

Special Energy Investigators

The Mission of the Special Energy Investigators is to..

- detect cases of energy wastage;
- identify those responsible;
- take steps to prevent repetition;
- report on the success of their activities.

The Case of the Dark Sunshine

Background information

Intelligence reports suggest that people in your sector are using electric lights when there is plenty of sunshine available. This is wasting both electricity and money. Most of our electricity is generated by burning coal, oil and natural gas. Generating this extra electricity is harming the planet by using up fuels and releasing excessive amounts of carbon dioxide into the atmosphere. The Special Energy Investigators must act to prevent this waste. They must encourage the use of sunshine whenever and wherever possible. Sunshine is free. It doesn't use up valuable fuel resources. It creates no pollution.

This is your special assignment

Codename: Operation Sunshine

Mount an investigation to find out if light is being misused in your school.

Collect evidence of potential misuse.

Decide if there is a case to answer.

If there is, DO SOMETHING ABOUT IT.

This is the drill

1. Check out the scene. Look out for clues. These could include ...

- Windows and roof lights that are dirty;
- Corridors and wash-rooms lit more brightly than necessary;
- Lights in naturally-lit corridors left on all day;
- Room lights left on after 10 a.m. (when there is usually enough sunlight coming in from outside);
- Lights nearest the windows incapable of being switched off independently of those further away from the windows.

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how light was being misused,
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Sunshine. Compare your observations.
 - When and where was light being misused?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to make sure that light is properly used?
- How can pupils, teachers and other adults help prevent the waste?
- Compile a dossier summarising your observations and ideas.
- Present the dossier to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update the dossier.
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Dark Sunshine as soon as you can. Remember that when Operation Sunshine is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

Head of Special Energy - Investigation Task Force

Special Energy Investigators

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The Case of the Light Wasters

Background information

Intelligence reports suggest that some people in your sector are using their lighting inefficiently. This could be because they are switching on lights when they needn't. It could also be because they are using the wrong types of lamps in some places.

Either way, this is wasting both electricity and money. The Special Energy Investigators must act to prevent this waste.

Energy efficient lighting includes 26 mm diameter fluorescent tubes and compact fluorescent lamps, together with sodium and mercury discharge lamps. To be energy efficient, these types must be used in the appropriate places.

This is your special assignment

Codename: Operation Candle

Make sure you can recognise the types of lamp found in your sector.

Mount an investigation to find out if lighting is being wasted in your school.

Collect evidence of potential wastage.

If there is a case to answer, DO SOMETHING ABOUT IT.

This is the drill

1. Check out the scene. Look out for clues. These could include ...

- Empty rooms with lights left on;
- Lights left on when daylight is adequate;
- Corridors and wash-rooms lit more brightly than necessary;
- Filament lamps used in places which must be lit for long periods (such as stair-wells, dark corridors, security lights);
- Dusty lamps, reflectors and diffusers

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how light was being misused,
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Candle. Compare your observations.
 - When and where were there problems?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to make sure that lighting is properly used?
- How can pupils, teachers and other adults help prevent the waste?
- Find out about schemes that help pay for the replacement of old-fashioned lighting. (CREATE, amongst others, has the latest data.)
- Present a report to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update your report..
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Light Wasters as soon as you can. Remember that when Operation Candle is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

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The Case of the Great Heat Waste

Background information

Intelligence reports last winter suggested that buildings near you were using excessive amounts of heat energy. People were feeling cold even though they were spending a lot of money trying to keep warm. Most of the energy used for heating came from burning coal, oil and natural gas. This is harming the planet by using up fuels and releasing excessive amounts of carbon dioxide into the atmosphere. The Special Energy Investigators must act to prevent this happening again.

This is your special assignment

Codename: Operation Furnace

Mount an investigation to find out if heat is being wasted in your school.

Collect evidence of potential misuse.

Decide if there is a case to answer.

If there is, DO SOMETHING ABOUT IT.

