Clean
Inspiring Environmental Change

NOVA SCOTIA

CLEAN ENERGY REVOLUTION

Challenge Guidebook

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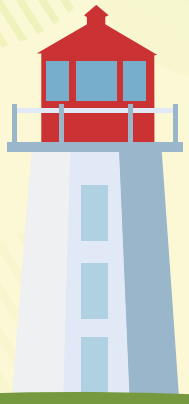


What is the Clean Energy Revolution?

Program Highlights

- Skill development and building for high school learners
- Career pathway development through industry expert mentors
- Healthy competition with rewards for both the participating learners and schools
- Real-world application of the clean energy sectors in Nova Scotia
- Learners can explore the clean energy sectors through the curriculum, across the curriculum, or through extra-curricular opportunities, allowing for easy integration into schools.
- Learners can create projects that explore concepts through STEAM, social sciences etc. or a combination of some or all, allowing them to build on their own interests and strengths.

Introduction

Canada is undergoing an energy transition across the country, and Nova Scotia is no exception. The Generation Energy report describes this in the following way:

"An energy transition is underway – and will continue to roll out over the course of a generation, roughly between now and 2040. It is the greatest shift of this kind the world has seen in generations. For nations like Canada that embrace this shift, it can represent a big change for the better. This transition has the potential to change how you switch on the lights, heat your home and get to work – maybe even the kind of work you do when you arrive there."

Nova Scotia has been actively leading this energy transition for over a decade and continues to be a leader in the reduction of greenhouse gas emissions. One of many success stories in the province is our transition to renewable and cleaner energy sources.

The Province of Nova Scotia has also made commitments through the *Environmental Goals and Sustainable Prosperity Act* (2007) which sets targets for renewable energy and sustainable prosperity. Through this legislation, the Province may carry out projects of public and community education and capacity-building. Furthermore, the Province has committed to education through the key priorities in the 2018 budget to support education and skills training throughout the province.

The Department of Energy and Mines is leading initiatives that focus on the energy transition through the everyday, real-world development of the clean energy sector in Nova Scotia. The Department of Energy's annual business plan states, "The challenges faced by Nova Scotia's energy sector have never been greater. This makes finding innovative solutions and capitalizing on our opportunities important. We need cleaner sources of energy to reduce emissions and fight climate change." A key aspect of addressing these challenges and building capacity within the Province includes a policy focus on raising energy literacy for Nova Scotians and building skills in youth for the future of our energy sector.

Meanwhile, learners today are facing an ever-changing landscape, and an environment where acquisition of key skills and competencies, such as creativity and innovation, critical thinking and technological fluency, become central for success in modern society.

The Clean Energy Revolution design challenge will provide opportunities for youth to develop skills, to become problem solvers and innovators in solving real-world environmental problems through relevant and authentic engagement. This challenge will meet the needs of today's learners with authentic learning experiences of STEAM subjects by engagement with the engineering design process and project management, team-work and hands-on applied learning.

This unique project is truly cross-curricular, requiring integration and application of topics across the curriculum, and provides an opportunity to carry out research, to analyze problems using scientific concepts and mathematics skills, to create and solve problems using technology, and to communicate their work to a broader audience.

Furthermore, the Nova Scotia Department of Education and Early Childhood Development have identified in the 2015 Education Action Plan that partnering with mentors in local business community can provide key experiences for students. These experiences foster an environment for authentic engagement in learning about STEAM subjects and skills of modern society, and expanding awareness of careers and mentorship.

[1] Generation Energy Council Report. Canada's Energy Transition: Getting to our Future Together (2018). http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/CoucilReport_june27_English_Web.pdf
[2] Environmental Goals and Sustainable Prosperity Act, Province of Nova Scotia Department of Environment, (2007). https://nslegislature.ca/sites/default/files/legc/statutes/environmental%20goals%20and%20sustainable%20prosperity.pdf
[3] 2018-19 Business Plan, Province of Nova Scotia, Department of Energy Budget (2018). https://novascotia.ca/government/accountability/2018-2019/2018-2019-business-plan-Department-of-Energy.pdf
[4] Province of Nova Scotia, Department of Education and Early Childhood Development. The 3 Rs: Renew, Refocus, Rebuild - Nova Scotia's Action Plan for Education. (2015).
https://www.ednet.ns.ca/docs/educationactionplan2015en.pdf

The Clean Energy Revolution

Goal: Advance high school learners' (grades 9-12) awareness and understanding of the causes, consequences and clean energy solutions to climate change in Nova Scotia. This challenge will:

- Support youth who are eager to become leaders and require support to do so;
- Build skills and knowledge in innovation and design thinking in learners; and
- Improve energy literacy skills and highlight career pathways for youth in clean energy fields.

