



# Energy



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- You have been in a car or a boat or a train or a plane
- You plug devices into the sockets at home to charge
- You have ever put batteries into a toy or appliance
- You have ever made a cake
  - What do all these activities have in common?







# What is energy?

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- **Energy** gives us the power to **make things happen**
- It can be gathered and stored
  - We need energy to **live**
  - We need energy to **grow**
  - We need energy to **move**
  - Where does **your** energy come from?
  - There are many **different types** of energy







# Potential energy

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- This is the energy **stored** within a body or object
- It has the **potential** to transform into other energy
  - A mountain bike at the **top of a hill** has **potential energy**
  - A **fully wound** mechanical **Yo-yo** also has **potential energy**
  - **Where else** might you find **potential energy**?





# Elastic energy

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- **Elastic energy** is a form of **potential energy**
- **Elasticity** is when a material is **stretched** or **squeezed** but then returns to its **original shape**
  - A **compressed spring** and a **stretched elastic band** both have **elastic energy**
  - Can you suggest an Olympic sport that relies on **elastic potential energy**?





# Gravitational energy

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- A parachutist waiting in a plane has **potential energy**
- Once they jump, **gravitational energy** means they fall to earth
  - What **increases** as the **gravitational energy** is transformed into **kinetic energy** as the parachutist falls?
  - Because of the pull of the earth called **gravity**, the falling parachutist also has **gravitational energy**







# Task 1: Fill in the gaps

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- Using the words in the list below, **fill in the gaps** in the following sentences

clockwork toy	gravitational energy	Elasticity	speed	trampoline	Potential energy	elastic energy
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- \_\_\_\_\_ is the energy stored within a body or object. A good example of this is a fully wound \_\_\_\_\_.
- \_\_\_\_\_ is the ability of a material to be stretched or compressed and return to its original form. The surface of a \_\_\_\_\_ demonstrates this when we jump on it.
- An archer draws back the string of their bow to provide \_\_\_\_\_ which will launch the arrow when they let go.
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# Mechanical energy

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- This fairground ride is raised using **mechanical energy**
- This mechanical energy can be stored before use
  - This **mechanical arm** stops briefly at the top before **swinging down**
  - When the mechanical arm stops **at the top** of its rotation, what type of **potential energy** does it have?





# Sound energy

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- **Sound energy** is energy that we can actually hear
- Sound energy is caused by the **vibration of particles**
  - When we sing, **vibrations** in our voice box make a sound
  - What **process** produces sound energy from a **bell**?
  - What **term** do we use to describe different **levels** of sound?

