what is energy and where it comes from?
- how our actions have an impact on the planet
- how our energy needs have changed over time
- what the social and physical implications of our energy use are
- the inequitable distribution of energy resources across the globe
- how we can conserve energy and better use our energy resources

Later Adolescence 9-10

This unit of work is designed to raise awareness in later adolescence students that energy:

- from fossil fuels is a finite resource
- from fossil fuels is the leading cause of emissions in the ACT and in Australia
- reduction in consumption can make a difference

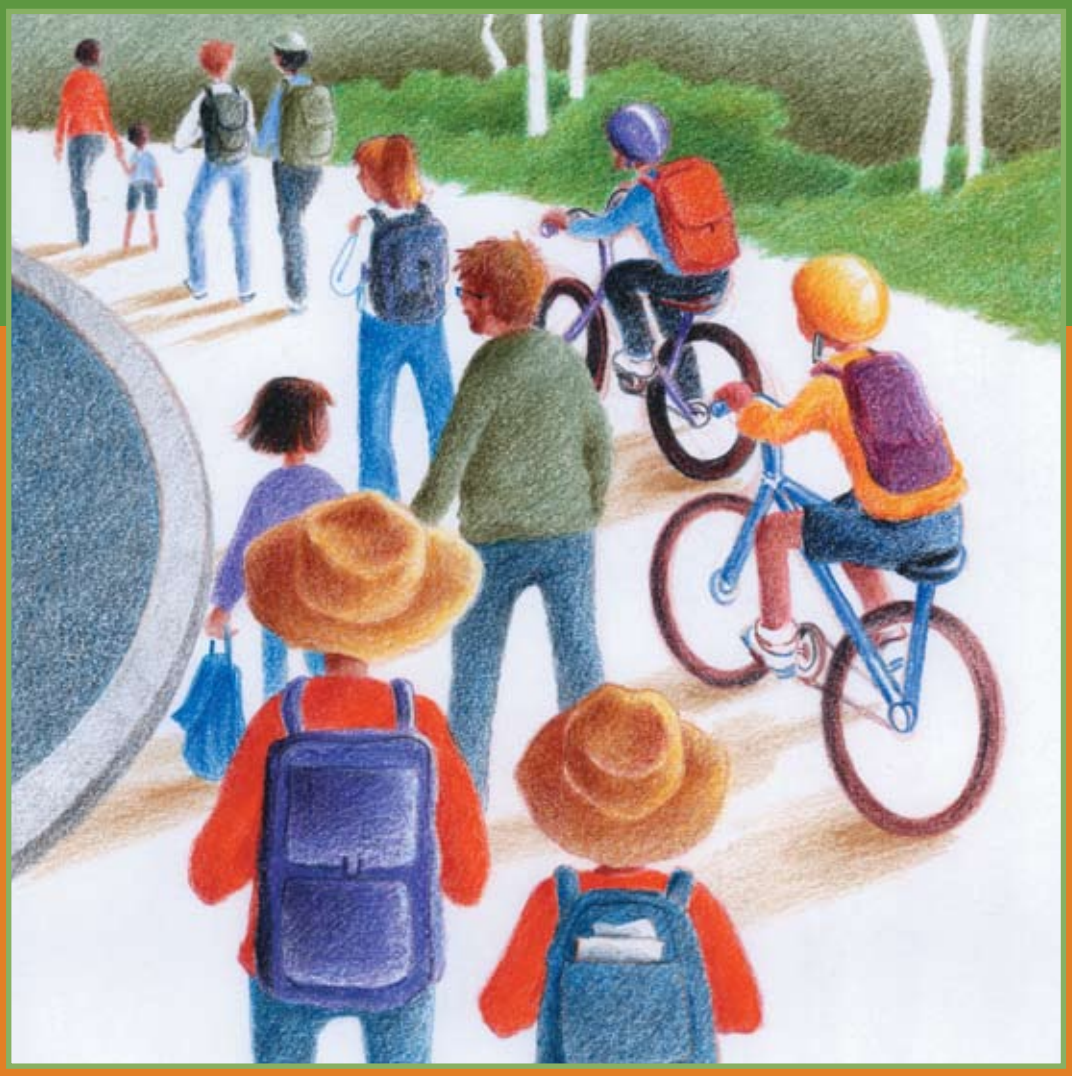
Students will be introduced to the key components of energy.

The students will explore central issues of:

- what is energy and where it comes from
- how humans can better use energy resources
- advantages and disadvantages of different energy sources
- the social and environmental implications of energy extraction
- possible global energy futures

energy for a sustainable future P–10 overview

energy
for a sustainable future



early childhood
years P–2

Australian Sustainable Schools Initiative - ACT

energy for a sustainable future

Unit Title: Energy for a Sustainable Future

Class: Preschool to Year Two

Band of Development: Early childhood

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The format for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Department of Education and Training Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in early childhood students that energy:

- from fossil fuels is a finite resource
- from fossil fuels is the leading cause of emissions in the ACT and in Australia
- reduction in consumption can make a difference

Students will be introduced to the key components of energy.

The students will explore central issues of:

- what is energy?
- why do we need energy?
- where does energy come from? (assumptions about energy)
- how was energy used by different people in the past?
- how do we use energy today?
- how much energy do we use?
- how can we conserve energy?

Big Understandings

1. Energy is an essential resource.
2. There are renewable and non-renewable energies.
3. Human consumption has a major effect upon energy resources.
4. We can reduce our energy consumption and lessen the environmental impact.
5. Sustainable practices will ensure energy for the future. Sustainable practices will extend our existing energy resources.

Values and Attitudes

During this unit of work, students will have the opportunity to develop the following values and attitudes:

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability

Schools may choose to include other worthwhile learning linked to the unit. For example:

- climate change and global warming
- social and health implication from emissions generated from energy
- food: production and transport and the issues surrounding energy consumption and usage
- energy Audit in home and school
- lifestyle change and choices

Essential Learning Achievements covered in this unit are ELA 2, 3, 19, 20, 22 and 23. Essential Content has been selected from the early childhood band of development.

ELA 2 the student understands and applies the inquiry process

Essential Content

In the early childhood band of development, students have opportunities to:

- explore inquiry as a useful process for creating knowledge and understanding the world around them
- contribute to planning and conducting simple investigations by asking questions and seeking answers through observing, experimenting, engaging with information in texts, discussing ideas with others and using ICT
- ask questions and identify possible sources of information to seek answers
- share and communicate observations, findings, ideas and understandings

ELA 3 the student makes considered decisions

Essential Content

In early childhood band of development, students have opportunities to learn to:

- ask for advice when making a decision or plan
- be aware when they have a choice
- delay a decision until they have thought about it
- set a small number of goals

ELA 19 the student understands and applies scientific knowledge

Essential Content

In early childhood, students have opportunities to understand and learn about:

- scientific aspects of their everyday activities and applications of science in their own lives and the place of science in the work of people in the community
- the concept of energy being needed to get things done and different forms of energy they use in familiar situations

ELA 20 the student acts for an environmentally sustainable environment

Essential Content

In the early childhood band of development, students have opportunities to understand and learn about:

- elements of the natural environment that humans, animals and plants need for survival
- how people cooperate to care for places in a community
- why it is important to conserve resources, protect the environment and participate in positive environmental action

In the early childhood band of development students have opportunities to learn to:

- observe and discuss changes evident in the local environment, both natural and caused by human action
- share responsibility for the quality of their immediate environments and for resource conservation

ELA 21 the student understands about Australia and Australians

Essential Content

In the early childhood band of development, students have opportunities to understand and learn about:

- the stories of some people and events in Australia's past

In the early childhood band of development students have opportunities to learn to:

- recognise Australia's shape and some if its places
- find out about people's lives in the past by asking questions

ELA 23 the student understands world events and issues

Essential Content

In the early childhood band of development, students have opportunities to understand and learn about:

- ways in which Australians, including young people, are connected to other people and places

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

Understand what energy is and where it comes from.

Energy is connected to their personal experiences.

Energy is integral to daily life.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- share and communicate observations, findings, ideas and understandings
- explore inquiry as a useful process for creating knowledge and understanding the world around them
- contribute to planning and conducting simple investigations by engaging with information in texts, discussing ideas with others and using ICT

Assessment

What evidence will there be that they have learnt?

Give simple explanations of what energy is (e.g. the ability of any object to do work).

Express and identify some simple sources of energy (e.g. food, sun, electricity, gas).

Design and create energy mural depicting the use of energy in their daily life and what they know about energy.

Strategy

What is/are the most effective strategy or strategies to teach this?

Inquiry process.

Brainstorm.

Listening.

Questions and statements.

Visual representations.

Sharing and cooperation.

Activity

What is the best vehicle to deliver the learning?

Visualise the human body as a machine. Engage in physical activity to enable various connections to be made between energy and energy sources.

Guided questioning to clarify student learning.

Design and create energy mural depicting the use of energy.

Whole class brainstorm:

What is energy and where does it come from?

Create an energy mind-map to display current knowledge and understanding about energy.

Make statements about energy.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

Different uses of energy in the classroom.

There are different forms of energy.

People need energy.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- share and communicate observations, findings, ideas and understandings
- contribute to planning and conducting simple investigations
- ask questions and identify possible sources of information

ELA 19 understands and applies scientific knowledge:

- the concept of energy being needed to get things done and different forms of energy they use in familiar situations
- scientific aspects of their everyday activities

ELA 21 understand about Australia and Australians:

- recognise Australia's shape and some of its places

Assessment

What evidence will there be that they have learnt?

Pictorially record and represent on a map where energy is used in the classroom.

Give a simple explanation to identify why energy is essential in our lives.