Objectives: Youth will work collaboratively within teacher-led teams and will liaise with partners across government, non-governmental organizations, and academia to encourage critical thinking and creativity. Youth will examine how the clean energy sector can offer possible solutions address to address climate change mitigation in Nova Scotia. The real-world application of the clean energy industry in Nova Scotia offers learners opportunities to link classroom learning to real-world applications, concepts and challenges, and to develop skills in problem-solving, technological fluency, project management, teamwork and communication.

The Clean Energy Revolution challenge will:

- Create connections between learners, teachers and schools and industry experts through mentorships allowing for learning and development opportunities through transfer of information, guidance, skill and capacity building, promoting links to future job and career pathways.
- Encourage the development of critical and creative thinking, problem-solving and leadership skills through the exploration of clean energy as one of the solutions to climate change for the province of Nova Scotia.
- Advance energy literacy through the exploration of the clean energy industry in Nova Scotia and creating connections to potential jobs and career opportunities.
- Encourage participation of students and teachers through curriculum integration for focused, in-depth projects exploring the clean energy industry by class subject area or as an extra-curricular exercise of interdisciplinary concepts. Students will explore the clean energy sector concepts stated in the Challenge Statement and through problem-solving and critical and creative thinking that will offer an innovative solution for the clean energy industry.

Rationale: The challenge enables learners to make connections to real-world applications of clean energy and climate change in Nova Scotia. Currently, clean energy is a growing sector in Nova Scotia that offers solutions to a growing set of complex problems presented by climate change. Curriculum in Nova Scotia is undergoing a renewal process. This initiative will build upon the renewal and offer advanced opportunities for schools, teachers, and students who choose to participate. Improving energy literacy throughout the province is a goal of the Department of Energy and Mines; this initiative can not only accomplish this goal, but it may also harness the creativity of young minds, engaging their participation in developing innovative solutions to today's challenges.

Clean Energy Revolution Statement

To protect our environment and meet our provincial, national and international climate change goals, Nova Scotia is moving away from coal-based electricity and toward the use of cleaner fuels that produce less carbon emissions, such as natural gas and renewable energy sources. Nova Scotia is a leader in energy efficiency and conservation, and we have an abundance of renewable resources that we can develop responsibly. Our opportunity to increase the use of renewable energy to generate electricity is significant.

Clean energy is one of many solutions to reducing greenhouse gas emissions and addressing climate change in Nova Scotia. The development of the clean energy sector is a shift away from fossil fuel energy sources such as coal, oil, and gas. This shift can create economic, cultural, social, and environmental benefits. However, a shift of this magnitude creates the need for a meaningful dialogue on Nova Scotia's energy future. It requires an understanding of our energy history and the future of cleaner, green energy in Nova Scotia as an important part of this dialogue.

No single resource can supply all our energy needs. Fossil fuels will continue to play a role in our energy needs, but we can reduce that role and create a diversity of energy resources, which include renewable, storage, clean electricity imports, as well as reduce our energy use through efficiency and conservation efforts.

