DETAILED PROJECT PLAN

The project: In this project, students will collaborate to conduct a classroom energy audit. Students will create documentary films for a mini-film festival that captures their audit process, their findings, and their solutions. The goal of each film is to communicate the detective work of uncovering a hidden system that impacts our lives and the lives of others.

TEACHER TIP || Questions to ask when planning to roll-out this project*:

	Prior Knowledge: *What prior knowledge (if any) do my students have about energy? Do my students have experience making films?*
Authentic Audience: *Who is the authentic audience for this film? Who needs to see the film to make the biggest impact?*	
	Context in Place: *What information about our classroom's energy use will be readily available to students? Who do students need access to in the school to find out this information?*
Project Management: *How will teams for the energy audit + the film be assigned? How will they be assessed individually vs. in a team?*	

***Project-based learning vs. traditional lesson planning:** In the midst of project-based learning, students are actively doing the work, learning, creating, and inquiring – eventually heading towards their end goal or product. Often misunderstood is that the organized chaos of what you might see in a PBL environment is carefully and intentionally designed by the teacher well before the project begins. The questions above should allow you to set the stage for student learning to unfold in the following project. Anticipating student questions and areas of need will help you to feel planned and ready in advance of a project.*

What's in the Data?

Essential Question:	How can we measure our energy footprint and use data to make informed decisions in our daily lives and community?

Skills and content needed to answer the Driving Question: *Refine these skills and content standards to the scope and need of your project. This project is designed to be interdisciplinary – but if you don't teach a subject, it doesn't mean that that skill or standard can't still play a role in the experience! – These selected skills and content will be supported throughout the project with activities, formative assessments and additional resources.*

Skills	Content/Standards
- Data Analysis - Data Collection - Oral Presentation - Collaborative Problem Solving - Film Making - Communication - Collaboration *Add other skills to practice in this project*	**NGSS MS–ESS3–4 Construct a scientific argument** Construct an argument supported by evidence for how increases in human population and per–capita consumption of natural resources impact Earth's systems. **CCSS.ELA–LITERACY.W.8.7 Research to Build and Present Knowledge** Conduct short research projects to answer a question (including a self–generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. **CCSS.ELA–LITERACY.W.8.8 Gathering Relevant Information** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. **CCSS.ELA–LITERACY.W.8.5 Writing Process** With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed. **CCSS.ELA–LITERACY.W.8.6 Publish and Present Writing** Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others. *Add or remove standards to practice and assess in this project*

Activites, Products and Assessments: *Below you will find the proposed activities, student products and assessments for this project. Refine them to match the scope and need of your project, making sure that they align with the skills and content you chose to drive from in the previous section.*

Final project & summative assessments:

- Energy Audit
- "Source to Switch" Short Film
- Film Presentation

Teacher Tip: Present the project calendar early on to show students where they are headed. *Students should know what is expected at the end from the beginning of the project.*

Understanding Climate Change with Data
How can data help us better understand climate change?

To launch the project, begin by watching the Mauna Loa film clip as a class. Discuss the following questions:
- What does the technology in the film do?
- Over the years, what has the data shown the scientists about climate change? Why is this important?
- What role does data collection play in understanding climate change?
- What can these scientists teach us with the data?
- How might our understanding of climate change be different *without* the data collected?

Play with data – given a set of data, students make sense of it and draw their own conclusions.
- Present the data on **Island Pulse**
- See, Think, Wonder Activity:
  - What do you **see** when you look at the data?
  - What do you **think** it all means?
  - What do you **wonder** about the data?
  - What are the key phrases and words that you **need** to know to better understand the data?
    - *Make a list as a class!*

What to collect from students:
–"See, Think, Wonder"

Type of assessment:
–Formative

Skills and content:
–Data Analysis

Energy
What are the different types of energy? What does the energy grid look like in Hawaii?

Using a Direct Instruction or Learning Stations* format, students build new

What to collect from students:
–Students can complete the station notetaker to document their learning.

	Type of assessment:
knowledge about energy. Use the **Station Notetaker document** to guide student learning. Use the following linked in resources to support learning in this section.	–Formative

knowledge about energy. Use the **Station Notetaker document** to guide student learning. Use the following linked in resources to support learning in this section.