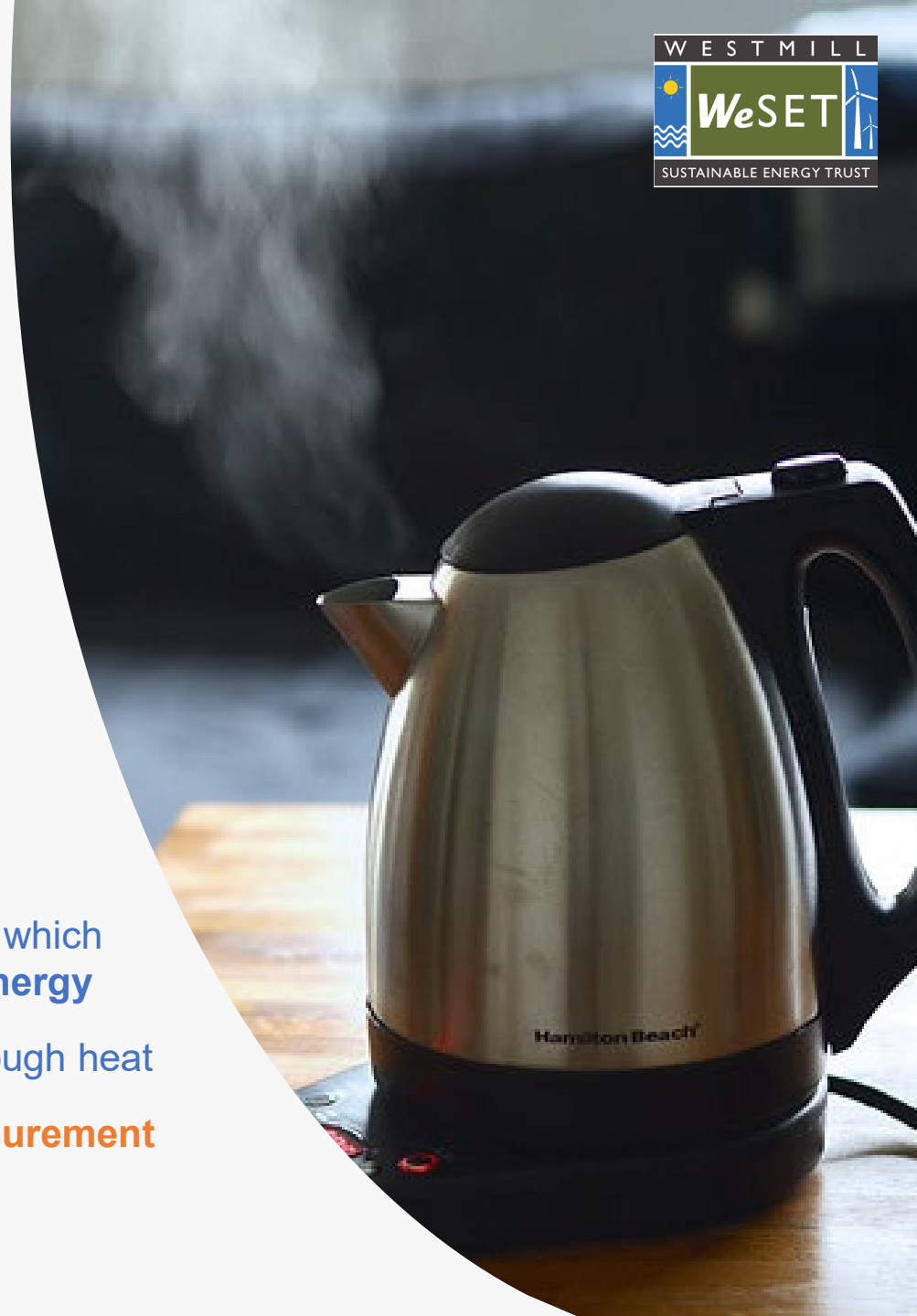




# Thermal energy

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- **Thermal energy** is different from **temperature** and **heat**
- A **catalyst** like electricity, heat or friction is used to **excite** the **molecules** in a substance
  - This forms **kinetic energy**, like the bubbling of water boiling in a kettle which is then transformed into **thermal energy**
  - Thermal energy is **transferred** through heat
  - What word do we use for the **measurement** of thermal energy?



# Light energy

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- **Light** is a vital **source** of energy for the whole planet
  - Can you name a **natural source** of light energy?
- In the past we brought light into our homes by **burning fuels** such as gas, oil, wood and coal
  - What is the most common **type of energy** that we **convert into light energy** nowadays?
  - Different types of **light bulb** include incandescent, tungsten, halogen, fluorescent, LED and neon





# Chemical energy

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- **Chemical energy** is stored within the **compounds** of a material or type of matter
- **Potential** chemical energy is realised when a catalyst causes a **chemical reaction**
  - The **friction** of **striking a match** results in a chemical reaction
  - What happens when we **burn** wood or coal on a BBQ?
  - What other chemical reactions **release energy** that we can use?





# Kinetic energy

- Fuelled by what we eat and drink, we all have **chemical potential energy**
- When we walk, run or jump this is converted into **kinetic energy**
  - This is the **energy of movement**
  - What **other types of energy** can be **converted** into kinetic energy?
  - If a skier skis down a mountain, at **what point** on the slope will the **kinetic energy** be greatest, at the top middle or bottom?