This is the drill

1. Check out the scene. Look out for clues. These could include ...

- Doors and windows left open on cold days;
- Rooms being heated when they are not in use;
- Rooms hotter than they should be (classroom = 18°C, corridor = 15°C);
- Heating system running full on when the building is not occupied;
- Radiators and hot air grilles surrounded by furniture and equipment;
- Electric fires in regular use during winter;
- Radiators not fitted with thermostatic radiator valves;
- Night-storage heaters used incorrectly.

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how heat was being wasted,
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Furnace. Compare your observations.
 - When and where was heat being wasted?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to make sure that energy is properly used?
- How can pupils, teachers and other adults help prevent the waste?
- Present a report to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update your report..
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Great Heat Waste as soon as you can. Remember that when Operation Furnace is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

Head of Special Energy - Investigation Task Force

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The Case of the Great Draught Hunt

Background information

Intelligence reports last winter suggests that excessive heat is escaping from rooms and buildings near you. People in your sector are suffering from draughts. This means that they feel uncomfortable and spend excessive amounts on keeping warm. This is wasting both energy and money. Most of the heat for our buildings comes from burning coal, oil and natural gas. Using extra heat is harming the planet by using up fuels and releasing excessive amounts of carbon dioxide into the atmosphere. The Special Energy Investigators must act to prevent this happening next winter.

This is your special assignment

Codename: Operation Breeze

Mount an investigation to find out if rooms are excessively draughty.

Collect evidence of potential problems.

Decide if there is a case to answer.

If there is, DO SOMETHING ABOUT IT.

This is the drill

1. Design and make your own draught detector. Then check out the scene.

Look out for clues. These could include ...

- Cracks and crannies round window and door frames;
- Draught strips damaged or missing;
- Windows and doors not closed properly on cold days;
- Automatic door closers not working or not used;
- Fans in kitchens, workrooms, etc left on longer than necessary to clear steam, fumes or noxious chemicals.

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how cold air was getting into the room (or warm air getting out),
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Breeze. Compare your observations.
 - When and where were draughts noticed?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to reduce draughts?
- How can pupils, teachers and other adults help prevent draughts?
- Compile a dossier summarising your observations and ideas.
- Present the dossier to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update the dossier.
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Great Draught Hunt as soon as you can. Remember that when Operation Breeze is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

Head of Special Energy - Investigation Task Force

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The Case of the Red Hot Drip

Background information

Intelligence reports suggest that hot water is being wasted in buildings in your sector. This means that excessive amount of energy are going down the drain. The money it costs might as well go there too! The energy needed to heat water comes from burning coal, oil and natural gas, either in the building itself or in a power station that generates electricity. This wastage is harming the planet by using up fuels and releasing excessive amounts of carbon dioxide into the atmosphere. The Special Energy Investigators must act to prevent this continuing.

This is your special assignment

Codename: Operation Sauna

Mount an investigation to find out if hot water is being wasted.

Collect evidence of potential problems.

Decide if there is a case to answer.

If there is, DO SOMETHING ABOUT IT.

This is the drill

Collect a thermometer and a measuring jug. Make sure you know how to use them safely. Then check out the scene. Look out for clues. These could include ...

- Hot water taps that drip even when fully turned off;
- People leaving water taps running or dripping;
- Excessive water has to be run before it comes hot;
- Water that is hotter than 43°C when it comes out of the tap;
- Hot water pipes not covered with insulation (=lagging);
- Water being heated when it is not required.

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how hot water is being wasted,
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Sauna. Compare your observations.
 - When and where was hot water being wasted?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to stop hot water being wasted?
- How can pupils, teachers and other adults help prevent waste?
- Compile a dossier summarising your observations and ideas.
- Present the dossier to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update the dossier.
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Red Hot Drip as soon as you can. Remember that when Operation Sauna is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

Head of Special Energy - Investigation Task Force

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The Case of the Dirty Glasses

Background information

Intelligence reports suggest that people in your sector are not allowing windows to let in as much sunlight as they should. They are switching lights on instead. This is wasting both electricity and money. Most of our electricity is generated by burning coal, oil and natural gas. Generating this extra electricity is harming the planet by using up fuels and releasing excessive amounts of carbon dioxide into the atmosphere. The Special Energy Investigators must act to prevent this. They must encourage the use of sunshine whenever and wherever possible. Sunshine is free. It doesn't use up valuable fuel resources. It creates no pollution.