Create a diagram representing how personally they use energy at home and school.

Design a whole-class chart/diagram/flow-chart to illustrate where energy comes from and how it is generated.

Strategy

What is/are the most effective strategy or strategies to teach this?

Questioning.

Surveying and recording.

Viewing and reading.

ICT.

Observations.

Comparing and contrasting.

Inferring.

Diagrams.

Activity

What is the best vehicle to deliver the learning?

Conduct a simple energy audit of their classroom to identify on a map items that require energy.

Class development of key energy questions.

Research and identify where energy comes from and how it is generated.

View ActewAGL and *Ollie Saves the Planet* websites to gain further knowledge and understanding about energy.

Design a whole-class chart/diagram/flow-chart to illustrate where energy comes from and how it is generated.

Create a diagram representing student energy usage at home and at school.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

The community needs and uses of energy.

There are different types of energy we use.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- ask questions and identify possible sources of information to seek answers about resources

ELA 3 makes considered decisions:

- be aware when they have a choice

ELA 19 understands and applies scientific knowledge:

- the concept of energy being needed to get things done and different forms of energy they use in familiar situations

Assessment

What evidence will there be that they have learnt?

List of ways in which the community uses energy.

Record and identify how energy is sourced and consumed.

Identify and classify through a visual representation the different sources of energy.

List questions about energy.

Explain connections between their own lives and energy uses.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Brainstorm.

List and classify.

Reflect.

Synthesis.

Report and present.

Activity

What is the best vehicle to deliver the learning?

Collect images to create classification posters that depict objects with different types of energy sources being used. For example:

Object: TV

Energy Source: mains electricity

Object: Remote control car

Energy source: battery

Develop a list of focus questions to gather information about energy usage.

Discuss the advantages and disadvantages of energy sources. Battery or mains, walking or cars.

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

Energy in the past. How it was sourced and used.

Energy has changed in the local area over time.

Energy has changed our lifestyle.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understand and apply the inquiry process:

- share and communicate observations, findings, ideas and understandings

ELA 19 understands and applies scientific knowledge:

- the concept of energy being needed to get things done and different forms of energy they use in familiar situations.

ELA 20 acts for an environmentally sustainable future:

- elements of the natural environment that humans, animals and plants need for survival
- how people cooperate to care for places in a community
- observe and discuss changes evident in the local environment, both natural and caused by human action

ELA 21 understands about Australia and Australians:

- the stories of some people and events in Australia's past

Assessment

What evidence will there be that they have learnt?

Identify state and explain how energy was used in the past.

Write and present a play to show similarities and differences between past and present uses of energy.

Accurately recall facts about excursions.

Strategy

What is/are the most effective strategy or strategies to teach this?

Excursions and guest speakers.

Co-operative learning.

Explain and report.

Artistic representations.

Activity

What is the best vehicle to deliver the learning?

Excursion to Blundell's Cottage/Calthorpe's House/Lanyon Homestead to have a practical experience of lifestyles of the past.

Using discussion to compare and contrast similarities and differences between past and present uses of energy.

List how energy was sourced and consumed in the past.

In co-operative learning groups write and present a play to show similarities and differences between past and present uses of energy.

Research the difference between energy today and in the past.

Interview a senior citizen about changes in lifestyle. Did people in the past use more or less energy than today?

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections stage?

We need to conserve energy.

Individuals can make a difference to conserving energy.

The need for a communal effort to conserve energy.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 3 makes considered decisions:

- delay a decision until they have thought about it
- ask advice when making a decision or plan

ELA 20 acts for an environmentally sustainable future:

- why it is important to conserve resources, protect the environment and participate in positive environmental action
- share responsibility for the quality of their immediate environments and for resource conservation

Assessment

What evidence will there be that they have learnt?

Peer interviews about energy - Why is energy important for you?

List ways we can conserve energy at home and school.

Illustrate what our environment would look like if we all conserved energy.

Illustrate what our environment would look like if we did not conserve energy.

Strategy

What is/are the most effective strategy or strategies to teach this?

Synthesis and interpret.

Reflect.

Generalise.

Brainstorm and elaborate.

Activity

What is the best vehicle to deliver the learning?

Discuss the advantages and disadvantages about energy and its usage.

Construct a consequence wheel for the “low energy” day?

Students brainstorm options for conserving energy.

Promoting sustainability to the school community.

Discuss all the different ways to inform people how to save energy.

Write sentences, statements and slogans that reflect the importance of energy conservation.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

We need to conserve energy.

Ways one person can make a difference to conserving energy.

The need for a communal effort to conserve energy.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- share and communicate observations, findings, ideas and understandings

ELA 3 makes considered decisions:

- delay a decision until they have thought about it

ELA 20 acts for an environmentally sustainable future:

- why it is important to conserve resources, protect the environment and participate in positive environmental action
- share responsibility for the quality of their immediate environments and for resource conservation

Assessment

What evidence will there be that they have learnt?

Design a personal action plan identifying how they will conserve energy.

Design, create and publish labels and badges to promote energy conservation in their community.

Record energy saving tips onto a CD or tape to promote energy conservation in the community.

Strategy

What is/are the most effective strategy or strategies to teach this?

Design and publish.

Discuss and consider options.

Inform and encourage others.

List.

Activity

What is the best vehicle to deliver the learning?

Design a personal energy conservation action plan.

Make and create labels and badges for objects and appliances to remind people to ‘switch off’.

Inform community members how to save energy.

Audio recording of energy saving tips to be played to remind people to turn off the lights and appliances when not in use.

Design and make posters that encourage energy conservation.

Encourage others and participate in a “low energy” day?

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

Share, discuss and reflect on current, values attitudes and understandings.

Reflecting upon the need for energy conservation.

Energy can be used for a sustainable future throughout the world.

Personal achievable goals.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- share and communicate observations, findings, ideas and understandings

ELA 3 makes considered decisions:

- set a small number of goals

ELA 20 acts for an environmentally sustainable future:

- share responsibility for the quality of their immediate environments and for resource conservation

ELA 23 understands about world events and issues:

- ways in which Australians, including young people, are connected to other people and places.

Assessment

What evidence will there be that they have learnt?

Demonstrate their learning by reflecting and answering the following questions:

- What is energy?
- Why do we need energy?
- Where does energy come from?
- What assumptions about energy do we make?
- How was energy used in the past?
- How much energy do we use now?

Respond to the following questions in pictures, words or writing - How we can conserve energy throughout the world?

Set two simple goals that they can achieve.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Justify.

Respond.

Set goals.

Activity

What is the best vehicle to deliver the learning?

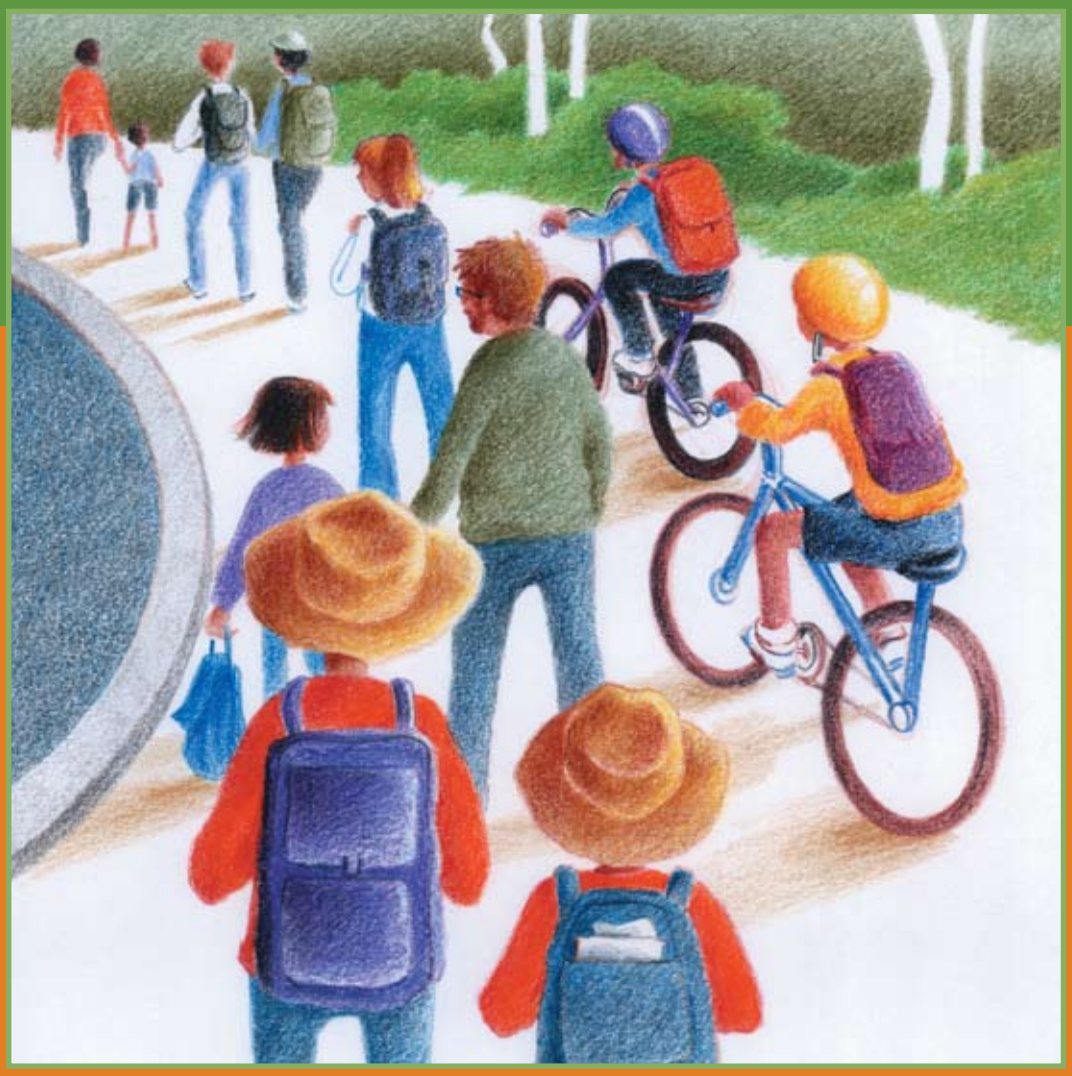
Sharing circle: Reflect and make generalisations about energy.