# Electrical energy

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- **Electrical energy** is the energy that powers our homes as well as our **devices** and **appliances**
- Moving **electrons** form an **electrical current**
  - Other types of energy can be **converted** into electrical energy
  - What **natural form** of electrical energy might we see on a stormy day?







# Types of energy

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# Task 2: Energy match

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- Match the **types of energy** with the relevant images below

Electrical

Kinetic

Chemical

Elastic

Thermal

Sound

Light







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Fireworks    Electric toothbrush    Skateboarder    Couple with resistance band    Drum set    Headlamp    Radiator



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Electrical      Kinetic      Chemical      Elastic      Thermal      Sound      Light

Fireworks

Electric toothbrush

Skateboarder

Man using resistance band

Drum set

Headlamp

Radiator





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Electrical	Kinetic	Chemical	Elastic	Thermal	Sound	Light
						

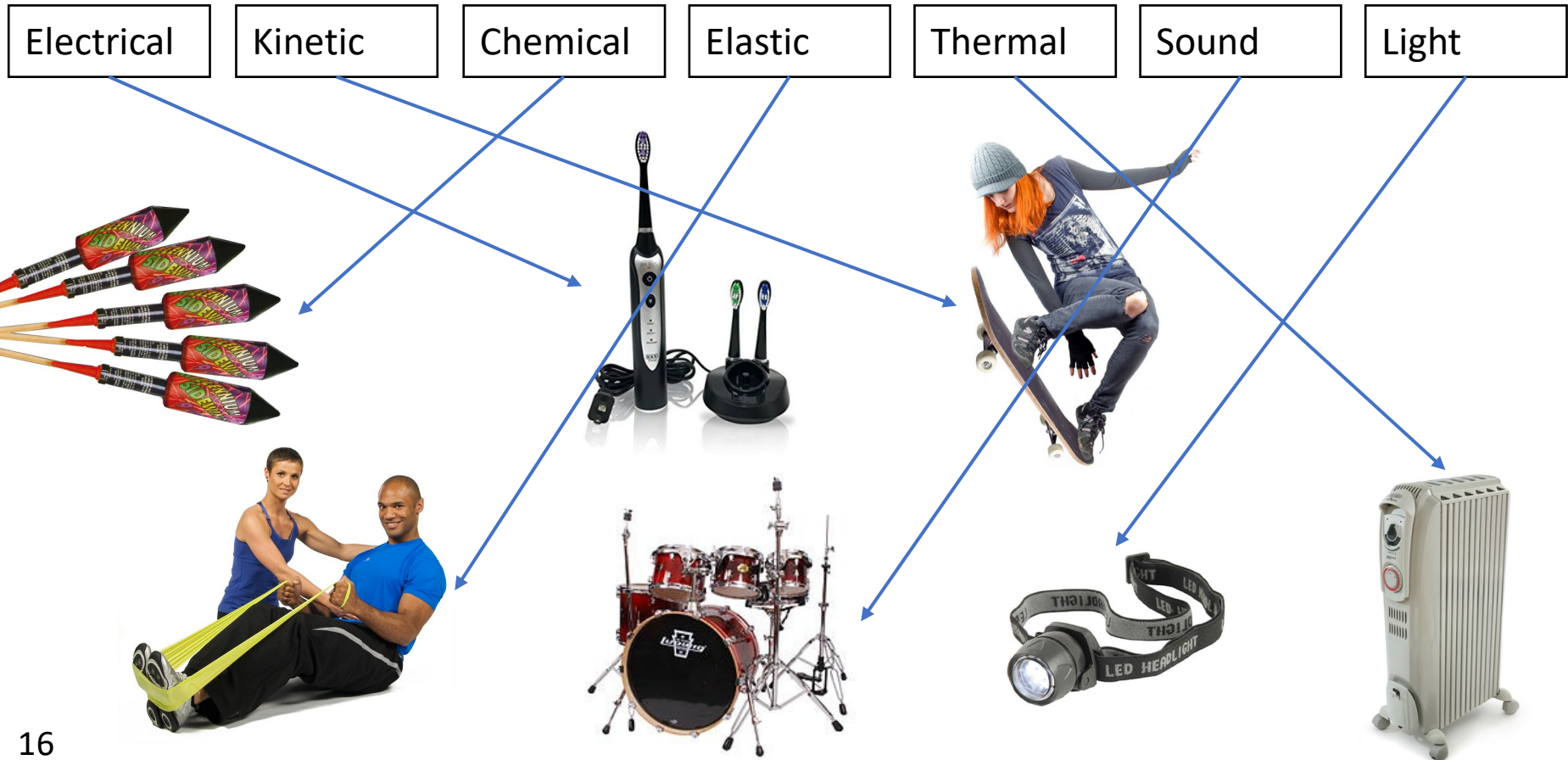
Diagram illustrating the matching of energy types to images:

