Foundations of Energy

Energy Transformers: From Potential to Power

Year level	5 & 6	Duration	6 weeks

Unit outline

This unit engages students in a comprehensive exploration of energy, introducing the concepts of potential and kinetic energy and emphasising the principle that energy is constantly being transformed rather than created or destroyed. Students investigate how electricity is produced in power stations, particularly hydroelectric facilities, by tracing the transformation of stored potential energy through turbines into electrical energy, and learning how work and energy efficiency impact this process.

Students engage with real-world applications such as hydroelectric power, investigating turbines, generators, and power stations to understand how mechanical energy is converted into electrical energy. The unit integrates scientific inquiry with numeracy by incorporating the measurement of energy using units such as Joules and watt-hours, as well as calculations of energy usage and efficiency.

Interactive activities, multimedia resources, and the Snowy Hydro educational game provide meaningful, contextualised learning experiences that make abstract concepts tangible. Learners are encouraged to think critically about energy transformation, work input, energy losses, and sustainability, fostering both scientific literacy and environmental awareness suited to contemporary energy challenges.

This unit culminates in a presentation assignment.

Unit context

What should learners already know?

This unit provides students with an in-depth exploration into the fundamental concepts of energy and electricity generation, building on learners' existing understanding of basic forces, motion, and simple energy forms such as light and heat.

It assumes that students already know that energy is involved in everyday activities and that some things move or produce heat and light.

The unit deepens this knowledge by introducing the scientific principle that energy cannot be created or destroyed but is transformed from one form to another.

Key Learning Area	Science				
Integration & Connection with other Key Learning Areas					
Science	Mathematics	The Arts	Design and Technologies		History
Geography	English	Health	Digital Technologies	Economics	Civics and Citizenship

Key vocabulary

Energy, Potential Energy, Kinetic Energy, Energy Transformation, Electricity, Electrical Charge, Generator, Power Station, Work, Turbine, Rotor, Stator, Electromagnetic Induction, Joules (J), Watt-hours (Wh), Kilowatt-hours (kWh), Megawatt-hours (MWh), Gigawatt-hours (GWh), Power, Watts (W), Kilowatts (kW), Megawatts (MW), Gigawatts (GW), Energy Efficiency, Energy Loss, Renewable Resources, Energy Investment, Energy Storage, Force, Energy Conversion, Energy Flow, Conservation of Energy, Energy Units, Scientific Understanding, Energy Measurement, Energy Calculation, Energy Matching, Energy Output, Head Height (in hydropower), Mechanical Energy

Key resources			
Resource name	**Resource type**	**Link to access**	**Used for**
Download all PDF resources in this zipped folder			
Power Peak game	Game hosted by Arludo	The Power Peak game is launching soon! Check back on the Snowy STEM Academy website to stay up to date with the launch date!	All lessons
Types of energy Sorting Game	Hands on activity	Teacher + Student combined resource	Concept 1. What is energy?
Science of the Snowy Scheme with Dr Kirsten Banks: Gravity video	Youtube video	Science of the Snowy Scheme with Dr Kirsten Banks: Gravity video	Concept 1. What is energy?
Energy Summary Table	Worksheet	Student resource Teacher resource	Concept 1. What is energy?
Energy Conversation Stations	Activity and Worksheet	See unit plan for items suggested Energy Conversation Stations Observations table	Concept 2. Energy transformation
Energy Calculations Table	Worksheet	Student resource	Concept 3. Electricity units
Energy Matching Scenarios	Worksheet	Student resource Teacher resource	Concept 3. Electricity units
Energy vs Power poster	Poster	Energy vs Power poster	Concept 3. Electricity units
Units for measuring electricity poster	Poster	Units for measuring electricity poster	Concept 3. Electricity units
You need energy to make energy YouTube video	Youtube video	You need energy to make energy YouTube video	Concept 4. Investments of energy & Concept 5. Energy storage