Students will reflect and answer the questions using pictures, discussion or writing answers.

Students will reflect on current understandings, values and attitudes through a personal visual artistic response.

Establish small goals for the reduction of energy consumption at home and school.

energy
for a sustainable future



later childhood
years 3–5

Australian Sustainable Schools Initiative - ACT

energy for a sustainable future

Class: Year 3-5

Band of Development: Later childhood

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The design for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Dept of Education Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in later childhood students that:

- energy from fossil fuels is a finite resource
- energy produced from fossil fuels is the leading cause of emissions in Australia and the ACT
- reducing personal and national consumption can make a difference

Students will be introduced to the key understandings about energy sources, reserves and patterns of consumption. They will explore:

- what energy is?
- what are the different forms of energy?
- where energy come from?
- how people use energy for different purposes
- conserving energy
- how to use energy resources more effectively
- the global impact of energy

Big Understandings

1. Energy is an essential resource.
2. There are renewable and non-renewable forms of energy.
3. Human consumption has a major effect upon energy resources.
4. We can reduce our energy consumption and lessen the environmental impact.
5. Sustainable practices will extend the life of our existing energy resources.

Values and Attitudes

During this unit of work students will have the opportunity to develop the following values and attitudes:

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability

Schools may choose to include other worthwhile learning linked to the unit. For example:

- Energy from fossil fuels is the leading course of emissions in the ACT, Australia and the world
- The heavy dependency our society has on energy is contributing to global warming
- Distribution of energy resources across the planet is geographically, socially, economically and politically uneven

energy for a sustainable future

Essential Learning Achievements overed in this unit are ELA 2, 3, 19, 20, 21 and 23. Essential Content has been selected from the later childhood band of development.

ELA 2 the student understands and applies the inquiry process

Essential Content

In later childhood, students will have opportunities to:

- recognise different contexts for applying the inquiry process
- make decisions about information and equipment needed and the tasks to be carried out
- conduct searches for information and use a range of sources, (e.g. information texts, artefacts, maps, images)

ELA 3 the student makes considered decisions

Essential Content

In later childhood, students will have opportunities to:

- identify what influenced them in a recent decision
- develop and apply a small number of criteria for judging the quality of a decision
- list advantages, disadvantages and risks of various options, using the inquiry process to gather information
- identify possible consequences of different decisions

ELA 19 the student understands and applies scientific knowledge

Essential Content

In later childhood band of development, students will have opportunities to understand and learn about:

- identifiable causes for some of the short and long term changes to the surface of the Earth or the atmosphere4 (e.g. volcanic activity, soil erosion, air pollution)

In later childhood band of development, students will have opportunities to learn to:

- apply scientific understandings to their experiences and describe how products (e.g. hair gel, sunscreen, protective clothing) and tools (e.g. egg beater, hair dryer) have been developed

ELA 20 the student acts for an environmentally sustainable future

Essential Content

In later childhood band of development, students will have opportunities to understand and learn about:

- some effects of human action on natural environments
- renewable and non-renewable resources, and the need to conserve non-renewable resources
- how protecting the environment requires people to work together as citizens and consumers and participate in appropriate actions as environmental stewards

In later childhood band of development, students will have opportunities to learn to:

- take responsibility for caring for a local environment

- explore probable and preferred futures in relation to environmental issues familiar to them, and discuss actions needed to make preferred futures happen

ELA 21 the student understands about Australia and Australians

Essential Content

In later childhood band of development, students will have opportunities to understand and learn about:

- significant landmarks, places and population centres in Australia

ELA 23 the student understands world events and issues

Essential Content

In later childhood band of development, students will have opportunities to understand and learn about:

- how present and future global events and issues may impact on people in Australia and Asia
- discuss and provide opinions on current and past global issues and world events, considering perspective

Tuning in

Outcomes

What understandings will my students have at the end of the Tuning In stage?

What energy is.

Where energy comes from.

Renewable and non-renewable energy sources.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- conduct searches for information and use a range of sources, (e.g. information texts, artefacts, maps, images)
- make decisions about information and equipment needed and the tasks to be carried out

ELA 19 understands and applies scientific knowledge:

- apply scientific understandings to their experiences and describe how products and tools have been developed

ELA 20 acts for an environmentally sustainable future:

- renewable and non-renewable resources, and the need to conserve non-renewable resources

Assessment

What evidence will there be that students have learnt?

Define energy e.g. *(energy is the ability to cause changes in matter)*.

Give an example of energy and its corresponding source.

Draw a cartoon that identifies differences between renewable and non-renewable energy resources.

Correctly identify and/or classify four types of energy as renewable or non-renewable.

Strategy

What is/are the most effective strategy or strategies to teach this?

Brainstorming.

Questioning.

Discussion and sharing ideas about energy.

Listing questions and statements about energy.

Concept mapping.

Reading and viewing.

Working cooperatively.

Activity

What is the best vehicle to deliver the learning?

Brainstorm to define what energy is (e.g. energy is the ability to cause changes in matter. There are renewable and non-renewable energies).

Discuss where energy comes from - renewable and non-renewable sources of energy.

Concept map to show non-renewable and renewable energy sources.

Use ICT and view *Ollie Saves the Planet* Website (e.g. energy and energy facts).

List and share ideas about energy.

Construct a visual representation of four types of renewable or non-renewable energy resources.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

There are different types of energy.

Energy comes in renewable and non-renewable energy forms.

Energy is used in the situations within a school environment.

Energy use can be measured.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- recognise different contexts for applying the inquiry process
- make decisions about information and equipment needed and the tasks to be carried out

ELA 19 understands and applies scientific knowledge:

- identifiable causes for some of the short and long term changes to the surface of the Earth or the atmosphere
- apply scientific understandings to their experiences and describe how products and tools have been developed

ELA 20 acts for an environmentally sustainable future:

- some effects of human action on natural environments

Assessment

What evidence will there be that students have learnt?

Ask key questions about energy types (e.g. coal, gas, nuclear, hydro, wind, solar, tidal).

Explain the difference between renewable and non-renewable energy sources.

Give an accurate description of a renewable energy and/or a non-renewable energy e.g. (sun and oil).

List items in the school that use energy and state which energy source is needed to make it operate.

Present and explain information on energy usage using some scientific language e.g. *(kilowatts per hour)*.

Strategy

What is/are the most effective strategy or strategies to teach this?

Listening.

Discussion.

Observation.

Interviewing guest speaker(s).

Reading and viewing.

Locating and selecting relevant information.

Working with others.

Activity

What is the best vehicle to deliver the learning?

Guest Speaker(s) from the ACT HEAT Team. Discuss and question the different types of energies. (e.g. coal, gas, nuclear, hydro, wind, solar, tidal).

Whole class discussion about energy usage in the school. (e.g. what types of appliances/what type of energy?).

Use the energy device 'Power Mate Measure' in small groups to audit energy consumption of different appliances within the school.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

Energy is consumed in the home and/or school.

Energy usage is high or low in particular locations and at particular times.

High local energy consumption has global implications.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- conduct searches for information and use a range of sources, (e.g. information texts, artefacts, maps, images)
- make decisions about information and equipment needed and the tasks to be carried out

ELA 3 makes considered decisions:

- identify what influenced them in a recent decision
- list advantages, disadvantages and risks of various options, using the inquiry process to gather information
- develop criteria for judging the quality of a decision
- identify the consequences of different decisions

ELA 20 acts for an environmentally sustainable future:

- take responsibility for caring for a local environment

ELA 21 understands Australia and Australians:

- identify and represent key features of Australia on maps

ELA 23 understands world events and issues:

- how present and future global events and issues may impact on people in Australia and Asia

Assessment

What evidence will there be that students have learnt?

Use the school map to accurately identify and label areas of high and low energy usage (e.g. high-red spots, low-green spots).

Accurately graph data about school energy consumption.

Report at least one global implication and/or issue surrounding high-energy usage and consumption.

Write a newspaper article about energy consumption in the home and how this impacts on consumption in the ACT and Australia.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Patterns and classify.

Cooperative learning.

Present and report.

Represent.

Draw and make diagrams.

Activity

What is the best vehicle to deliver the learning?

Discuss areas within the home and school in which energy is consumed.

Debate why / why not the areas of energy consumption are high/low in particular locations. (e.g. ICT classroom, kitchen, canteen, bathroom).

Write a newspaper article about energy consumption in the home.

Locate, list and classify areas of energy consumption within the home/school.

Role-play various scenarios that show the global affect of high local energy consumption.

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

Different sectors of the community use energy in various ways (e.g. transport, public service, private enterprise).

There are advantages and disadvantages of different types of energy.

Energy is changed for distribution and use in different situations.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- conduct searches for information and use a range of sources, (e.g. information texts, artefacts, maps, images)

ELA 20 acts for an environmentally sustainable future:

- how protecting the environment requires people to work together as citizens and consumers and participate in appropriate actions as environmental stewards
- some effects of human action on natural environments

ELA 23 understands about world events and issues:

- how present and future global events and issues may impact on people in Australia and Asia
- discuss and provide opinions on current and past global issues and world events, considering perspective

Assessment

What evidence will there be that students have learnt?