- Electrical: Electric toothbrush
- Kinetic: Person on a skateboard
- Chemical: Firecrackers
- Elastic: Resistance band exercise
- Thermal: Electric heater
- Sound: Drums
- Light: LED headlamp



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# Energy transformation

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- One type of energy can be **transformed** into another
- This process is also known as energy **conversion**
  - For example, when we plug in and switch on a radio, **electrical energy** is converted into **sound energy**
  - What **energy transformation** takes place when we pedal a bicycle?





# Conversion systems

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- Several different types of energy may be at play at the same time
- Like a bicycle, a torch is really **system of parts** used to transform or convert energy
  - What type of energy does a **battery** hold?
  - **Positive** and **negative** terminals on the battery are connected causing a **reaction** which allows electrons to flow between them
  - What is the **outcome** of this transformation?





# Energy loss

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- Each time energy is changed or transformed there will be some normal **loss of energy**
  - A runner loses some of their energy as their **body heats up** and they burn **calories** (potential chemical energy)
- Nowadays we try to **conserve** energy when and wherever we can
  - Does **lost energy** simply disappear?
  - Why might it be seen as a **bad sign** if a car is very **noisy** or **overheats** regularly?





# Task 3: Transformation

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- Identify the types of **energy transformations** that **provide power** for the items or actions pictured below. What is the **outcome**?
- The first one has been done as an example...

Once lit, **chemical energy** in the gas canister is transformed into **thermal energy** or heat for cooking





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When the blender is switched on, **electrical energy** is transformed into **mechanical energy**, causing the blades to rotate





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When the blender is switched on, **electrical energy** is transformed into **mechanical energy**, causing the blades to rotate



At the top of the rollercoaster, the train has **potential gravitational energy**. As it plunges down, this is converted into **kinetic energy** creating a fast, exciting ride





# Task 4: Fill in the gaps

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- Using the words in the list below, **fill in the gaps** in the following sentences