The Challenge Statement

For the pilot year of the challenge, youth are asked to develop an innovative solution to one of the following challenges facing the clean energy sector in Nova Scotia:

1. Technology development that works in Nova Scotian contexts and conditions
2. Addressing energy poverty and energy affordability for low-income households
3. Changing behaviours, habits, and actions of energy users

Products that students may create for the challenge include:

1. A model or demonstration of a solution- product, concept and/or prototype design, or
2. A business plan for a social enterprise

The project may address a clean energy solution in one or more of the fields in the Nova Scotian energy sector currently be explored and implemented:

- Wind
- Marine Renewable Energy
- Hydropower
- Geothermal
- Solar
- Biomass
- Energy storage
- Low-carbon transportation
- Electrification
- Active transportation
- Energy efficient buildings: Including net zero, passive house, beyond the National Energy Code for Buildings, and existing buildings
- Energy conservation and load shifting technology
- Another cutting-edge clean energy solution

Eligibility

- The competition is open to teams of students in grades 9-12 in a Nova Scotia secondary school level or those who are homeschooled.
- Student members may be part of an extracurricular club and not necessarily attend the same school.
- The team must be lead by a teacher or adult guide (parent, Scout or Girl Guide, 4H or cadet leader, etc.).
- The maximum group size is four students.
- A student may not be on multiple teams.

Prizes and awards

Finalists are eligible to win cash prizes for their school. The grand prize for the top team is $1000 and $500 for second place. The winning team will also be awarded funding for their school. Recognition awards will also be given in special categories – most creative, best presentation, etc.

Deliverables

- Registration form
- Project proposal (assessable)
- Mentorship check-in form
- Written component: business plan for social enterprise or design plan for prototype/model (assessable)
- Build prototype/model - can be submitted on a rolling basis until deadline
- Presentation at Clean Energy Revolution Event

Timeline

Registration opens: November 8, 2019
Registration and project proposal due: December 6, 2019
Written component and/or model due: April 3, 2020
Clean Energy Revolution Event (presentations): May 2020

Rules

- Schools or organizations must register and submit their proposal for the competition by midnight (AST) on **December 6, 2019.**
- If deadlines are missed, points may be deducted from the final score.
- Judges will evaluate projects in accordance with the rubrics, and the score a judge assigns is final.
- All students on the team must participate.
- Harassment or bullying in any form will not be tolerated.
- Any complaints or disputes must be lodged by the team adult leader.
- A person who volunteers as a judge during the competition may not also serve as a mentor or adult leader for a team during the competition cycle.
- Expenses incurred during the innovation process will be the responsibility of the individual teams.
- Presentation aids such as slideshows and videos must be submitted in advance to ensure compatibility with technology available at the Clean Energy Revolution Event (for finalists).

Scoring

The projects will be evaluated by judges from a range of backgrounds: people working in the clean energy industry, in government, and educators. Scoring will be based on innovation, design, utility and presentation of the final product. The rubrics used for scoring are included in the guidebook for reference.

Educator Resources

Introduction to Educator Resources

Welcome to the Clean Energy Revolution and thank you for participating! The Clean Energy Revolution is a cross-curricular project-based learning activity that is designed to be integrated as a class project or completed as an extra-curricular activity. Depending on the topic and direction the learner(s) choose(s), the Challenge can be used to complement almost any high school course. The resources contained in this guidebook are optional but may provide a jumping-off point for project management, the design process, and evaluation of the components.

Mentorship

An important outcome of this challenge is the creation of connections between students, teachers, and schools with industry experts through mentorships. Mentorship encourages the transfer of information, guidance, skill and capacity building, and facilitates learners's transition to job and career pathways.

A mentor is a professional in Nova Scotia's energy industry, who has important subject matter expertise and experience in dealing with the unique challenges of the Nova Scotian landscape. This person can act as a resource for information, advice or expertise, providing skills or resources. Suggestions of available mentors for the Challenge will be provided by contacting representatives at Clean EnviroEd (energyrevolution@clean.ns.ca), or if groups have ideas for potential mentorships, they may pursue that avenue as well. It is expected that you may contact this person several times over the process of this challenge.

Checklists for Educators

Thank you for agreeing to participate in the Clean Energy Revolution Challenge! As a project-based, student-led challenge, this challenge will help develop leadership, problem-solving, and creative thinking skills in young innovators. This checklist is a compilation of tasks to which the educator may refer that will ensure a successful Clean Energy Revolution Challenge experience for all involved.