Explain the role of energy in relation to a specific sector (e.g. transport, public service, and private enterprise).

Create an accurate energy profile that lists key characteristics and the advantages and disadvantage of particular types energy.

Construct an accurate energy diagram to show how resources are changed for use in different sectors *(e.g. coal is mined and taken to a power station. It is turned into steam, which creates and generates electricity for use).*

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Questions.

Reading and viewing.

Working co-operatively.

Research.

Activity

What is the best vehicle to deliver the learning?

Discuss the relationship between humans and energy.

Visit ACTEWAGL website:
http://www.actewagl.com/education/sitemap.aspx

Work in small groups to question and assess the effectiveness of various energy sources (e.g. number of units of coal/solar/wind/ required to power the 'rock concert' feature).

Draw energy diagrams to show different types of energy and how resources are changed to allow for use in different sectors *(e.g. Coal is mined and taken to a power station. It is turned into steam, which creates and generates electricity for use).*

Create energy profiles. Research in small groups characteristics of different types of energy.

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections stage?

There is a relationship between lifestyle and energy consumption.

Different types of energy have different characteristics.

Energy can be used efficiently.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 3 makes considered decisions:

- identify possible consequences of different decisions

ELA 20 acts for an environmentally sustainable future:

- how protecting the environment requires people to work together as citizens and consumers and participate in appropriate actions as environmental stewards
- take responsibility for caring for a local environment
- explore probable and preferred futures in relation to environmental issues familiar to them, and discuss actions needed to make preferred futures happen
- some effects of human action on natural environments

ELA 23 understands world events and issues:

- discuss and provide opinions on current and past global events, considering perspective

Assessment

What evidence will there be that students have learnt?

Explain how and why current energy usage and consumption is not sustainable.

Construct a consequence wheel that shows the relationship between humans, lifestyle and energy.

Report how different energy types work using accurate classification.

Write and present possible scenarios for energy (e.g. role-play, dramatisation, newspaper article, fable, and good luck/bad luck story).

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Questions.

Reading and viewing.

Working co-operatively.

Reporting and presenting.

Activity

What is the best vehicle to deliver the learning?

Discussion about different energy types.

Construct consequence wheel to make explicit links between humans, current lifestyles and unsustainable energy consumption.

Write various reports on different energy types in small groups. Present to others for wider understanding.

Discuss energy using 'what if' statements with particular focus past and present issues.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

We have a personal responsibility to use energy efficiently at home, school, and work.

We have a collective responsibility for energy usage.

Current ACT energy use is not sustainable.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 3 makes considered decisions:

- make considered decisions as an involved group member

ELA 20 acts for an environmentally sustainable future:

- establish a personal and cooperative approach towards sustainable energy usage and management
- how protecting the environment requires people to work together as citizens and consumers and participate in appropriate actions as environmental stewards

Assessment

What evidence will there be that students have learnt?

Construct a personal plan to reduce energy (e.g. include realistic outcome and timeframe).

Explain various ways to reduce energy usage.

Design an appropriate timeline to reduce energy consumption in a particular area (e.g. home, school, industry).

Clearly articulate why current ACT energy usage is not sustainable.

Design an accurate concept map to show how lower energy usage affects the global environment.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Reflection.

Responding.

Graphic organisers.

Timeline.

Participation.

Activity

What is the best vehicle to deliver the learning?

Establish school-based initiatives to monitor and reduce energy use (e.g. form partnerships and roles within SRC to support this).

Network with other schools to share ideas and tips for effective energy usage and consumption.

Design an appropriate timeline to reduce energy consumption in school over a specific time period.

Draw a concept map to show links between energy usage and global environment.

Hold a public information workshop to highlight the need for cooperative sustainable practices *(e.g. present energy usage findings and highlight areas for improvement).*

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

Understandings of how to gage personal and group energy usage and consumption.

Identify areas of strength and weakness within the unit.

Essential Content

What do I want students to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- maintain and strengthen curiosity to improve knowledge of energy, energy usage and energy resource systems

ELA 3 makes considered decisions:

- use considered decisions to recognise the importance of cooperative work to achieve sustainable outcomes

Assessment

What evidence will there be that students have learnt?

Answer key questions about energy usage and consumption.

Identify and explain the importance of making considered decisions.

Present key understandings and knowledge about energy (e.g. role-play).

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Reflection.

Share.

Diagrams and charts.

Evaluating.

How can energy be used for a sustainable future?

Activity

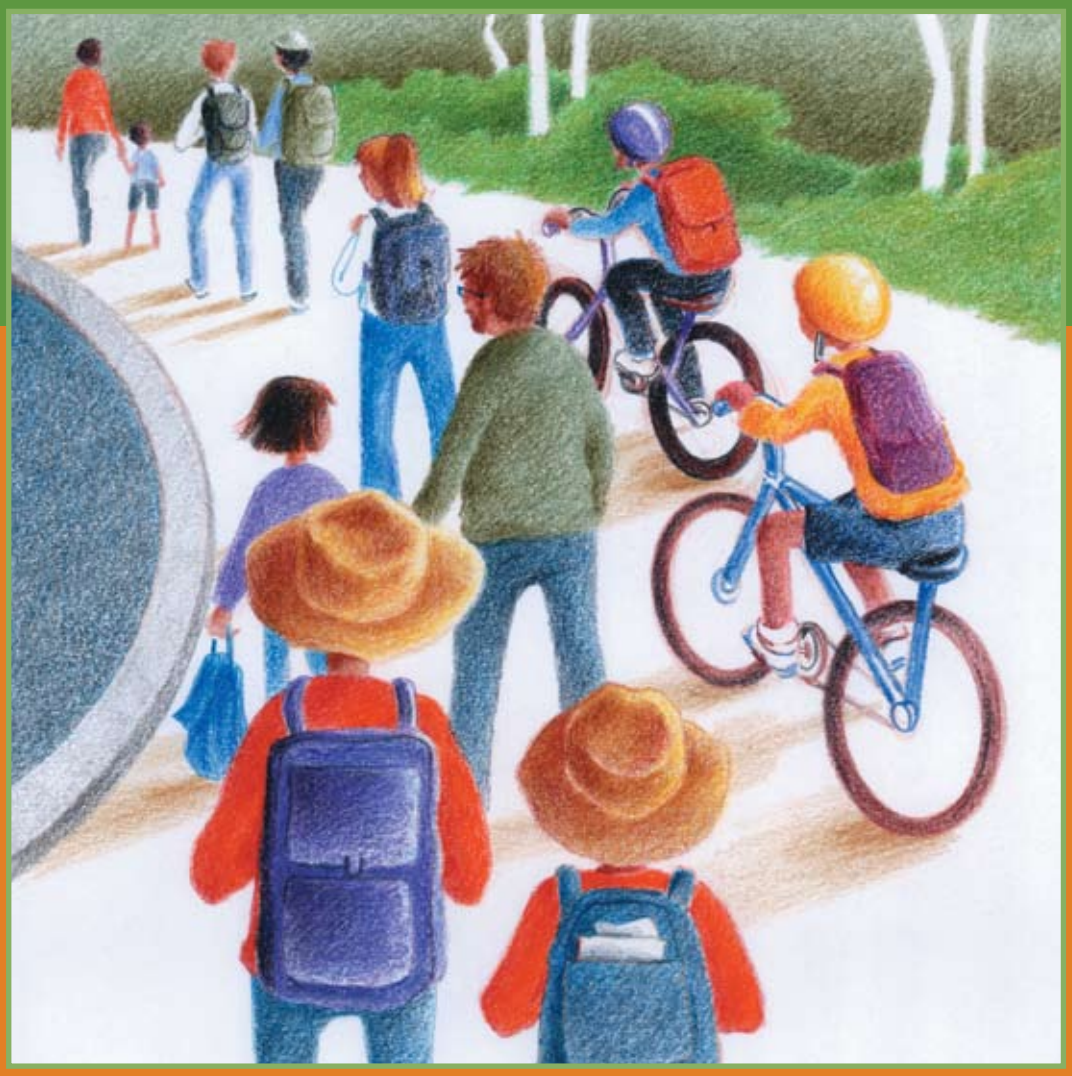
What is the best vehicle to deliver the learning?

Revisit earlier work to evaluate knowledge of energy.

Role-play current knowledge and understandings about energy.

Identify further areas of investigation

energy
for a sustainable future



early adolescence
years 6–8

Australian Sustainable Schools Initiative - ACT

energy for a sustainable future

Class: Year 6 - 8

Band of Development: Early adolescence

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The design for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Dept of Education and Training Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in early adolescence students that energy:

- from fossil fuels is a finite resource
- from fossil fuels is the leading cause of emissions in the ACT and in Australia
- reduction in consumption can make a difference

Students will be introduced to the key components of energy. The students will explore central issues of:

- what is energy and where it comes from
- how our actions have an impact on the planet
- how our energy needs have changed over time
- what the social and physical implications of our energy use are
- the inequitable distribution of energy resources across the globe
- how we can conserve energy and better use our energy resources

Big Understandings

1. Energy is an essential resource.
2. There are renewable and non-renewable energy resources.
3. Human consumption has a major effect upon energy resources.
4. We can reduce our energy consumption and lessen the environmental impact.
5. Sustainable practices will ensure energy for the future. Sustainable practices will extend our existing energy resources.

Values and Attitudes

During this unit of work students will have the opportunity to develop the following values and attitudes

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability.