This is your special assignment

Codename: Operation Glaze

Mount an investigation to find out if windows are being misused in your school.

Collect evidence of potential misuse.

Decide if there is a case to answer.

If there is, DO SOMETHING ABOUT IT.

This is the drill

1. Check out the scene. Look out for clues. These could include ...

- Dirty windows and roof lights covered in leaves and moss;
- Curtain and blinds that are left closed throughout the day (especially during winter when they have been closed overnight to keep the warmth in);
- Curtains and blinds awkward to open and close; pull cords difficult to find;
- Windows covered in displays or blocked by furniture;
- Overhanging branches and bushes shading windows;
- Dark walls opposite north-facing windows. (Walls painted white reflect more light into the room.)

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how windows were being misused,
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Glaze. Compare your observations.
 - When and where was sunlight unable to get in to rooms?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to make sure that windows are used properly?
- What can pupils, teachers and other adults do to help this?
- Compile a dossier summarising your observations and ideas.
- Present the dossier to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update the dossier.
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Dirty Glasses as soon as you can. Remember that when Operation Glaze is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

Head of Special Energy - Investigation Task Force

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The Case of the Hungry Appliances

Background information

Intelligence reports suggest that people in your sector are wasteful in the way they use appliances such as videos, tvs, computers and kettles. This behaviour uses more electricity than it needs to and costs money. Most of our electricity is generated by burning coal, oil and natural gas. Generating this extra electricity is harming the planet by using up fuels and releasing excessive amounts of carbon dioxide into the atmosphere. The Special Energy Investigators must act to prevent this.

This is your special assignment

Codename: Operation Gizmo

Mount an investigation to find out if appliances are being misused in your school.

Collect evidence of potential misuse.

Decide if there is a case to answer.

If there is, DO SOMETHING ABOUT IT.

This is the drill

1. Check out the scene. Look out for clues. These could include ...

- Computer monitors, printers, video-players and tv sets left on stand-by when not being used, instead of being switched fully off;
- Computer left on, when they should be on "snooze" or switched off;
- Photocopiers left on for long periods when not used;
- A kettle full of water being boiled to make a single hot drink;
- Extractor fans being left running after the steam or smell have gone;
- Drinks and vending machines left on over weekends and holidays;
- The hot water urn in the staffroom being left on all day;
- Electric fires being used to heat offices and classrooms when the main school heating is on.

2. Keep records

- Make your own Special Energy Investigators Notebook.
- Record your observations in it. Information should include ...
 - the time,
 - the place,
 - how appliances were being misused,
 - who was the last person there before you arrived.

3. Hold a case conference

- Call a meeting of all the Special Energy Investigators assigned to Operation Gizmo. Compare your observations.
 - When and where were appliances wasting electricity?
 - What is common about the times and places?
 - Who are the witnesses and the suspects?

4. Come up with a scheme

- What can be done to make sure that appliances are properly used?
- How can pupils, teachers and other adults help prevent waste?
- Compile a dossier summarising your observations and ideas.
- Present the dossier to your Senior Officers (teachers and headteacher)
- Explain the advantages of your scheme and how it can be carried out.

5. The follow-up operation

- When your Senior Officers have had time to consider your plan, ask them which parts they intend to put into operation.
- Later, make undercover observations to find out if the plan is working.
- Make careful notes of what you find out.
- Call another case conference and discuss progress. Update the dossier.
- Decide what should be done next.
- Report your conclusions to your Senior Officers.

Wrap up the Case of the Hungry Appliances as soon as you can. Remember that when Operation Gizmo is successfully completed, there will always be another case for the Special Energy Investigators.