Key resources			
Resource name	**Resource type**	**Link to access**	**Used for**
Pinwheel activity	Worksheet	Pinwheel Activity sheet Pinwheel templates	Concept 4. Investments of energy
Dam holding back water images	Image gallery	Dam holding back water images	Concept 5. Energy storage
Water release video - Jindabyne Dam	Youtube Short	Water release video - Jindabyne Dam	Concept 5. Energy storage
Create a Turbine hands-on activity	Activity	Create a Turbine hands-on activity	Concept 5. Energy storage
How Hydroelectric dams make electricity video	Youtube Short	How Hydroelectric dams make electricity video	Concept 5. Energy storage
The Power of Water Assignment	Assignment	The Power of Water Assignment instructions and rubric	Concept 6. The Power of Water Assignment

Science curriculum content and achievement standards	
Achievement standards	**Curriculum content descriptions**
Year 5 Understanding	
There are no explicit science understanding curriculum links in this unit.	
Year 6 Understanding	
They identify the role of circuit components in the transfer and transformation of electrical energy.	AC9S6U03 investigate the transfer and transformation of energy in electrical circuits, including the role of circuit components, insulators and conductors
Year 5 & 6 Science Inquiry	
They construct representations to organise data and information and describe patterns, trends and relationships.	AC9S5I04 & AC9S6I04 construct and use appropriate representations, including tables, graphs and visual or physical models, to organise and process data and information and describe patterns, trends and relationships
They use language features that reflect their purpose and audience when communicating their ideas and findings.	AC9S5I06 & AC9S6I06 write and create texts to communicate ideas and findings for specific purposes and audiences, including selection of language features, using digital tools as appropriate
Year 5 & 6 Science as a Human Endeavour	
They describe examples of collaboration leading to advances in science, and scientific knowledge that has changed over time. They explain why science is often collaborative and describe different individuals' contributions to scientific knowledge. They describe how individuals and communities use scientific knowledge.	AC9S5H01 & AC9S6H01 examine why advances in science are often the result of collaboration or build on the work of others
	AC9S5H02 & AC9S6H02 investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions

Maths curriculum content and achievement standards	
Achievement standards	**Curriculum content descriptions**
Number and Algebra	
Students use their proficiency with multiplication facts and efficient calculation strategies to multiply large numbers by one- and two-digit numbers and divide by single-digit numbers. Unit specific: Uses efficient strategies for calculations, including converting and working with units in science (e.g., watts, kilowatts). They apply properties of numbers and operations to find unknown values in numerical equations involving multiplication and division.	**Year 5** AC9M5N06 solve problems involving multiplication of larger numbers by one- or two-digit numbers, choosing efficient calculation strategies and using digital tools where appropriate; check the reasonableness of answers **Year 6** AC9M6N06 multiply and divide decimals by multiples of powers of 10 without a calculator, applying knowledge of place value and proficiency with multiplication facts; using estimation and rounding to check the reasonableness of answers
Measurement & Geometry	
The Achievement Standard does not specifically address the units of measure students are exposed to in this program but can be summarised to include Measures and records quantities (energy, time, power output) using formal units.	**Year 5** AC9M5M01 choose appropriate metric units when measuring the length, mass and capacity of objects; use smaller units or a combination of units to obtain a more accurate measure **Year 6** AC9M6M01 convert between common metric units of length, mass and capacity; choose and use decimal representations of metric measurements relevant to the context of a problem

Statistics	
They compare distributions of discrete and continuous numerical and ordinal categorical data sets as part of their statistical investigations, using digital tools.	**Year 5** AC9M5ST03 plan and conduct statistical investigations by posing questions or identifying a problem and collecting relevant data; choose appropriate displays and interpret the data; communicate findings within the context of the investigation **Year 6** AC9M6ST03 plan and conduct statistical investigations by posing and refining questions or identifying a problem and collecting relevant data; analyse and interpret the data and communicate findings within the context of the investigation

Digital Technologies curriculum content and achievement standards	
Achievement standards	**Curriculum content descriptions**
Year 5 & 6 Knowledge and Understanding: Digital systems	
Students securely access and use multiple digital systems and describe their components and how they interact to process and transmit data.	AC9TDI6K02 examine how digital systems form networks to transmit data Uses digital systems and tools to create and manage information (e.g., using dashboards, games, or modelling data).