Schools may choose to include other worthwhile learning linked to the unit. For example:

- health and energy
- government regulations and policies for energy usage and consequences
- climate change and global warming
- energy audit in home and school
- food: production and transport and the issues surrounding energy consumption and usage
- role of media

Essential Learning Achievements covered in this unit are ELA 2, 3, 19, 20, 21,and 23. Essential Content has been selected from the early adolescence band of development.

ELA 2 The student understands and applies the inquiry process

Essential Content

In early adolescence band of development, students have opportunities to:

- formulate questions, predictions or propositions suitable for investigation and clarify the inquiry process
- collect and assemble relevant data or information, taking steps to minimise error (e.g. systematic observation, repeated trials)
- organise and analyse data or information (e.g. using ICT), summarise and explain patterns in data, or compare and synthesise information from different sources
- draw reasonable conclusions based on analysis of data and information
- present and communicate findings and conclusions using suitable representations and subject terminology
- acknowledge the sources of information using bibliographies

ELA 3 The student makes considered decisions

Essential Content

In early adolescence band of development, students have opportunities to:

- identify and evaluate the influences of media and peers in relation to a recent decision, using their skills of critical interpretation
- identify sources of information for making decisions about key aspects of their lives (e.g. school pathways, health behaviours)
- develop criteria to judge future decisions
- analyse strengths and weaknesses of options, using a SWOT tool or similar strategy
- make decisions and put them into effect in authentic situations as part of topics or themes across the school's curriculum.

ELA 19 The student understands and applies scientific knowledge

Essential Content

In early adolescence band of development, students have opportunities to understand and learn about:

- how the use of science and technology has changed the ways people live
- apply scientific knowledge and language in interpreting information and forming explanations, arguments and lines of reasoning

In early adolescence band of development, students have opportunities to learn to:

- ways in which different forms of energy can be transferred or stored (e.g. solar energy, electric circuits, batteries)
- use their scientific understandings to consider and respond to appropriate ethical and social issues relevant to them (e.g. those related to health and wellbeing)

ELA 20 The student acts for an environmentally sustainable environment

Essential Content

In early adolescence band of development, students have opportunities to understand and learn about:

- responsibilities of global citizenship for individuals, organisations and governments and the roles and responsibilities of companies, producers and consumers in relation to sustainability

In early adolescence band of development, students have opportunities to learn to:

- investigate practical ways for individuals, households or communities to conserve resources (e.g. waste recycling, energy and water saving) and evaluate their practicality and effectiveness
- participate in raising awareness about environmental issues
- examine issues of sustainability of the natural, build or social environment, extending from local to global perspectives (e.g. investigate arguments and students about climate change and its effects, generate probable and preferred future scenarios for future sustainable living)

ELA 21 The student understands about Australia and Australians

Essential Content

In early adolescence band of development, students have opportunities to understand and learn about:

- current issues and challenges facing the community and Australian society

ELA 23 The student understands world events and issues

Essential Content

In early adolescence band of development, students have opportunities to understand and learn about:

- causes and effects of significant world events and their connections to current issues
- global inequalities and different life opportunities and some of their causes and effects
- how Australians are connected to other people in the Asia-Pacific region and the world (e.g. economic, political and cultural links)
- the origins of conflicts around the world based on geography (e.g. availability of natural resources)

In early adolescence band of development, students have opportunities to learn to:

- compare and contrast representations of a current event or issue in the media

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

What energy is and where it comes from.

How we harness energy for our everyday use.

Energy usage and energy production are linked to current world issues.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- formulate questions, predictions or propositions suitable for investigation and clarify the inquiry process
- collect and assemble relevant data or information

ELA 19 understands and applies scientific knowledge:

- apply scientific knowledge and language
- how the use of science and technology has changed the ways people lived
- ways in which different forms of energy can be transferred or stored

ELA 23 understands world events and issues:

- compare and contrast representations of a current event or issue in the media

Assessment

What evidence will there be that they have learnt?

Identify prior knowledge about energy and write questions to investigate.

Write a description of what the fossil fuels are, and illustrate where they come from.

List and state why we would use different sorts of energy for everyday use.

Write questions about the need to address the usage of energy by our society.

Identify a world issue connected to energy by making statements about information heard or read about in the news media.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Brainstorm.

Organise.

Question.

Activity

What is the best vehicle to deliver the learning?

Revise prior knowledge about what energy is in class discussions.

Use a placemat proforma to organise their knowledge about energy. Identify where our energy comes from.

The sun is our major source of energy.

Brainstorm different types of energy harnessing that they know and locate where they may find evidence of production in our local region.

Read and access a variety of media for reports on energy.

Commence a weekly, reflective journal about their learning during the unit.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

Human actions have an impact on the planet.

Energy consumption affects our world.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- organise and analyse data or information, summarise and explain patterns in data, or compare and synthesise information from different sources
- draw reasonable conclusions based on analysis of data and information

ELA 3 makes considered decisions:

- identify and evaluate the influences of media on a recent decision

ELA 19 understands and applies scientific knowledge:

- use scientific knowledge to consider and respond to appropriate ethical and social issues relevant to them

ELA 20 acts for an environmentally sustainable future:

- concepts of the interdependence of living things within a habitat, an ecosystem, and how change in one part of an ecosystem impacts on other parts

ELA 23 understands world events and issues:

- global inequalities and different life opportunities and some of their causes and effects.

Assessment

What evidence will there be that they have learnt?

Use ICT to complete an ecological footprint to determine their individual impact on the planet.

Reflect and report on their findings in their journal, including recognising their source/s of information.

Demonstrate correct use of language relating to ecological footprints: carbon emission; carbon footprint; global hectare; biologically productive.

Use a range of media sources to identify how energy is consumed in the world.

Strategy

What is/are the most effective strategy or strategies to teach this?

ICT research skills.

View and read.

Listen, discuss and write.

Activity

What is the best vehicle to deliver the learning?

Discuss what an ecological footprint is.

Compare different carbon footprint calculators (available online) and demonstrate how to interpret the results. Working in pairs students calculate and compare how adjusting the variables affects the result.

Collect personal data to assist them complete an ecological footprint.

Research and consider the environmental footprints of people in different places

Using ICT complete a personal ecological footprint.

Collect media reports on world energy consumption, and energy issues.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

Energy needs have changed over time.

European settlement in Australia has led to a dramatic change in our landscape and in our energy requirements.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievement).

ELA 2 understands and applies the inquiry process:

- present and communicate findings and conclusions using suitable representations and subject terminology
- acknowledge the sources of information using bibliographies

ELA 19 understands and applies scientific knowledge:

- how the use of science and technology has changed the ways people live

Assessment

What evidence will there be that they have learnt?

Produce an energy timeline showing key developments in the history of energy usage by humans.

Show in the form of a written report the connection between industrialisation and energy needs.

Strategy

What is/are the most effective strategy or strategies to teach this?

Read, view, discuss.

ICT research.

Timeline.

Inferring.

Report writing.

Activity

What is the best vehicle to deliver the learning?

Read information on how human's energy use has changed with the development of new technologies. (See State of the Planet by John Nicholson, page 37.)

Discuss energy use in Australia three hundred years ago, and compare to today.

Produce a timeline showing these changes.

Complete a report or poster showing the connection between industrialisation and energy needs.

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

Social and physical implications of our energy use are.

Inequitable distribution of energy resources across the globe.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 3 makes considered decisions:

- use the inquiry process to gather information from a variety of sources to identify additional options
- make decisions and put them into effect in authentic situations as part of topics or themes across the school's curriculum

ELA 19 understands and applies scientific knowledge:

- how the use of science and technology has changed the ways people live
- use their scientific understandings to consider and respond to appropriate ethical and social issues relevant to them

ELA 20 acts for an environmentally sustainable future:

- investigate practical ways for individuals, households or communities to conserve and evaluate their practicality and effectiveness
- examine issues of sustainability of the natural, build or social environment, extending from local to global perspectives
- responsibilities of global citizenship for individuals, organisations and governments and the roles and responsibilities of companies, producers and consumers in relation to sustainability
- participate in raising awareness about environmental issues

ELA 21 understands about Australia and Australians:

- current issues and challenges facing the community and Australian society

ELA 23 understands world events and issues:

- global inequalities and different life opportunities are caused by variations in the distribution of natural resources
- causes and effects of some significant world events and their connections to current issues
- how Australians are connected to other people in the Asia-Pacific region and the world
- the origins of conflicts around the world, based on geography

Assessment

What evidence will there be that they have learnt?

Continue weekly journal reflection.

Develop a logical and reasonable argument.

In small groups create a web page for the school's website that has statements about implications of our energy use.

Compare the resources Australia has with resources of different countries. Do we have more than we need? Do we use more than we need? Is it possible to make access to resources more equitable?

Strategy

What is/are the most effective strategy or strategies to teach this?

Discuss.

Brainstorm.

ICT research.

Planning and designing.

Writing, analysing, reflecting.

De Bono's Six Thinking Hats.

Activity

What is the best vehicle to deliver the learning?

Discuss what the implications of our energy use are, and brainstorm questions about social and physical implications.

Using an information retrieval grid, select questions developed by class, and research to complete grid.

Conduct research of current media reports of world issues related to energy.

Working in small groups and using De Bono's Six Hats look at how energy resources are distributed across the world, and consider issues of equity. Using 'green hat' thinking, students design a web page to present their findings.

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections stage?

Ways individuals and families can conserve energy.