Getting Started:

- o Read the handbook to get a sense of the scope of the project, deadline and deliverables, and who you can get in touch with if you have any questions.
- o Get in touch with a Challenge co-ordinator if you have any questions or concerns.
- o Have your team fill in a registration form and submit this along with the project proposal by email before midnight (AST) on **December 6, 2019.**
- o Work with students to create a preliminary schedule, making sure time is allotted for contacting mentors, phases of the design process, and preparing for the Challenge Event.
- o Provide copies of any forms, templates, or rubrics from the Guidebook that will be helpful to your team.
- o Provide some ideas for project management tools to student team to help them effectively plan and communicate.
- o Assist students during the brainstorming and project proposal phase to ensure they are within the Challenge specifications.
- o Assist in initiating contact with an industry mentor, if necessary.
- o Oversee the design process with each team.

Throughout Development

- o Check in with students to make sure they are on track with timelines and team communication.
- o Assist in obtaining materials if necessary.
- o Encourage team to think critically, revisit design process, contact mentors when necessary.

Preparing for Presentation (Finalists)

- o Review presentation rubrics and rules with team.
- o Assist with software and other technology needs for presentation.
- o Practice presentation with team and offer feedback for improvement.
- o Submit presentation slideshow or video by deadline indicated within Finalist information package.

Challenge Event (Finalists)

- o RSVP to Challenge event.
- o Arrange transportation to the event for you and your team.
- o Arrange for a substitute teacher on the event day.
- o Make sure students have all their equipment, visual aids, and required materials for their presentation.

Curriculum Connections and Competencies and Skills Development for the Clean Energy Revolution

	CONTENT KNOWLEDGE	COMPETENCIES						OTHER SKILLS		
Competition Deliverables	STEAM subjects (Mathematics, Sciences, Technology Education, Arts, etc.)	Communication	Citizenship	Creativity and Innovation Design Process	Critical Thinking Problem Solving	Technological Fluency	Personal Career Development	Project Management	Marketing	Research
Project Plan/ Proposal	✓	✓		✓	✓		✓	✓		✓
Background information/ research	✓	✓	✓	✓	✓	✓	✓	✓		✓
Model Or Business Plan	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓	✓	✓	✓	✓ ✓
Presentation		✓	✓	✓	✓	✓			✓	✓

Project Management Tools for High School Students

Guiding students through the project management process will ensure they are meeting their deadlines and charting their progress. There are many ways to manage projects, but the underlying components are typically:

1. Set goals and track progress
2. Break tasks down and assign deadlines
3. Implement specific strategies (i.e. the design process)
4. Iteration/feedback loop: adjust and problem solve

Project management software helps with planning and managing deadlines within teams. Each team and project will benefit from different approaches to project management software so it is beneficial to have a variety of tools available from which students can choose. The following resources may be of use:

Trello

Trello is a free project management tool that can be used by students to collaborate by sharing an interactive project board where tasks may be moved between different columns (such as to-do, in progress, and finished). It can be integrated with Google Docs and real-time progress monitored daily.

Padlet

Padlet is a digital whiteboard on which users can post text, images, videos, or links. Users can collaborate, create connections between posts, and reply to posts to create discussion threads.

Microsoft Planner

Planner is a paid solution included in Office 365. It has similar features to Trello, but is tightly integrated within the Office ecosystem so files and schedules can be seamlessly synchronized across a team.

Google Classroom

Google Classroom is a cross-platform (Android, IOS, computer, tablet) learning management system that can be used for project management. Deadlines can be posted with automatic reminders and notifications for students. This also allows teachers to view documents that learners work on in real-time, and provide feedback, regardless of the platform used.

Gantt Charting in a Spreadsheet

Spreadsheet software can be used to keep track of projects in a Gantt chart or project timeline format. Templates are available to simplify the creation process. Students will be able to see project timelines and responsibilities as they extend toward deadlines.

Student Facing Resources

Student Handout: The Clean Energy Revolution Challenge

Introduction

Thank you for participating in the Clean Energy Revolution Challenge!

Nova Scotia faces a future with a strong need for innovators like you. This challenge asks you to imagine and present a solution to at least one of the following issues:

1. Technology development that works in Nova Scotian contexts and conditions
2. Addressing energy poverty and energy affordability for low-income households
3. Changing behaviours, habits, and actions of energy users

Our responses to these issues, and others like them, will shape how Nova Scotia continues to thrive in the future. This is your opportunity to have a hand in that future and the kind of world in which you and future generations will live.