English curriculum content and achievement standards	
Achievement standards	**Curriculum content descriptions**
Year 5 Literacy	
They create written and/or multimodal texts, including literary texts, for particular purposes and audiences, developing and expanding on ideas with supporting details from topics or texts.	AC9E5LY06 plan, create, edit and publish written and multimodal texts whose purposes may be imaginative, informative and persuasive, developing ideas using visual features, text structure appropriate to the topic and purpose, text connectives, expanded noun groups, specialist and technical vocabulary, and punctuation including dialogue punctuation
They use language features including complex sentences, tenses, topic-specific vocabulary and literary devices, and/or multimodal features.	AC9E5LY07 plan, create, rehearse and deliver spoken and multimodal presentations that include relevant, elaborated ideas, sequencing ideas and using complex sentences, specialist and technical vocabulary, pitch, tone, pace, volume, and visual and digital features
Year 5 Language	
For particular purposes and audiences, they share, develop and expand on ideas and opinions, using supporting details from topics or texts.	AC9E5LA03 describe how spoken, written and multimodal texts use language features and are typically organised into characteristic stages and phases, depending on purposes in texts
They use different text structures to organise, develop and link ideas.	AC9E5LA07 explain how the sequence of images in print, digital and film texts has an effect on meaning
They use language features including topic-specific vocabulary and literary devices, and/or multimodal features and features of voice.	AC9E5LA08 understand how vocabulary is used to express greater precision of meaning, including through the use of specialist and technical terms, and explore the history of words
Year 6 Literacy	
They create written and/or multimodal texts, including literary texts, for particular purposes and audiences, developing, explaining and elaborating on relevant ideas from topics or texts.	AC9E6LY06 plan, create, edit and publish written and multimodal texts whose purposes may be imaginative, informative and persuasive, using paragraphs, a variety of complex sentences, expanded verb groups, tense, topic-specific and vivid vocabulary, punctuation, spelling and visual features

They use and vary language features including sentence structures, topic-specific vocabulary and literary devices, and/or multimodal features.	AC9E6LY07 plan, create, rehearse and deliver spoken and multimodal presentations that include information, arguments and details that develop a theme or idea, organising ideas using precise topic-specific and technical vocabulary, pitch, tone, pace, volume, and visual and digital features
Year 6 Language	
They use and vary text structures to organise, develop and link ideas.	AC9E6LA03 explain how texts across the curriculum are typically organised into characteristic stages and phases depending on purposes, recognising how authors often adapt text structures and language features
They use and vary language features including topic-specific vocabulary and literary devices, and/or multimodal features and features of voice.	AC9E6LA07 identify and explain how images, figures, tables, diagrams, maps and graphs contribute to meaning

General Capabilities	
General Capabilities	**How will students develop or demonstrate the targeted General Capability?**
Critical and Creative Thinking	
Inquiring **Identify, process and evaluate information** This sub-element supports students to seek information from a range of sources, make decisions about expert or personal opinion and understand which sources are trustworthy, relevant and useful.	• **Identify, process and evaluate information** ○ identify and examine relevant information and opinion from a range of sources, including visual information and digital sources ○ compare information and opinion that can be verified against claims based on personal preference
Generating **Create possibilities** This sub-element supports students to explore and combine ideas to create innovative solutions, and adapt and present ideas in new ways, as they engage with learning area content.	• **Create Possibilities** ○ create possibilities by changing, combining, or elaborating on new and known ideas in a variety of creative ways
Analysing **Interpret concepts and problems -** This sub-element supports students to interpret concepts, ideas, theories and problems, and deconstruct them into their component parts, to gain a deeper understanding of the context or situation.	• **Interpret concepts and problems** ○ identify the relevant and significant aspects of a concept or problem, understanding that approaches may change depending on the subject or learning area