Ways our society can better use our energy resources.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- organise and analyse data or information, summarise and explain patterns in data, or compare and synthesise information from different sources
- present and communicate findings and conclusions using suitable representations and subject terminology

ELA 3 makes considered decisions:

- develop criteria to judge future decisions
- analyse strengths and weaknesses of options, using a SWOT or similar strategy

ELA 20 acts fro an environmentally sustainable future:

- investigate practical ways for individuals, households or communities to conserve
- examine issues of sustainability of the natural, build or social environment, extending from local to global perspectives
- responsibilities of global citizenship for individuals, organisations and governments and the roles and responsibilities of companies, producers and consumers in relation to sustainability
- participate in raising awareness about environmental issues
- key concepts used in contemporary information and debates about environmental sustainability

Assessment

What evidence will there be that they have learnt?

List ways we can conserve energy in our homes, school, our country and globally.

Evaluate and assess designs prepared and presented by themselves and other students.

Strategy

What is/are the most effective strategy or strategies to teach this?

Create lists.

Brainstorm.

Drawing, designing and writing.

Presenting and critiquing.

Activity

What is the best vehicle to deliver the learning?

Using prior knowledge and research compile a list of ways energy can be conserved in the home, at school,

“The New Inventors” Students design a personal transport vehicle of the future using an alternative energy source. Designs are then presented to the class as a whole, and a panel of ‘experts’ (e.g. other teachers, invited guests, other students) comment on the designs. Allow time for questions and answers. Students then vote on their preferred design.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

Ways the individual can conserve energy and work towards a sustainable future.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 20 acts for an environmentally sustainable future:

- investigate practical ways for individuals, households or communities to conserve resources and evaluate their practicality and effectiveness
- examine issues of sustainability of the natural, build or social environment, extending from local to global perspectives
- responsibilities of global citizenship for individuals, organisations and governments and the roles and responsibilities of companies, producers and consumers in relation to sustainability.
- participate in raising awareness about environmental issues
- key concepts used in contemporary information and debates about environmental sustainability

Assessment

What evidence will there be that they have learnt?

A personal plan describing actions that the student may take to help conserve energy.

Signs and posters around the school reminding people of actions they can take to conserve energy.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discuss.

Brainstorm.

Design and create.

Consider options.

Activity

What is the best vehicle to deliver the learning?

Create a plan to reduce the size of your ecological footprint, and then make a pledge.

Design and create posters to go around the school to take action to conserve energy.

Work cooperatively to produce a rap or song that suggests actions we can take to work towards a sustainable energy future.

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

Share, discuss and reflect on student learning about Energy for a sustainable future.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- formulate questions, predictions or propositions suitable for investigation and clarify the inquiry process

ELA 3 makes considered decisions:

- develop criteria to judge future decisions

Assessment

What evidence will there be that they have learnt?

State what they have learned.

Describe an action they are going to or have taken for sustainable energy futures.

Explain something they have learned about how the use of energy resources has a global consequences.

Strategy

What is/are the most effective strategy or strategies to teach this?

Reflect.

Write.

Discuss.

Explain.

Activity

What is the best vehicle to deliver the learning?

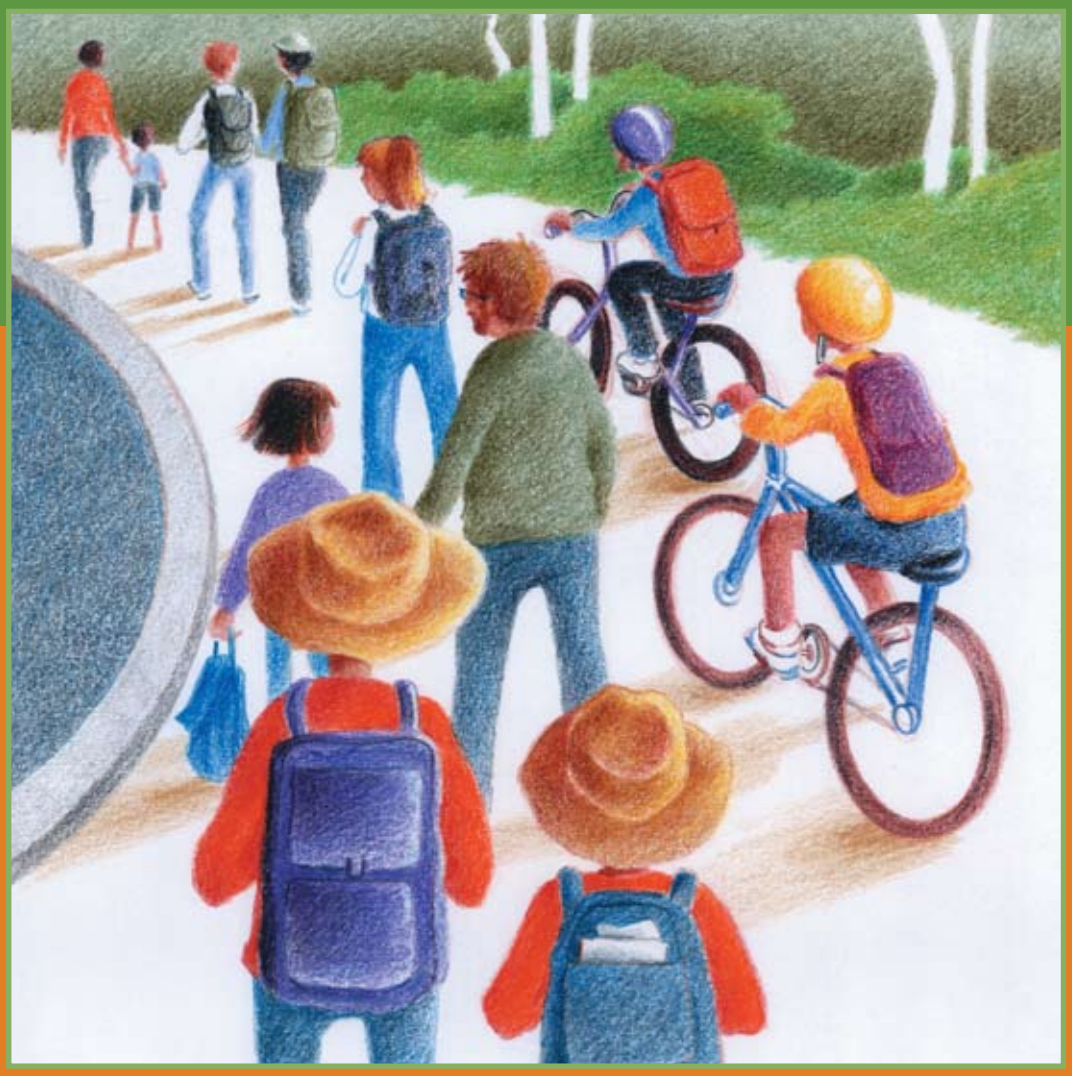
Complete individual journal reflecting on what they have learned.

Share in group discussion ways in which what they have learnt has changed their behaviour.

Complete an evaluation of the unit answering the following questions:

- what have we achieved in this unit of work?
- what was the worst part of the unit?
- what was the best part of the unit?

energy
for a sustainable future



later adolescence
years 9–10

Australian Sustainable Schools Initiative - ACT

energy for a sustainable future

Class: Year 9 - 10

Band of Development: Later adolescence

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The design for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Dept of Education and Training Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in later adolescence students that energy:

- from fossil fuels is a finite resource
- energy from fossil fuels is the leading cause of emissions in the ACT and in Australia
- reduction in consumption can make a difference.

Students will be introduced to the key components of energy.

The students will explore central issues of:

- what energy is and where it comes from
- how humans can better use energy resources
- advantages and disadvantages of different energy sources
- the social and environmental implications of energy extraction
- possible global energy futures

Big Understandings

1. Energy is an essential resource.
2. There are renewable and non-renewable energy resources.
3. Human consumption has a major effect upon energy resources.
4. We can reduce our energy consumption and lessen the environmental impact.
5. Sustainable practices will ensure energy for the future. Sustainable practices will extend our existing energy resources.

Values and Attitudes

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability

Schools may choose to include other worthwhile learning linked to the unit. For example:

- Investigations into climate change and global warming.
- This unit can be adapted to be used for Year 9 Exhibitions. Content could be taught in KLAs according to the following table, with students using the "Going Further" task of investigating an energy issue for their major Exhibitions task.

Cross-curricular content:

English	Maths	Science	SOSE
Journal writing Report writing Speaking - debates and discussion	Collection and analysis of data Graphing and data representation	Development of scientific knowledge Scientific terminology Scientific matters	Recognising interrelationships between politics, economics, society, cultures and environments Mapping

Essential Learning Achievements covered in this unit are ELA 2, 3, 19, 20, 21 and 23. Essential Content has been selected from the later adolescence band of development.

