



## **Junior High Application Example**

### **YOUR A+ FOR ENERGY PROJECT**

**What is the title of your A+ for Energy Project?**

When is zero ACTUALLY zero?

**Briefly describe your project idea. This summary communicates the overall intent and outcomes of your project.**

Net zero, zero emissions, zero carbon... these terms get thrown around a lot in today's society but what do they really mean? Which is "better" and why? Students will explore the difference between what it means to be Net Zero and what it means to produce Zero Emissions to tackle the complexities around energy use in a variety of scenarios. After collecting data on air quality in a variety of situations, students will use this as a jumping-off point for understanding the challenges of determining whether Net Zero or Zero Emissions strategies are more useful. Researching and developing offset strategies, while also building and programming automated devices that will conserve energy, thereby reducing greenhouse gas emissions will be key components of this project. Once they have completed their work, they will prepare a proposal that will focus on either net zero offset measures or emissions reduction strategies and will debate which is the most effective for combating climate change brought on by greenhouse gas emissions.

**Approximately how many students will be directly involved in the A+ for Energy project?**

51-100

**Approximately how many students will be indirectly impacted by the A+ for Energy project?**

251-500

**What grades will participate directly in the project?**

7-9

**Which subject areas will you incorporate into your A+ for Energy Project? (By selecting a subject, you are indicating that you will be meeting learning objectives from the curriculum for this subject.)**

Science, Social Studies, Language Arts

**Identify the energy topic(s) that will be the focus of your project**

Renewable/Alternative Energy Sources, Nonrenewable/conventional Energy Sources, Energy Conservation, Energy Efficiency, Energy Technology & Innovation, Other

If other please list them below:

**Reducing Greenhouse Gas Emissions**

## STUDENT LEARNING & EXPERIENCE

**How will this A+ for Energy Project enhance student learning about energy?**

Energy in Alberta is a complex issue. Students are bombarded regularly with multiple perspectives which all have important roles in the decisions made regarding how to best use energy resources while simultaneously ensuring minimal harm is done to the environment. Part of becoming a more scientifically literate student, and an informed citizen, is gaining appropriate knowledge and understanding of a concept through experiential learning and analysis. With this goal in mind, a crucial piece of this project will be for students to have a better understanding of the difference between what it means to be “Net Zero” versus “Zero Emissions”. They will be able to explore both concepts via inquiry-based methods and will learn the intricacies and complexities of what it means to truly reduce a carbon footprint in a world that is still largely dependent on fossil fuels. Using data they have collected on air quality in a variety of scenarios, they will gain insights into the amount of greenhouse gas and other emissions that are being continually released into the atmosphere. By choosing specific scenarios to research and experiment with, students will gain experience that will help them to become better critical thinkers on the subject of carbon emissions and the relationship to energy use in Alberta. They will be developing their research skills, persuasive writing, and presentation skills throughout the project, not to mention how to design and build devices that will reduce energy consumption, thereby reducing greenhouse gas emissions.

**Explain how your energy project connects to and enhances curriculum outcomes.**

Without a doubt, this project will be highly focused on developing and enhancing learning outcomes within the Skills and Attitudes components of the Alberta Program of Studies. Specific examples include:

- Identify problems to investigate
- Propose alternative solutions to a problem

- Identify science-related issues
- Research information relevant to a problem or issue
- Construct and test prototype designs
- Identify information and data that are relevant to an issue
- Identify and troubleshoot problems
- Evaluate designs and prototypes
- Identify and evaluate potential applications of findings
- Identify new questions and problems that arise
- Apply given criteria for evaluating evidence and sources of information

In addition to the above outcomes, we will be integrating this project into our Science 9 units of study for Electrical Principles and Technologies, and Environmental Chemistry. There is also the potential to connect with our English Language Arts and Social Studies teachers to build authentic cross-curricular connections.

### **How will this A+ for Energy project enhance student experience?**

This project is all about getting students involved and learning about the different perspectives involved in making decisions regarding energy use in Alberta. Students have been experiencing increasing amounts of “climate anxiety” as they are confronted with the reality of how individual and collective actions impact life on our planet. Providing them with the opportunities to both research and develop concrete solutions to this complex issue can help ease some of this anxiety. As well, students will be gaining and enhancing their critical thinking skills so that they can more effectively evaluate the validity of the information they are continually exposed to on a multitude of topics. Finally, part of this project will involve presenting what they have learned to different audiences, including younger students, their peers, and adults from the greater community. We are also hoping to develop proposals and present them to those in positions of leadership.

## CREATIVITY

### **What’s different? What’s innovative? How will the A+ for Energy grant allow you to inspire and engage your students in a new, exciting way?**

Students love to immerse themselves in experiential learning. We often teach young people to make decisions based on evidence but they don’t always have reliable evidence available to them. In this project, we will use Pocket Lab Air devices to gather and track air quality data in a variety of situations and this evidence will be used to inform the direction students choose to take the next step of the project. While we have incorporated coding with microbits and other technology into our classes in the past, rather than simply focusing on one energy-saving device,

students will be challenged to examine energy use and conservation on a broader scale. They will research such areas as agriculture, urban development, industry, and individual housing. Within these areas of research, they will then find examples of how Net Zero offsets are being used already and evaluate their effectiveness. Once they get a solid picture of this component, students will then work in groups to design, build, and code prototype designs that will conserve energy and, therefore, reduce the amount of greenhouse gas emissions that reach the atmosphere. Finally, they will be responsible for creating proposals that can be presented to leaders in the areas they focus on (housing developers and builders, school trustees, city and provincial government representatives, etc). This project allows students to look for real-world solutions and to get advice from those involved, as well as feel that their voice has meaning and influence. When students see that the work they are doing in the classroom can have widespread impacts, they are more likely to be fully engaged.