Digital literacy	
Creating and exchanging **Plan** This sub-element supports students to use digital tools to plan and manage a process that considers design constraints and risks. **Create, communicate and collaborate** This sub-element supports students to execute plans for the design of digital content and to develop, test and refine models to create original products. Students recognise different types of peer-to-peer communication and collaboration strategies, tools and formats, and decide which methods are most effective for individual or collaborative goals.	**Plan** • select and use digital tools to develop and follow a plan to complete individual tasks and group projects **Create, communicate and collaborate** • select and control a variety of features in appropriate digital tools to create content and communicate and collaborate with trusted groups
Literacy	
Reading and viewing **Understanding texts** This sub-element describes how a student becomes increasingly proficient in decoding, using, analysing and evaluating texts, to build meaning. It describes how students learn, apply, integrate and adapt strategies and skills as they engage with increasingly complex texts, for a range of purposes. Texts include components of print, image, sound, animation and symbolic representations, in a range of forms including digital forms. Understanding texts is a holistic sub-element which is supported by the other sub-elements under this element.	**Understanding texts** • Please note this will vary significantly across students within a Year 5 and/or Year 6 Classroom. • Target levels could be anywhere between Level 5 to Level 7 or beyond.
Writing **Creating texts** This sub-element describes how a student becomes increasingly proficient at creating texts for a range of purposes and audiences across learning areas. Students' writing moves from representing basic concepts and simple ideas to conveying abstract concepts and complex ideas, in line with the demands of the learning areas. Creating texts is a holistic sub-element which is supported by the other sub-elements under this element.	**Creating texts** • Please note this will vary significantly across students within a Year 5 and/or Year 6 Classroom. • Target levels could be anywhere between Level 5 to Level 7 or beyond.

Numeracy	
Measurement and geometry **Understanding units of measurement** This sub-element describes how students becomes increasingly able to identify attributes that can be measured and the units by which they are measured. They initially use direct comparison to recognise and understand what it means to have more or less of a particular attribute, and progress to using informal, and then metric and other formal units.	**Understanding units of measurement** **Converting units** • converts between metric units of measurement of the same attribute
Statistics and probability **Interpreting and representing data** This sub-element describes how a student becomes increasingly able to recognise, use and interpret visual and numerical displays to describe data associated with statistical investigations, and to critically evaluate investigations by others. They learn to employ the sequence of steps involved in a statistical investigation: posing questions, collecting and analysing data, and drawing conclusions.	**Interpreting and representing data** **Collecting, displaying, interpreting and analysing numerical data** • poses questions based on variations in continuous numerical data and chooses the appropriate method to collect and record data • compares the usefulness of different representations of the same data
Personal and social capability	
Social awareness **Community awareness** This sub-element supports students to gain an understanding of the role of advocacy in contemporary society. They learn to build their capacity to take responsibility for their social, physical and natural environments.	**Community awareness** • explain the way their actions and the actions of others influence communities
Social management **Communication** This sub-element supports students to learn to negotiate and communicate effectively with others through verbal and non-verbal means in a range of contexts. **Decision-making** This sub-element supports students to choose from possibilities to solve problems. They develop their understanding around factors that influence decisions and learn to evaluate the outcomes of decisions.	**Communication** • apply skills to address factors that influence verbal and non-verbal communication **Decision-making** • explain factors that influence individual and group decision-making and consider the usefulness of these factors when making decisions

Cross Curriculum Priorities	
Cross Curriculum Priorities	**How will students develop or demonstrate the targeted Cross Curriculum Priority?**
Sustainability	
Design: SD1: Sustainably designed products, environments and services aim to minimise the impact on or restore the quality and diversity of environmental, social and economic systems. SD3: Sustainable design requires an awareness of place, past practices, research and technological developments, and balanced judgements based on projected environmental, social and economic impacts.	AC9S5H02 & AC9S6H02 • **examining how communities use knowledge of erosion processes to design landscape features that reduce erosion in fragile environments** AC9S5H02 & AC9S6H02 • **examining how knowledge of hydropower is a valuable source of the peaking and firming electricity that uses the transformation of energy to create electricity.**
Futures SF2: Sustainable futures require individuals to seek information, identify solutions, reflect on and evaluate past actions, and collaborate with and influence others as they work towards a desired change.	AC9S5H02 & AC9S6H02 • **examining how knowledge of hydropower is a valuable source of the peaking and firming electricity that uses the transformation of energy to create electricity with lower impacts on the environment than other energy sources.**