ELA 2 the student understands and applies the inquiry process

Essential Content

In the later adolescence band of development, students have opportunities to:

- understand the possibility of multiple perspectives and partial explanations of phenomena being investigated
- identify sources and collect data and information in systematic ways to improve reliability (e.g. use refined searches to locate a range of relevant sources, control variables, use repeat trials and replication of experiments with appropriate sample sizes, seek counter-examples or explore proofs to verify truth of propositions)
- draw conclusions that are consistent with the data or information and provide evidence or supporting details
- present and discuss their investigation using appropriate representations, conventions and terminology specific to the discipline
- evaluate methodologies, reasoning and conclusions, and discuss specific improvements to their investigation or ways to conduct further investigations

ELA 3 the student makes considered decisions

Essential Content

In the later adolescence band of development, students have opportunities to:

- evaluate the role of intuition, feelings, values, beliefs in decision-making and strengthen their capacity for moral and ethical decisions
- review and evaluate their performance in carrying out plans, making decisions and applying time management strategies
- make plans and decisions and put them into effect as part of topics, themes or activities across the school's curriculum

ELA 20 the student understands and applies scientific knowledge

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- instances in which progress in science can be affected by and influence social issues and priorities (e.g. water purification, alternative energy sources, space exploration, ethics of biotechnology)
- scientific advances that challenged understandings and practices in science and everyday life (e.g. causes of disease)
- how and why the movement of energy (e.g. light and sound) varies according to the medium through which it moves and conservation of energy when it is transformed and transferred

In the later adolescence band of development, students have opportunities to learn to:

- analyse and synthesise information and use scientific models and terms to explain properties and interrelationships and to predict change in phenomena and systems
- apply scientific knowledge in exploring and constructing views around ethical and social issues relating to science (e.g. genetic modification, stem cell research, animal testing of products, nuclear energy)

ELA 20 the student acts for an environmentally sustainable environment

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- key concepts used in contemporary information and debates about environmental sustainability (e.g. biodiversity, carrying capacity, ecological footprint, preservation, conservation, wilderness, heritage, sustainability, sustainable development)
- events that have significant effects on regional or global ecosystems and describe related environmental, social or economic consequences (e.g. drought, cyclones, bushfires, earthquakes, El Nino, climate change)
- how peoples' views on the environment influence government policy and non government organisations, and the ways in which governments attempt to address issues of development and sustainability

In the later adolescence band of development, students have opportunities to learn to:

- apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability (e.g. salinity, nuclear energy production, land degradation)
- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability
- examine examples of individual and global actions to create sustainable futures, assess their strengths and limitations, and propose further appropriate actions

ELA 21 the student understands about Australia and Australians

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- Australia's involvement in major world wars and their impact on our national identity (e.g. World War I and the Anzac tradition, World War II, Vietnam War)
- contemporary and future issues and challenges facing Australian society

ELA 23 the student understands world events and issues

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- significant world movements and conflict in the twentieth and twenty-first centuries (e.g. political ideologies, feminism, decolonisation, civil rights, revolutions, wars) and the key people who shaped events (e.g. Nelson Mandela)
- Australia's relationship with other nations and the influence of regional and global events and issues on these relationships (e.g. military alliances, trade partnerships, independence movements)

In the later adolescence band of development, students have opportunities to learn to:

- interpret people's motives and actions in order to understand a current world event or issue in depth, considering different perspectives or bias in accounts

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

Energy and where it comes from.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- understand the possibility of multiple perspectives and partial explanations of phenomena being investigated

ELA 19 understands and applies scientific knowledge:

- apply scientific knowledge in exploring and constructing views around ethical and social issues relating to science

ELA 23 understands world events and issues:

- significant world movements and conflicts
- interprets people's actions and motives in order to understand a current world event or issue

Assessment

What evidence will there be that they have learnt?

Define renewable and non-renewable energy, and list types of both energy sources eg renewable: wood, solar, wind, tidal, and hydro, non-renewable: fossil fuels (coal, oil, gas), nuclear.

Identify and discuss world issues connected to energy.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discussion.

Brainstorm.

Read, write and define.

Source information from a variety of texts.

Pose questions.

Activity

What is the best vehicle to deliver the learning?

Revise prior knowledge about what energy is in class discussions.

Research and define renewable and non-renewable energy.

Read and access a variety of media for reports on energy. Students individually locate and identify a world energy issue. As a whole class discuss and debate the issues.

Commence a weekly, reflective journal about their learning during the unit.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

Ways we can better use energy resources.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- identify sources and collect data and information in systematic ways to improve reliability, control variables, use repeat trials and replication of experiments with appropriate sample sizes, seek counter-examples or explore proofs to verify truth of propositions
- present and discuss their investigations using appropriate representations
- understand the possibility to multiple perspectives and partial explanations of phenomena being investigate

ELA 19 understands and applies scientific knowledge:

- instances in which progress in science can be affected by and influence social issues and priorities

ELA 20 acts for an environmentally sustainable future:

- examine examples of individual global actions to strengthen sustainable futures
- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability

Assessment

What evidence will there be that they have learnt?

Present a data collection of graphs, diagrams and maps in workbook clearly demonstrating energy resources and usage.

Explain and identify different consequences of energy use and suggest ways that could reduce the impact.

Identify how patterns of energy use have changed between 1850 and the present, and the scientific advances that have led to those changes.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discuss.

Read, write, graph and map.

Interpret and link.

Activity

What is the best vehicle to deliver the learning?

Using a variety of resources (text books, ICT, maps, posters) collect information on energy usage the ACT.

Where is the energy we use generated?

How is it transmitted?

What are the environmental, social, economic, political and technological consequences of energy usage?

Suggest ways that we could make better usage of energy and reduce the impact on society.

Why does it matter?

Using information collected above and by completing further research students analyse how and why patterns of energy consumption have changed over the past 150 years.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

Advantages and disadvantages of different energy sources.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- understand the possibility of multiple perspectives and partial explanations of phenomena being investigated

ELA 19 understands and applies scientific knowledge:

- instances in which progress in science can be affected by and influence social issues and priorities (e.g. water purification, alternative energy sources, space exploration, ethics of biotechnology)
- apply scientific knowledge in exploring and constructing views around ethical and social issues relating to science (e.g. genetic modification, stem cell research, animal testing of products, nuclear energy)

ELA 20 acts for an environmentally sustainable future:

- key concepts in contemporary information and debates about sustainability

Assessment

What evidence will there be that they have learnt?

Complete PMI table.

Provide a journal entry based on visit by guest speaker. Reflect on the advantages and disadvantages of different energy sources.

Strategy

What is/are the most effective strategy or strategies to teach this?

PMI table.

Research.

Guest speaker.

Reflection.

Activity

What is the best vehicle to deliver the learning?

Using ICT and library resources complete a PMI table on the following energy resources:

- fossil fuels
- nuclear
- wood
- solar
- wind
- wave
- hydro
- one further energy resource of students' choice.

Participate in visit by guest speaker from science research organisation or energy group/ department (e.g. CSIRO, Energy Australia, ACTEWagl), and make entry in journal reflecting on the advantages and disadvantages of different energy sources.

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

Social and environmental implications of energy extraction.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- understand the possibility of multiple perspectives and partial explanations of phenomena being investigated
- draw conclusions that are consistent with the data or information and provide evidence or supporting details
- present and discuss their investigation using appropriate representations, conventions and terminology specific to the discipline

ELA 20 acts for an environmentally sustainable future:

- events that have significant effects on regional or global ecosystems and describe related environmental, social or economic consequences
- key concepts used in contemporary information and debates about environmental sustainability
- how peoples' views on the environment influence government policy and non government organisations, and the ways in which governments attempt to address issues of development and sustainability
- examine examples of individual and global actions to create sustainable futures, assess their strengths and limitations, and propose further appropriate actions
- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability
- apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability

ELA 21 understands about Australia and Australians:

- Australia's involvement in war and the way it has impacted on the development of our identity
- contemporary and future issues and challenges facing Australian society

ELA 23 understands about world events and issues:

- Australia's relationship with other nations and the influence of global events and issues on these relationships
- significant world movements and conflict in the twentieth and twenty first century

Assessment

What evidence will there be that they have learnt?

Participate in class discussions and debates.

Present research to peers.

Make statements and draw conclusions on how Australia's energy use impacts on the rest of the world and how the rest of the world impacts on Australia.

Strategy

What is/are the most effective strategy or strategies to teach this?

Brainstorm

Discuss, debate, and research

Present

Activity

What is the best vehicle to deliver the learning?

Questions for discussion/debate/research:

- What energy resources do we have in Australia?
- Who do we sell them to?
- What do those countries use the resources for?
- Which countries have nuclear weapons?
- Who has used them, where, and when?
- Why has Australia been involved in two wars in Iraq?
- What happens when less developed countries discover they have large deposits or supplies of an energy resource?
- What will happen to Australia once we've dug up all the energy resources we have?

Possible issues to cover include:

- Uranium deposits in Kakudu
- Indigenous rights to extract and sell energy resources on their land
- Nuclear weapons in North Korea
- Wars - WWII; Iraq

Making Conclusions

Outcomes

What understandings will my students have at the end of the Making Connections stage?

Possible global energy futures.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 19 understands and applies scientific knowledge:

- instances in which progress in science can be affected by and influence social issues and priorities (e.g. water purification, alternative energy sources, space exploration, ethics of biotechnology)
- scientific advances that challenged understandings and practices in science and everyday life (e.g. causes of disease)
- apply scientific knowledge in exploring and constructing views around ethical and social issues relating to science (e.g. genetic modification, stem cell research, animal testing of products, nuclear energy)

ELA 20 acts for an environmentally sustainable future:

- events that have significant effects on regional or global ecosystems and describe related environmental, social or economic consequences
- key concepts used in contemporary information and debates about environmental sustainability
- examine examples of individual and global actions to create sustainable futures, assess their strengths and limitations, and propose further appropriate actions
- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability
- apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability (e.g. salinity, nuclear energy production, land degradation)

Assessment

What evidence will there be that they have learnt?

Offer suggestions of real solutions to environmental issues our society is experiencing.

State alternative energy futures for the globe and their advantages and disadvantages.

Strategy

What is/are the most effective strategy or strategies to teach this?

Reflection.

Brainstorming ideas.

Investigate.

Research.

Analysing and synthesising.

Essay writing.

Activity

What is the best vehicle to deliver the learning?

Investigate and research alternative energy futures (e.g. peak oil, nuclear powered).