**What inspired you and/or your students to develop this idea?**

This year I started taking a different approach to the Science 9 Electricity and Environmental Chemistry units. Because we live in Alberta, the idea of energy (how it is used, where it comes from, and what are the impacts) is a complex one and I wanted to ensure I was honoring all perspectives. As we explored the topic, questions arose from the students about what Net Zero meant, and some spirited discussions resulted as students debated the merits of this strategy versus reducing the greenhouse gas emissions that reach the atmosphere. I knew this was something I wanted to delve deeper into and this project was born!

## PROJECT PLANNING & IMPACTS

Please list the total amount of money you are requesting from the A+ for Energy Program.(\$)

\$5,000

**Please complete and attach the budget template available on the Inside Education A+ for Energy webpage.**

<b>Item</b>	<b>Source</b>	<b>Unit Cost</b>	<b>Quantity</b>	<b>Total Cost</b>	<b>Brief Description of how the item is aligned with project activities</b>
<i>Pocket Lab Air - 5 pk</i>	<i>Pocket Lab</i>	1,740	1	1,740	<i>Students determine where they would like to monitor air quality and we can place monitors there, collecting data using the apps</i>
<i>Earthbox Victory Garden</i>	Earthbox	350	1	350	<i>Controlled garden environments for which to plan and construct greenhouses or model agricultural systems that will be controlled by automated kits.</i>
<i>Smart Greenhouse Kit</i>	PiShop.ca	66	8	528	<i>Students use to automate multiple functions for our classroom gardens to save energy and resources</i>
<i>SMART Agriculture Kit</i>	PiShop.ca	82	10	820	<i>Similar to greenhouse kits but can also be expanded to more large-scale designs</i>
<i>Switch for Microbit</i>	PiShop.ca	9	10	90	<i>Required for multiple component systems to turn things on and off.</i>
<i>Microbit V2 - Set of 10</i>	PiShop.ca	320	2	640	<i>These have built-in buzzers and other components saving us on needing additional accessories</i>
<i>IR Movement Detectors</i>	PiShop.ca	9	30	270	<i>Many devices will likely be programmed to reduce energy use unless people are present - these will detect motion and help turn devices on or off as needed.</i>
<i>Smart Home Kit</i>	PiShop.ca	72	4	288	<i>These will allow students to examine a household and devise multiple strategies that could be used to automate energy use</i>

<i>Smart City Kit</i>	PiShop.ca	72	4	288	<i>Similar to the Smart Home kits, students will be able to take on the role of city planner and examine energy automation on a larger scale, determining the best energy-saving measures to take at the municipal level.</i>
<i>TOTAL</i>				<b>\$5,014</b>	

## PROJECT TIMELINE (MONTHLY)

### **September 2023:**

- Source materials and place orders

### **October & November 2023:**

- Work with colleagues in English Language Arts and Social Studies to plan appropriate cross-curricular connections and timelines
- Organize all materials for student use
- Brainstorm with students where to measure air quality (school, home, other)
- Students sign out Pocket Lab Air monitors and gather data throughout these two months

### **Progress report due December 15, 2023**

- Collect all Pocket Lab Air monitors from students and complete an initial data analysis to determine, as a group, where additional data should be collected from.

### **January 2024:**

- Sign out Pocket Lab Air monitors for additional data collection

### **February 2024:**

- Introduce Energy in Alberta stations and allow students to explore how energy is used in our province.
- discussions regarding greenhouse gas emissions and pros and cons for other energy sources.
- research Net Zero
- examine different "offset" mechanisms and their validity
- Collect data surrounding

### **March 2024**

- Students determine kWh of power and estimate the greenhouse gas emissions produced from this value.
- Students propose offsets to bring their energy use to Net Zero.
- Students choose a larger scale model to investigate and estimate the carbon footprint of said model.

- Students examine how to optimize and reduce energy use through designing, building, and coding automated devices.

### **April 2024**

- Students develop proposals for their model to present to leaders in industry and/or participate in a formal debate regarding Net Zero versus Zero Emission strategies (still working with colleagues on which will be more appropriate).

### **June 15, 2024**

Submit final report to Inside Education

#### **Is this A+ Project application an extension of a previous project?**

No

#### **If yes, describe the need addressed by the funding requested. How will additional funds help scale up your existing project?**

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#### **Is this grant the sole funding resource for your project? If you are augmenting this grant with others please let us know which ones and how they will work together.**

As of right now, this is the sole source of funding for this project, although I may explore other Avenues grants depending on the direction the students wish to take the project. This would be to supplement the purchase of additional coding kits or Pocket Lab Air devices.

#### **Who else will be involved in your project?**

Local organizations, Parents & family members, Community members

#### **Briefly describe how those listed above will be involved in your project.**

We will be approaching various organizations depending on the direction students wish to go in their research and planning. Local neighborhood developers, business owners, school board trustees, and those in government may be invited to help advise our students. It is difficult to pinpoint exactly who as we don't know yet where students will want to focus their research. Parents and community members will be invited to our final showcase of student work which could take a variety of formats.

#### **How do you plan to measure the impact of this project on student learning?**

Student learning will be measured using triangulation of assessment including observations and conversations during the various stages of the project as well as evaluating their products (devices, proposals, etc) using co-constructed criteria.

#### **What opportunities will there be for project expansion and longevity?**

Most, if not all, of the materials we plan to purchase, will be able to be reused in future years so that we can continue to provide similar learning opportunities for all students. While we may or may not replicate this exact project in future years, we will be able to allow student interest to drive similar projects.

**Anything else you want to tell us?**

I am quite active on social media and love sharing what we do with funds provided by projects such as this. I hope this helps the funding partners see how valuable these programs are - thank you for giving us the opportunity to apply!