Teaching and Learning Plan

Concept 1. What is energy?			
Learning Intention	State what energy is and distinguish between potential and kinetic energy.		
Success criteria	Define energy Identify examples of potential energy Identify examples of kinetic energy Explain the difference between potential and kinetic energy		
Texts/resources	**Learning sequence and Teaching Strategies**	**Differentiation opportunities**	**Assessment**
Types of energy Sorting Game Science of the Snowy Scheme with Dr Kirsten Banks: Gravity video Energy Summary Table Student Energy Summary Table Teacher **Power Peak Game LAUNCHING SOON!**	**Introduction** Ask: "What helps a bike move, a light bulb shine, and a rubber band snap?" **Explicit teaching** What is energy? • The ability of anything to do work is called **energy**. • Lots of different things have energy. • Energy can never be created or destroyed, but it is always transforming between different types of energy Two Forms of Energy 1. Kinetic energy • The energy of moving things is called kinetic energy. • There are different forms of kinetic energy (moving car, running person, heat, sound, light—these are all kinetic energy because they involve movement). 2. Potential energy • Anything that has the potential to start moving and create kinetic energy is said to have potential energy. • Examples: A stretched rubber band, water held behind a dam, a ball at the top of a hill	**Opportunities to simplify:** Provide partially completed Energy Summary Table **Opportunities to extend:** In the sorting game, introduce more specific types of energy (light, chemical, sound etc) and use the cards to define them Deadly Science – Renewable Resources Book 8 | Corey Tutt	**Tasks** Energy Summary Table – challenge students to think of their own examples **Reflection** Can you list examples from your own life where you saw energy *change* from potential to kinetic? Why is it important to understand that energy is never created or destroyed, just transformed?

	Do **Sorting Game (Pairs or Groups):** Hand out scenarios/images depicting different forms of energy (e.g. parked car, roller coaster at rest, jumping, bouncing ball, swinging bat). Students classify each as either potential or kinetic energy. **Extension opportunity,** introduce more specific types of energy (light, chemical, sound etc) and use the cards to define them **Discuss** Ask students to describe what causes a change from potential to kinetic energy or kinetic to potential energy in each scenario. **Explicit teaching** Snow the **Science of the Snowy Scheme with Dr Kirsten Banks: Gravity video** to introduce gravity as potential energy **Do** **Summary Table** Co-create a summary table with the headings: Form of energy, Explanation, Example for each form of energy. **Introduce Game** Introduce Snowy Hydro specific examples using the Power Peak game. Explain that students will explore these energy ideas in a game where they will lift things, move things and make energy – just like the Snowy Hydro does. Ask students to identify incidents of kinetic and potential energy they experience during the game. **Reflection**		

Concept 2. Energy transformation			
Learning intention	Recognise that energy cannot be created or destroyed. Summarise that energy can be transformed between different types of energy and all energy can be compared by measuring the energy in Joules or Watt-hours.		
Success criteria	Describe electricity as the flow of energy in the form of electrical charge and identify it as a form of kinetic energy. Explain that generators in power stations transform other forms of energy into electricity. Recognise and understand the terms "create" and "generate".		
Texts/resources	**Learning sequence and Teaching Strategies**	**Differentiation opportunities**	**Assessment**
Various items for Energy Conversation Stations (see examples in learning sequence) Energy Conversation Stations Observations table **Power Peak Game LAUNCHING SOON!**	**Introduction** • "When you turn on a light, where does the energy come from?" • Discuss the Law of Conservation of Energy and introduce the idea that energy cannot be created or destroyed—it is transformed. • Briefly define "create" (making something from nothing) and "generate" (producing something from something else). **Describing Electricity** • Electricity is the flow of energy carried by moving electrical charges (electrons). • Explain: This flow is a form of kinetic energy, as the charges are moving. • Show a diagram of an electric circuit: battery, wires, and bulb. **Generators and Power Stations** • Explain that in power stations, generators do not "create" electricity out of nothing. Instead, they "generate" electricity by transforming other forms of energy (e.g., chemical, thermal, or mechanical) into electrical energy. • Coal-fired power station: chemical energy (coal) → thermal (heat) → mechanical (turbine) → electrical (generator). • Hydroelectric station: gravitational potential energy (water) → kinetic (moving water) → mechanical (turbine) → electrical.	**Opportunities to simplify:** Supported discussion at each station. **Opportunities to extend:** Are students able to find/think of some of their own examples for energy stations?	Verbal or written responses to: What is electricity? How does a power station generate electricity? What's the difference between "create" and "generate"? **Reflection** What did you think of the game? What do you think the game was really teaching you about?