1. **What is energy?**
   a. [Energy Defined](#) – PBS Nova Labs
2. **Types of Energy**
   a. [Putting Energy to Use](#) – PBS Nova Labs
   b. [Powering the Future](#) – National Geographic
   c. Practice implementing different types of energy systems with the [Energy Lab](#) – PBS Nova Labs
3. **Energy in Hawaii**
   a. [Green Energy Future in Hawaii](#) – Hawaiian Electric
   b. Explore the [Hawaiian Electric Clean Energy webpage](#) – Hawaiian Electric
   c. Facts about [Schools + Energy in Hawaii](#) – Hawaii Energy
   d. Scaffold this article, *[How Hawaii has built momentum to become a renewable energy leader](#)* –Green Biz
   e. [Tips and Tricks Booklet](#) – Hawaii Energy + Blue Planet Foundation
4. **The journey of energy, from source to switch**
   a. [Understanding the energy grid + smart grid](#) – Wikipedia
   b. Video on [How electricity is made and delivered to your home](#) – Alliant Energy
   c. [How electricity is delivered to consumers](#) – EIA
   d. Learn about [Zero Energy Schools](#) –Energy.gov

Ideas for Learning Stations:
- **Option 1: Common Ground**
  - Break students into four groups
  - Students rotate to each while collectively adding to one large note sheet (chart paper or white board)
- **Option 2: Jigsaw**
  - Break students into four groups
  - Each group takes 1 topic, becomes the "expert", and reports back to the rest of the group

Skills and content:
–Research to Build and Present Knowledge (CCSS.ELA-LITERACY.W.8.7)

–Construct a scientific argument (NGSS MS-ESS3-4)

Classroom Energy Audit. What is our classroom energy use?

Set up for a classroom energy audit:
- Break students into teams.
- Assign each team (or have students choose their interest) a different portion of the energy audit. This will be the topic they will eventually create their film on as well.
  - *Topics*:
    - **Lighting**
      - What type of light bulbs are used in the classroom?

What to collect from students:
–Individually, students complete the [Audit Background Research](#)
–In teams, students complete the Classroom Audit Report and present their findings

Type of assessment:

This topic focuses on taking data of the lighting features in the classroom to determine their efficiency.

- **Appliances**
  - This topic focuses on taking an inventory of all of the appliances in the classroom, such as microwaves, computer charging stations, and projectors.
- **Heat/A.C.**
  - Does the classroom have AC? Ceiling Fans? Are the doors kept open? This topic focuses on the efficiency of energy regarding heating and cooling in the classroom.
- **Usage by students and staff**
  - This topic focuses on making observations of human behaviors – do students plug their phones in around school? Are chromebooks charged using charging stations or individual plugs? What kind of appliances do the teachers keep plugged in? Students in this group will generate observation questions and collect qualitative and quantitative data.

Conduct the classroom energy audit:
- Observe
  - Students take initial notes about what they observe about energy usage pertaining to their topic.
- Research
  - Using the **Audit Background Research** document, have students research their topic in more detail – independently or in groups
  - Debrief their research findings in small groups, and have them complete a group **Exit Ticket** before moving on.
- Collect
  - Using the **Appliance Energy Calculator,** and other tools that students find during their research phase, student teams collect the data for their audit.
- Report
  - In teams, students draft and submit a **Classroom Audit Report** (assess using parts of the **rubric**)
  - Have students present their reports using one of the following formats:
    - Whole class presentation
    - Small group presentation (jigsaw so that 1 student from each group is represented in a smaller group)
    - Gallery walk presentation

(Optional) Invite a community member who works in the energy field to speak to the students or give feedback on the energy audits.

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–Formative

Skills and content:
–Research to Build and Present Knowledge (CCSS.ELA–LITERACY.W.8.7)

–Gathering Relevant Information (CCSS.ELA–LITERACY.W.8.8)

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Audience + Scope.

As you move into the next stage of the project, start determining who the final audience of the project will/can be, and what the scope of the project will be.