Best of luck.

Head of Special Energy - Investigation Task Force

Special Energy Investigators - Teachers' Notes

Aims

- To provide a context for the practical application of scientific, technological, geographical and mathematical knowledge in a familiar real-world situation.
- To identify those parts of the school and its normal practices where it may be possible to use energy more wisely without curtailing facilities, reducing comfort or compromising safety.
- To provide information to assist the school manage energy more wisely so that more of its financial resources can be spent on core educational activities.

Target group

- Upper primary pupils

Assumed knowledge

- The Sun is a free source of light and heat energy.
- At some times of day and year, natural lighting and heating are supplemented by other sources of energy, mainly from fossil fuels. This energy has to be paid for.
- Burning fuels to obtain energy releases gases that may affect climate.
(Carbon dioxide is the most important of these.)
- The combustion of fuels may take place in the classroom (open coal fire or portable gas heater), in the school boiler house or off-site in electrical power stations.
- Heat energy may be distributed around the school as circulating hot water and released into rooms by radiators or hot air blowers.
- Heated air can be lost through open windows and doors, and through cracks. It is replaced by colder air that then has to be heated to a comfortable temperature. Excessive supplementary heating increases energy bills considerably.
- It is possible to regulate the amount of heat released by individual radiators and the central heating system as a whole (though this is not always done well).
- A separate system supplies hot water to sinks.
- Light is absorbed by overhanging trees, dirt on windows and diffusers on light fittings, displays stuck to windows, etc.

Preparation

- Make sure that it is acceptable for pupils to have access to much of the school.
- Brief other staff, caretaker, ancillaries, etc about what will be going on and that they may be asked questions.

Equipment

All groups:-

- Clip-boards, pencils and paper
- Basic map of school showing classrooms, halls, corridors, washrooms, store-rooms

Some groups may require one of the following:-

- Measuring jugs (with smaller plastic beaker if jug will not fit under hot water taps),
- Thermometers
- Draught detectors (e.g. ruler with 1 x 15cm strip of tissue paper stuck to end)

Timing

- This activity is best during spring or autumn, when supplementary lighting or heating is often being used but may not actually be required.
- This activity takes about half a day, but this need not be a whole morning or afternoon.
- Useful information can be obtained by carrying out investigations before and after normal schools hours and during breaks and dinner-times.
- Some of the work can be done as part of English, Science, Maths and ICT lessons.

Procedure

- Initial introduction
- The class is divided into groups of between three and six pupils.
- Each is given copies of the briefing sheet for a different "case."
- Groups plan their investigations
- Groups move around school gathering evidence
- Groups discuss evidence
- Groups present evidence and suggestions for possible improvements to the whole class.

(*teacher circulating*
with advice
and encouragement)

Suggested follow-up

- Pupils present their findings to the whole school, Headteacher and/or School Board, etc.
- In due course, school management team make reasoned responses to their suggested improvements, along the lines of ...
 - "This is already happening, but obviously it doesn't show."*
 - "This is planned and will start ..."*
 - "This can't be done because ..."*
 - "We hadn't thought of this, so we're going to ..."*
 - "Can you help us with ..."*
- SMT commission further investigations of selected proposals, providing a stimulus for work in Science, Maths, English, Technology, etc.
- Pupils carry out investigations and prepare detailed report(s)
- Pupils monitor progress / lack of progress on implementation of adopted proposals.
- Pupils report to school, governors, and parents at special assembly, newsletter, etc
- Establishment of a School Energy Team (E-team) involving representatives of pupils and adults from the school, the local authority energy manager, and the local community.
- Home energy surveys can be made along similar lines, perhaps with pupils staging an event for their families dealing with wise energy use at home.
- Consider becoming an Eco-School (www.eco-schools.org.uk)

Reference

The use of an outsider to lead the activity, through playing the part of "J" (the Head of the Special Energy Investigation Task Force), is described in Primary Science Education 57 – March 1999 pp 26-28 (published by the Association for Science Education)