	Measuring Energy Introduce the units of energy: • **Joules (J):** Standard unit of energy in science. • **Watt-hours (Wh):** Common in electricity, shows how much energy is used over time. **Energy Conversation Stations** Set up several stations for students to explore. At each station they should record answers in the **observation table worksheet**: • What forms of energy are involved? • Where is electricity used/generated? • Is energy created or transformed? • What forms of kinetic energy are present? Possible stations (use what you have access to at your school) • Hand-crank generator: Mechanical to electrical, lighting a bulb. Discuss what is happening—students are generating electricity, not creating it. • Battery-powered toy car: Chemical to electrical to kinetic. • Wind-up music box: Mechanical to sound energy. • Hand warmer pack: Chemical to thermal energy • Glow stick: Chemical to light energy **Introduce Game** Introduce the game and allow students time to explore and play! Thinking prompts: • Identify Gravitational potential energy, kinetic energy and mechanical energy within the game • Find where energy is transformed from one type to another within the game **Reflection**		

Concept 3. Electricity units			
Learning intention	Explain that electricity is a form of kinetic energy that can be generated via turbines in power stations. Calculate that the total amount of energy in the form of electricity is measured in Watt-hours, Kilowatt-hours and Megawatt-hours.		
Success criteria	Explain that energy is measured in Joules or Watt-hours. Explain that electricity energy is measured in Watt-hours, like measuring total distance. Understand that we use "create" or "generate" to talk about making electricity, even though energy is just being changed from one form to another.		
Texts/resources	**Learning sequence and Teaching Strategies**	**Differentiation opportunities**	**Assessment**
Energy Calculations Table Energy Matching Scenarios Student Energy Matching Scenarios Teacher Energy Vs Power poster Units for measuring electricity Poster **Power Peak Game LAUNCHING SOON!**	**Electricity Generation** • Briefly describe (revisit) how turbines in power stations (coal, solar, hydro, wind) turn mechanical energy into electrical energy. • Emphasise: The term "generate" means transforming other types of energy into electricity. **Units for Measuring Electricity** Last lesson we were introduced to the concept that energy can be measured in Joules or Watt-hours. For electricity, Watt-hours are used (think of it like measuring total distance travelled by a car): • 1 Watt-hour (Wh): energy used by something running at 1 Watt for 1 hour. • 1 Kilowatt-hour (kWh): 1,000 Watt-hours • 1 Megawatt-hour (MWh): 1,000,000 Watt-hours Example: If a light bulb uses 60 Watts for 5 hours, total energy = 60 x 5 = 300 Watt-hours. **Energy Calculations** Practice: Use the **Energy Calculations Table** worksheet. Provide appliances and their power ratings; students calculate total energy used over a set time (given in the worksheet). **Option**: students can do this as an at home task to find appliances in their own house.	**Opportunities to simplify:** Work through scenarios step-by-step **Opportunities to extend:** Try converting your house's monthly electricity usage from kWh into MWh and then into Joules.	Quiz: For each scenario, circle the correct unit to describe the energy amount: 1. A mobile phone battery uses energy measured in: Wh / kWh / MWh 2. A small café uses energy measured in: Wh / kWh / MWh 3. A city power station produces energy measured in: Wh / kWh / MWh **Reflection** What connections did you find between the lesson and the game?