connection

electrodes

electricity

heat

batteries

negative

light

potential

positive

chemical

electrons

bulb

- The torch uses \_\_\_\_\_ which contain \_\_\_\_\_ chemical energy.
- Each battery has two terminals or \_\_\_\_\_ at each end, one \_\_\_\_\_ and one \_\_\_\_\_. The battery contains a \_\_\_\_\_ called an electrolyte.
- When the switch is on, a \_\_\_\_\_ is made allowing electrons to flow between the terminals forming \_\_\_\_\_, which powers the \_\_\_\_.
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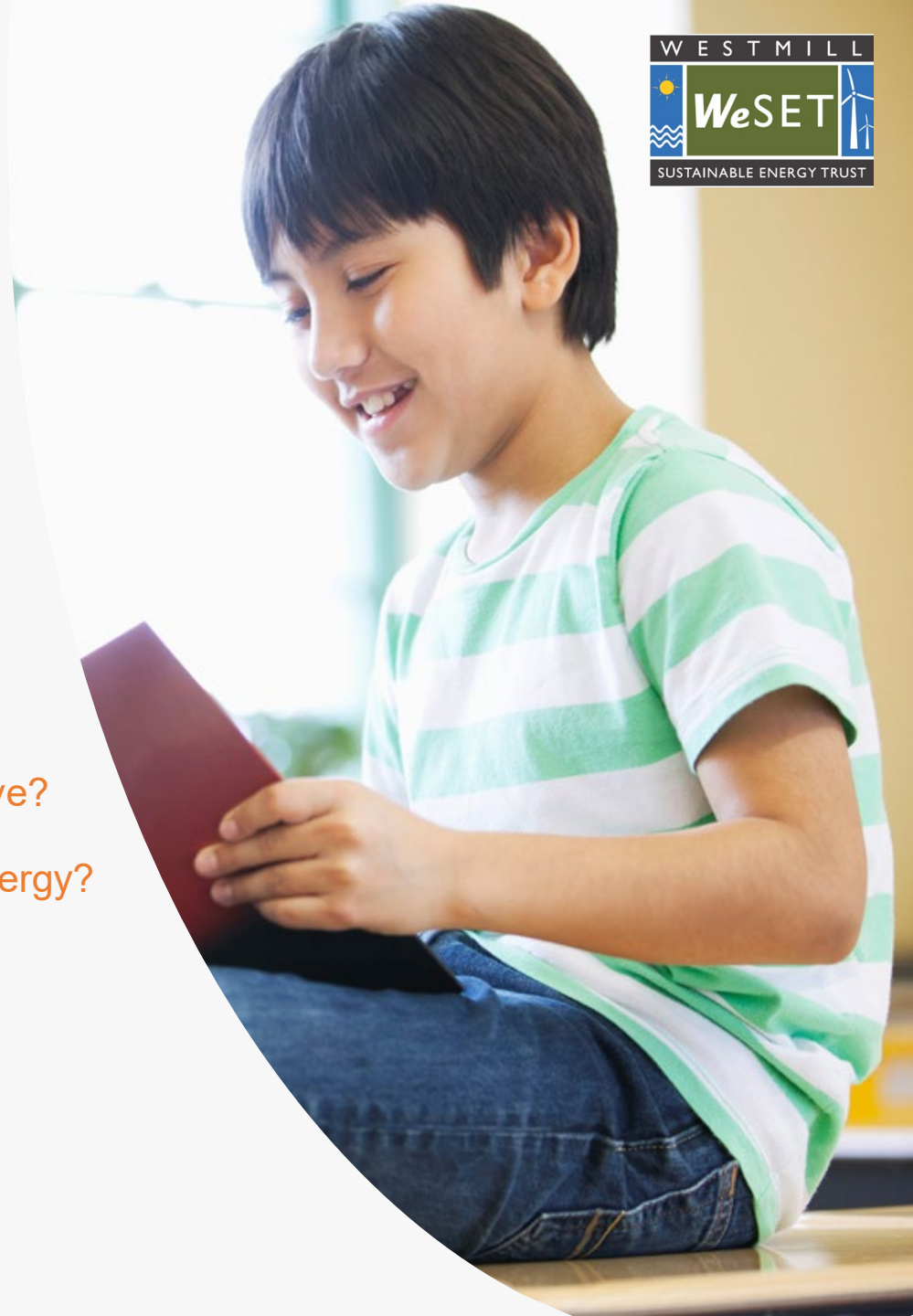