Consider the advantages and disadvantages of these futures, and predict how these alternatives contribute to a sustainable future.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

Ways we can conserve energy and work towards a sustainable future.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 3 makes considered decisions:

- evaluate the role of intuition, feelings, values, beliefs in decision-making and strengthen their capacity for moral and ethical decisions
- review and evaluate their performance in carrying out plans, making decisions and applying time management strategies
- make plans and decisions and put them into effect as part of topics, themes or activities across the school's curriculum

ELA 20 acts for an environmentally sustainable future:

- examine examples of individual and global actions to create sustainable futures, assess their strengths and limitations, and propose further appropriate actions
- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability
- apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability (e.g. salinity, nuclear energy production, land degradation)

Assessment

What evidence will there be that they have learnt?

Complete an ecological footprint, and consider what lifestyle changes can be made to reduce their impact on the planet.

Complete a formal letter to a political party or electoral representative.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discuss.

Brainstorm.

Design and create.

Consider options.

Activity

What is the best vehicle to deliver the learning?

Using an ecological footprint calculator (available online), students calculate their footprint. As a class discuss the results, and brainstorm changes that can be made to reduce their impact. Students then make a commitment to one lifestyle change that will reduce their energy impact on the planet.

Compare and contrast the environmental policies of the major political parties in Australia. Discuss how the parties address the issue of sustainability.

Write to a political party or electoral representative suggesting ways the party or representative could address issues of energy sustainability.

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

Share, discuss and reflect on their learning about energy for a sustainable future.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements).

ELA 2 understands and applies the inquiry process:

- evaluate methodologies, reasoning and conclusions and discuss specific improvements to their investigation or ways to conduct further investigations

ELA 20 acts for an environmentally sustainable future:

- apply relevant scientific understandings to make responsible, ethical and informed decisions about issues about sustainable futures for energy

Assessment

What evidence will there be that they have learnt?

State what they have learned and how and why their learning has changed their thinking and learning.

Describe an action they are going to or have taken for sustainable energy futures.

Strategy

What is/are the most effective strategy or strategies to teach this?

Reflect.

Write.

Discuss.

Explain.

Activity

What is the best vehicle to deliver the learning?

Complete individual journal reflecting on what they have learned.

Share in-group discussion ways in which what they have learnt has changed their behaviour.

Complete an evaluation of the unit answering the following questions:

- what have we achieved in this unit of work?
- what was the worst part of the unit?
- what was the best part of the unit?

Resources and References

Books and Articles

Barnham, K 2006, *Save Energy,* Hodder Wayland, Great Britain

Boehm-Jerome, K 2003, *Protecting the Planet,* Rigby, Port Melbourne

Bohem-Jerome, K 2003, *Using Energy,* Rigby Port Melbourne

DeBono, Edward (1999) *Six Thinking Hats - Edward DeBono*, MICA

Jakab, C 2007, *Clean Air and Water, Global Issues,* MacMillan Education Australia Pty Ltd, South Yarra, Victoria

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Jarman, M 2006, *The Impact of Big Business,* Franklin Watts Australia, Sydney

Lang, J 2007, *How to Succeed with Education for Sustainability,* Curriculum Corporation, Carlton, Victoria

Nicholson, J 2000, *The State of the Planet.* Allen & Unwin, Crows Nest, NSW

Our Environment, Topics to Go, 2007, Rigby, Port Melbourne

Stewart, S 2004, *Save our Earth,* Pearson Education Australia

Websites

ACT Sustainable Schools website http://www.sustainableschools.act.gov.au/energy

ACTEWAGL Education Resources website http://www.actewagl.com.au/education/energy/default.aspx

ACT HEAT (Home Energy Advice Team) website http://www.heat.net.au

Best Foot Forward Carbon Footprint website http://www.bestfootforward.com/footprintlife.htm

Blundell's Cottage website http://downloads.nationalcapital.gov.au/experience/blundells_selfGuidedTour.pdf

Calthorpes' House website http://www.museumsandgalleries.act.gov.au/calthorpes/index.asp

CSIRO Australia website http://www.csiro.au/

Earthday Network Ecological Footprint Quiz website http://www.myfootprint.org/

Energy Australia website http:// www.energy.com.au

EPA Victoria website http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/introduction.asp

Lanyon Homestead website http://www.museumsandgalleries.act.gov.au/lanyon/index.asp#04

Ollie's Island and Ollie Saves the Planet website http://www.olliesworld.com/

Uranium Information Centre website http://www.uic.com.au/ueg.htm

CD-ROMs, DVDs, Videos, Kits, and Posters

Ollie Saves the World Series

Ollie Saves the Planet 2002, CD-ROM, Sustain Ability International Pty Ltd, Camberwell, Victoria

Ollie's Island 2007, CD-ROM, Sustain Ability International Pty Ltd, Camberwell, Victoria

Glossary

ACT HEAT Team	The Home Energy Advise Team is funded by the ACT government to provide free, independent, expert advice on how to improve the energy efficiency in the home, school or workplace.
atmosphere	The air around the Earth.
biomass power	A renewable energy source that uses materials such as animals' waste and plant remains to produce power.
Carbon Dioxide	A colourless, odourless gas in the atmosphere. Carbon dioxide's chemical formula is CO_2. In general, it is exhaled by animals and utilized by plants during photosynthesis.
climate change	Changes to the climate systems as a result of global warming.
Conservation	Conservation is the careful use, protection and management of ecosystems, heritage and natural resources to ensure the long-term viability.
dams	Strong walls built across river valleys to hold back water.
deforestation	Removal or clearing of forest cover.
developed countries	Countries with industrial development, a strong economy and a high standard of living.
distribution	Distribution in the stage after transmission, where the large supplies of electricity that has arrived in cables, is divided into smaller lots and sent to retailers (the ACT's main retailer is ActewAGL).
ecosystem	An ecosystem is a natural unit consisting of all plants, animals and micro-organisms in an area functioning together with all the non-living physical factors of the environment.
ecological diversity	Refers to the variety of biological communities or ecosystems in a given area.
ecological footprint	A measure of the consumption of natural resources by a human population.
electric current	Electrons flowing from one place to another, normally within a form of electrical circuit.
electricity	The power or energy used to give light and heat and to work machines.
energy	The power which lets people and machines move, or provides light and heat.
energy audit	Provides information on how, when, where, how often and how much energy is being consumed.
energy sources	Where energy comes from
environmental impact	The impact an action or event has on the environment
food	Food is any substance, usually composed primarily of carbohydrates, fats, water and/or proteins, that can be eaten or drunk by an animal or human being for nutrition or pleasure. Items considered food may be sourced from plants, animals or other categories such as fungus or fermented products like alcohol. Although many human cultures sought food items through hunting and gathering, today most cultures use farming, ranching, and fishing, with hunting, foraging and other methods of a local nature included but playing a minor role.
fossil fuels	Natural fuels, such as coal, oil or gas that formed long ago.
gas	Natural gas, sometimes referred to as methane, is a colourless and odourless fossil fuel.
gas plants	Natural gas, used in the same way as coal, can be used for heat to generate electricity in a power plant (i.e. to create heat, to boil water, to make steam, to turn the turbines, to generate electricity).
generation	The electricity we use in our homes and communities is produced, or generated, in powerhouses, powerplants and powerstations (e.g. where the coal is burned).
geothermal	Heat from the inside of the Earth.
geothermal energy	The use of geothermal heat to generate electricity.
global warming	An increase in the average temperature on Earth.
greenhouse gas	Gases that help trap the Sun's heat in the atmosphere.
hydro-electricity	Power generated by moving water in rivers and dams through turbine.

Glossary

natural gas	Natural gas is believed to have formed from living organisms that died millions of years ago in shallow oceans and seas. They were covered before they could decay, this allowed anaerobic bacteria, assisted by heat and pressure, to begin the process of turning them into gas and oil. The gas is trapped in pockets between layers of rock underground.
non-renewable energy source	An energy source, such as fossil fuels, that takes millions of years to form.
nuclear	Nuclear power is the controlled use of nuclear reactions to release energy for propulsion, heat, and the generation of electricity. Human use of nuclear power to do work in currently limited to nuclear fission and radioactive decay to boil water, produce steam, and drive a steam turbine. The turbine can be used for mechanical work and also to generate electricity.
nuclear power	Power produced from the splitting apart of atoms.
nuclear research reactor	A machine for producing nuclear energy that is used in research.
petrol	Petrol is a secondary source of energy produced in oil refineries, from crude oil.
Power Mate Measure	The Power-Mate calculates the power usage thousands of times in each second, and integrates these to achieve very realistic and accurate measurements.
radioactive	A substance, such as uranium, that gives off energy a a result of the breaking up of nuclear atoms.
radioactive waste	The by-product of generating electricity from nuclear power.
renew	To restore to a new or fresh condition.
renewable energy	Energy that does not disappear once it has been used e.g. wind, solar, tidal, geothermal.
retail	ActewAGL buys electricity from number of non-renewable and renewable energy sources to meet the ACT's needs. From there, the energy comes to your house through a version of even smaller electricity lines.
sensor	A devise that receives and responds to a signal or change.
solar energy	Energy that comes from the sun.
solar panels	Special panels that capture the sun's rays to turn it into electricity or heat water.
Sun	The sun is the biggest renewable energy source on Earth.
tidal energy	Power achieved by capturing the energy contained in moving water mass due to tides. Two types of tidal energy can be extracted: kinetic energy of currents between ebbing and surging tides and potential energy from the difference in height (or head) between high and low tides.
tones	A unit of mass equal to 1000 kilograms.
transmission	After generating the electricity, it is transmitted through a large, high-voltage line to a processing centre (which sorts out who needs what energy, where, when and for how much?).
turbine	A spinning rotor that turns when air or water rushes through it to generate electricity.
uranium	A radioactive metal which used in nuclear reactors.
wind energy	Uses the air current in a similar fashion to water generators using the water currents. Most modern wind generates electricity by converting the rotation of turbine blades into electrical current by means of an electrical generator.