	Energy Matching Scenarios Read each scenario in the **Energy Matching Scenarios worksheet** and decide which unit (Watt-hour (Wh), Kilowatt-hour (kWh), or Megawatt-hour (MWh)) is most appropriate for the amount of energy described. Explain your choice. Example: *A small desk lamp uses 10 Watts of power for 2 hours.* • Calculate the total energy used: 10 W x 2 h = 20 Wh • Unit: Wh • Explain: Because the amount is small, Watt-hours are appropriate. **Power Peak Game LAUNCHING SOON!** • Work through game slides to link explicit content of this lesson with the game. • Allow students time to play game Thinking prompts: • What are the different energy units the game uses? • Why do the units change throughout the game? **Reflection**		

Concept 4. Investments of energy			
Learning intention	Explain that there is an investment of work for energy to transform into another form of energy and into the electricity that is produced to be consumed in our everyday lives. Illustrate that because of the investment of work, not all energy that goes into a system comes out as the target energy type.		
Success criteria	Describe how a resource's kinetic energy spins a turbine to generate electricity. Explain that work is the energy transferred to move an object via force. Recognise that transforming energy requires an input or investment of energy. Identify that not all input energy is transformed into the target type, and some is needed to start the process		
Texts/resources	**Learning sequence and Teaching Strategies**	**Differentiation opportunities**	**Assessment**
You need energy to make energy YouTube video Pinwheel activity sheet and Pinwheel templates Materials required include pins, paper, paper straws **Power Peak Game LAUNCHING SOON!**	**Introduction** • Begin the lesson with a quick question: "What happens when you ride a bike uphill? Where does the energy come from and where does it go?" • Relate students' responses to everyday energy transformations. **Power Peak Game LAUNCHING SOON!** • Work through game slides to link explicit content of this lesson with the game. Highlight opportunities to observe these phenomena: o **Work and Force:** Identify a moment in the game where energy is *transferred* to move an object, and describe the force that is applied to achieve this "work." o **Energy Investment:** Where in the energy transformation process do you have to commit an initial "investment of energy" just to make the system operate? o **Energy Loss and Efficiency:** When you input energy, observe the output. Where does the energy go that is *not* converted into the target electrical energy? • Allow students time to play game	**Opportunities to simplify:** Scaffold diagrams and peer support as needed. **Opportunities to extend:** Challenge students to calculate work (Work = Force x Distance) for a real-world example.	**Task** Annotated diagrams **Reflection** What is work? Why do we need an investment of energy to produce electricity? What happens to energy that isn't converted into electricity?

	Explain Show the '**You need energy to make energy video'**. Present the scientific understanding using a simple diagram or video of turbines and generators 1. Kinetic energy or water spins the turbine. 2. Mechanical energy from the turbine spins the rotor. 3. Rotor movement has an electromagnet within it and induces electricity in the stator's copper coils. Define "work" as the energy transferred via force! **Explore** Use the **Make a Pinwheel activity** and **pinwheel templates** to create a model of a turbine. Remember, the turbine is the thing that spins before connecting to a generator. • How a fan (wind) spins a model turbine. • What happens when you try to spin the turbine faster/slower or encounter resistance. • Discuss: What needs to happen for the system to start spinning? (Initial energy investment: work). • Allow students a chance to use the model. **Create** • In groups, students draw an energy flow diagram for a turbine system (wind, turbine, generator, electricity). • Annotate where energy is invested (work) and where energy is lost (heat, sound, friction). • Groups share their diagrams. **Reflection**		