Consider the following: *use the planning document*

A. **Audience:**
    a. Who is the authentic audience that will benefit the most from watching the final product? How can I set this up prior to rolling out the next stage with students?
    b. Will you set up a Film Presentation during the school day? In the evening? How will invitees be notified?
B. **Scope:**
    a. Consider the scope and resources you want to offer/provide your students to complete this project:
        i.   **Technology:** What is available? Are there iPads + video cameras available to student groups? Do you need to reserve these? Will you allow students to film on their phones? Talk to the people at your school that can help!
        ii. **Types of film:** Will students have a range of choices to choose from? (i.e. stop motion, whiteboard animation, role play, etc.) Will you limit their choices to increase quality? Are there experts at your school that can help you and your students in creating quality short films?
        iii. **Editing:** What editing softwares are available to students? Are students familiar with any of these editing softwares? Again, talk to the people at your school that have access and expertise, and can help.
            1. [iMovie](#) (installed on most IPADs and Apple Devices
            2. [WeVideo](#) (easy use for chromebooks)
            3. [Whiteboard animation options](#)
            4. [Stop Motion for students](#)

Storyboard. How do we inspire action through film and media?

Through a storyboard (written or digital), student teams will: *tell the story of energy in our classroom, from the source (where it comes from) to the switch (our use of it).*

Conduct learning stations so students can be exposed to the different parts of the assignment:

1. **Learning Station 1:** Video Examples
2. **Learning Station 2:** What's a storyboard?
3. **Learning Station 3:** Flashdraft ideas (draw it out)
4. **Learning Station 4:** Brainstorm

Work on storyboards and complete storyboard checklist:

❏ Tell the story of _____ (i.e. classroom lighting) from the source to the switch
    ❏ What kind of energy impact does our classroom make when using

What to collect from students:
–Students create their Storyboard and Storyboard checklist

Type of assessment:
–Formative

Skills and content:
–CCSS.ELA–LITERACY.W.8.5 Writing Process

–MS–ESS3–4 Construct an Argument for human impact on Earth

this type of energy?
- ❏ What are some proposed small-scale changes?
- ❏ What lesson should we take with us moving forward?
- ❏ Include a beginning, middle and end to your film
- ❏ Determine how long you will film for each section
- ❏ Propose a platform to use for filming (animation, filming with a camera, etc.)

## Script and Feedback. How do we inspire action through film and media? 	
 	
 Draft script:
 ❏ All Storyboard Elements *(see storyboard checklist)*
 ❏ Materials
 ❏ Roles
 ❏ Dialogue (if any)
 ❏ Feedback
  ❏ 1. Written by a peer (in google doc comments)
  ❏ 2. Given orally by a peer (in a 1-1 feedback conversation)
  ❏ 3. Teacher feedback (final round before moving forward)
	What to collect from students:
	 –Drafted script for the "Source to Switch" film, using the storyboard and script checklist
	
	 Type of assessment:
	 –Summative
	
	 Skills and content:
	 –Writing Process (CCSS.ELA-LITERACY.W. 8.5)
	
	 –Construct an Argument for human impact on Earth (MS-ESS3-4)

## Film Production. How can I effectively communicate my message through film? **Once you've approved student scripts,** they can move on to film production. To help students stay on task, set a deadline for when filming should be completed and all footage uploaded to editing programs. Set another deadline for when editing should be completed, with enough time to give and receive feedback. **Students create and complete their Final Film Checklist.**	**What to collect from students:** –Periodic check-ins with students on the progress they're making on their Final Film Checklist **Type of assessment:** –Summative **Skills and content:** –Publish and Present Writing (CCSS.ELA-LITERACY.W. 8.6)

Film Presentation. What actions can we take in our classroom and school to reduce our energy impact?

Dependent on the scope and audience you selected in planning the project, it is now time for students to publicly present their films. Consider the following prompts for helping students prepare to present:
- What were the results of your energy audit? What surprised you?
- What are small scale changes you could propose to reduce the classroom energy impact?
- What can the community *(or your selected audience)* learn from the audit and the film?

Showcase films to an audience. Use the Audience & Scope planning document earlier on in the project to determine who this will be.

Reflect.
- Have students complete the project reflection after they've showcase their films. Consider the following questions to dig deeper:
  - *How can we explore power and privilege through the lens of energy?*
  - *How can we use data to make informed decisions in our daily lives and community?*
  - *How do our actions here affect other communities around the world?*
  - *What economic factors are associated with energy consumption and reduction?*
  - *What actions can you take in the shared community to reduce your carbon impact?*

What to collect from students:
–Project Reflection

Type of assessment:
–Formative

Skills and content:
–Communication
–Reflection

Assessment Tip: *Determine before the final presentation day whether you will assess the final projects/presentations before or after the public presentation. If you decide to wait until after, students can be given a chance to reflect on how the public presentation went, make any final changes and then submit to you for assessment.*