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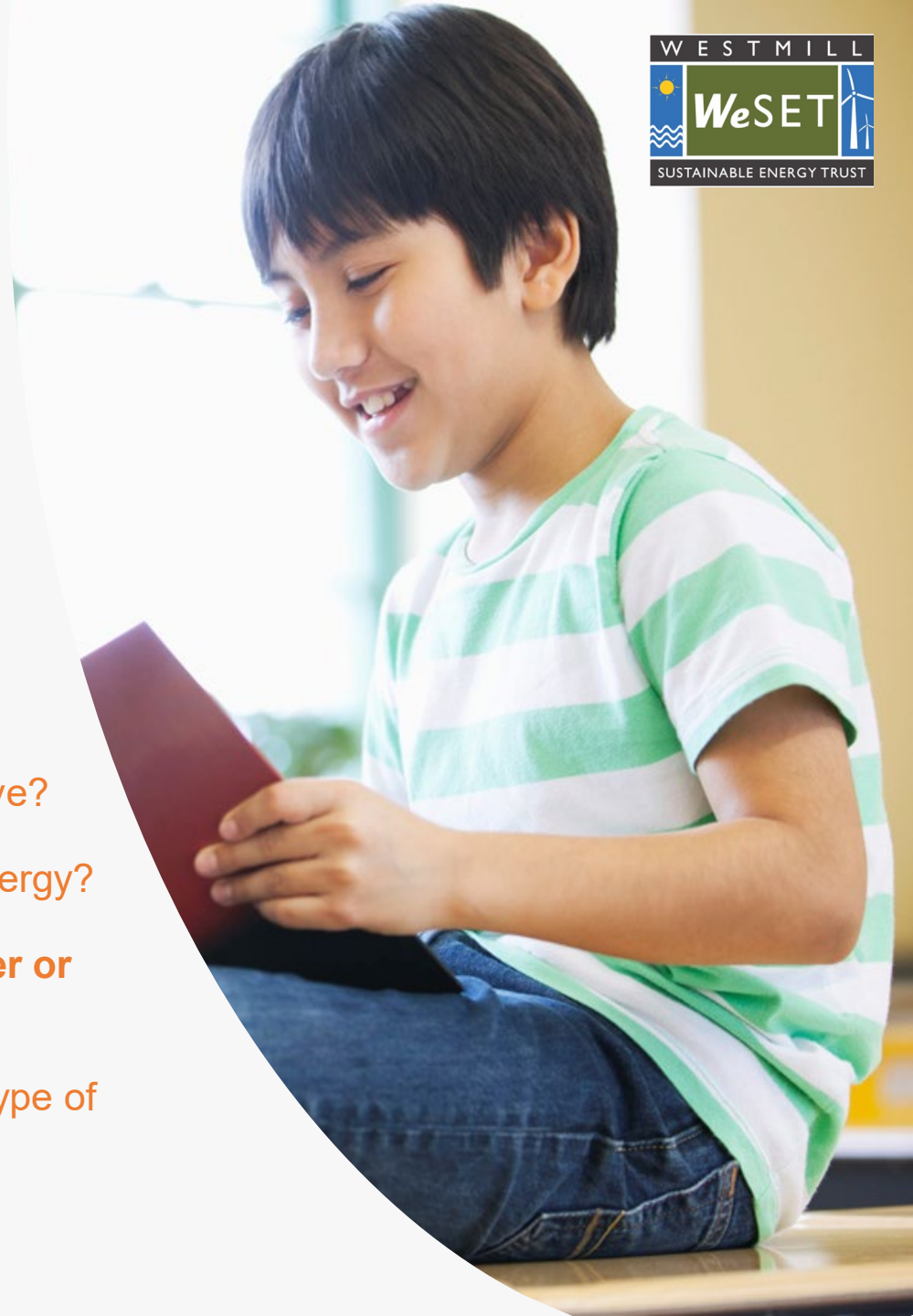




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- What name do we use for the **energy of movement**?
- What type of energy does a **battery** have?
- What is meant by the term **potential** energy?
- What type of energy do we use to **power or charge** our devices?
- What other word do we use when one type of energy is **converted** into another?



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