Concept 5. Energy storage			
Learning intention	Illustrate how energy is stored as potential energy (such as water stored in dams) can be transformed into kinetic energy, into mechanical energy to spin a turbine, then kinetic energy of a rotor and stator transform into electricity.		
Success criteria	Describe how kinetic energy spins a turbine and generates electricity using magnets and copper coils. Explain that work is the energy transferred to or from an object to make it move by applying force. Identify that energy transformation requires an investment of energy. Explain that not all energy used in a transformation process becomes the target energy type, and that an initial investment of energy (work) is needed to start the process.		
Texts/resources	**Learning sequence and Teaching Strategies**	**Differentiation opportunities**	**Assessment**
Power Peak Game LAUNCHING SOON! **Dam holding back water images** **Water release video - Jindabyne Dam** **Create a Turbine hands-on activity** **You need energy to make energy video** **How Hydroelectric dams make electricity video**	**Power Peak Game LAUNCHING SOON!** • Work through game slides first to link explicit content of this lesson, with the game. • Allow students time to play game at the intervals identified in the slides. **Introduction** • Begin by asking: "Where does the energy in electricity come from?" Discuss briefly. • Introduce the concept of potential energy with a simple example: water stored behind a dam. • Show an image or animation of a dam holding back water. Head to the Snowy Hydro Gallery and click on "Snowy Assets" • **Energy Transformations** • Explain potential energy: energy stored due to position or height. • Show the **Jindabyne Dam release video** of water released from a dam converting potential energy to kinetic energy as it flows downhill. • Discuss the idea of kinetic energy: energy of motion.	**Opportunities to simplify:** Simplified Flowchart Templates: Give students a partially completed flowchart to fill in with energy types and processes. **Opportunities to extend:** Calculating Efficiency: Challenge students to estimate or calculate the efficiency of a hydroelectric power station, considering energy losses. Compare Different Power Stations: Have students research and compare energy transformations in other types of power stations (e.g., wind or solar), describing similarities and	**Task** Diagram and flow chart Verbal explanation **Reflection** Review the success criteria with the class: ask students to explain each point in their own words. Use questioning to reinforce: 1. How does kinetic energy spin the turbine? 2. What is work and how does it relate to energy transfer? 3. Why do we need to invest energy

	The Transfer of Work and Energy • Use the **Create a Turbine hands-on activity** to demonstrate the transfer of work • Clarify the definition of work as energy transferred through applying force to make an object move. • Revisit the example of water pushing turbine blades- water applies force, causes movement (work). **Turbine and Electricity Generation** • Rewatch **You need energy to make energy video**. • Show **How Hydroelectric dams make electricity video**. • Describe how the turbine spins a rotor fitted with magnets inside or around copper coils (stator). • Explain electromagnetic induction: spinning magnets near coils generate electricity. • Emphasise that kinetic energy of the spinning rotor is transformed into electrical energy. **Energy Investment and Efficiency** • Discuss that the process requires energy input (work) to get the turbine turning - energy investment. • Explain that not all the input energy becomes electricity; some energy is lost as heat, sound, or friction (energy transformation is not 100% efficient). • Use a simple analogy (e.g., pedalling a bike requires effort before it moves). **Apply thinking** • Students complete a diagram of their turbine they made illustrating the transformation from potential energy in stored water to electrical energy, labelling each energy type and the work involved. • Students can create a flow chart of the flow of different types of energy and the transformations and "losses" along the way • Students can explain in writing or verbally how energy transformation works and why energy input and losses happen. **Reflection**	differences.	to start the process? 4. Why isn't all energy converted into electricity?

Concept 6. The Power of Water Assignment			
Learning intention	Investigate, explain, and evaluate the use of water movement to generate electricity		
Success criteria	Explain the specific transfer and transformation of energy, detailing the movement from water's kinetic energy, through the turbine's mechanical energy, and into electrical energy via the generator. Construct a sophisticated visual model (diagram, graph, or physical model) that clearly represents data and relationships within the energy system. Calculate an accurate example of energy consumption using correct multiplication strategies and the appropriate units (e.g., watts or kilowatts). Evaluate how scientific knowledge about hydropower is used by communities to make informed and sustainable decisions about energy Organise and sequence the multimodal text (images, diagrams, and written information) to logically and expertly inform the community about the energy journey. Deliver a highly engaging and persuasive presentation using varied tone, eye contact, and body language to successfully inform the community.		
Texts/resources	**Learning sequence and Teaching Strategies**	**Differentiation opportunities**	**Assessment**
The Power of Water Assignment	**Introduction** • Introduce the assessment for this unit. **Student work time** • Allow students independent or team time to create the presentation **Conduct presentations** • Conduct the presentations for the assignment	**Opportunities to simplify:** Provide a presentation template and suggest order of project **Opportunities to extend:** Ask students to research the amount of energy used in your city over a fixed time and compare to the generation capacity of the whole Snowy Scheme	**Use the Power of Water Assignment**