The Challenge

With your team, you will develop a plan to address one of the above issues. You have two options in terms of how your project will take form:

1. A model or demonstration of a solution- product concept and/or prototype design, or
2. A business plan for a social enterprise

Think about what is needed in Nova Scotia to achieve a cleaner future. There are resources included in this guidebook to help you through this innovation process. Be creative! There are many different avenues that Nova Scotia is currently exploring. This list may help you get started but feel free to branch out, as long as your topic is related to clean energy in Nova Scotia!

- Wind
- Marine Renewable Energy
- Hydropower
- Geothermal
- Solar
- Biomass
- Energy storage
- Low-carbon transportation
- Electrification
- Active transportation
- Energy efficient buildings: Including net zero, passive house, beyond the National Energy Code for Buildings, and existing buildings
- Energy conservation and load shifting technology
- Another cutting-edge clean energy solution

In addition to this guidebook and your co-operating educator, you will have the opportunity with this challenge to benefit from the knowledge of an industry expert as a mentor. This partnership will provide you with valuable insight into your chosen topic, and feedback on improvements throughout the innovation and design process. We hope all participants in the Challenge take advantage of this unique opportunity.

Before beginning the Challenge, please take time to read the documents included in this guidebook to familiarize yourself with the requirements for all deliverable products. And finally, have fun!

Registration Form

Please submit registration form by December 6, 2019 to energyrevolution@clean.ns.ca.

Project Name:		
Name of Student	**Grade**	**Email Address**
1.		
2.		
3.		
4.		
School (s) or indicate if homeschooled		
Name(s):		
Address(es):		
Co-operating Adult		
Name:		
Phone Number (s):		
Email Address:		
Relationship to youth in group (teacher, parent, guardian, leader, etc.):		

Project Proposal

Project Name:
Team Members:
Co-operating Adult:
Name of School(s):
Industry Mentor (if known):
Estimated Completion Date:
Project Description (please include additional pages, if necessary)
Define the Problem your Innovation will Solve
Specific Goals
Target Audience
Anticipated Benefits
Outline of Team Member Tasks

Student Handouts: Project Management

First Phase: Goal setting

First, think about the resources, constraints and assumptions you have with this project. Use this information to help set up your goals and write it down on the "Set Goals" handout.

Project Resources
What can you use to help design and build (if chosen) your clean energy innovation? Think about people you can ask for advice, including teachers and mentors available through the Challenge. What skills are required to execute your plan? What can you, your team and mentors can offer? What supplies, equipment, and software will you need and where will you obtain them? How will you communicate with your team members?

Constraints
These are the limitations on your project. They may come in the form of adherence to the challenge specifications, but also time, money, and availability of mentors and teachers with needed expertise should be considered. List the constraints you imagine facing on the handout and include ways to adapt or mitigate your constraints as much as you can.

Assumptions
What do you know to be true about this project? Write down how much time you have, the materials you know you can obtain, how and when your group members will work together, and what assumptions you have about the difficulties you will face.

Project Goals
Describe what you hope to achieve with your innovation project and who it will benefit. Knowing your resources, constraints and assumptions will help you refine your goals.

Student Handouts: Project Management

Project Name:
Team Members:
Schools:
Co-operating Adult:
Industry Mentor (if known):
Project Resources:
Constraints:
Assumptions:
Goals:

Student Handouts: Project Management

Second Phase: Project management

Figure out what needs to be done, and in what order. You can use the process outlined here as a starting point.

Step 1: List the tasks required for each deliverable

Start by brainstorming tasks for each deliverable component of your project. You can use sticky notes, index cards, a whiteboard (take pictures before erasing!), or a website/app that is designed for task management and can be edited by multiple users (ex. Google docs, Trello).

Step 2: Determine the order in which the tasks should be completed

In what sequence must each stage of the project be completed? Arrange your tasks to show the logical order for completion of the deliverables.

Step 3: Estimate the time requirements for each task

Think about how much time the tasks will take and give your best estimate. It's ok if you must make changes when a task takes more or less time than anticipated.

Step 4: Assign roles or tasks to each team member

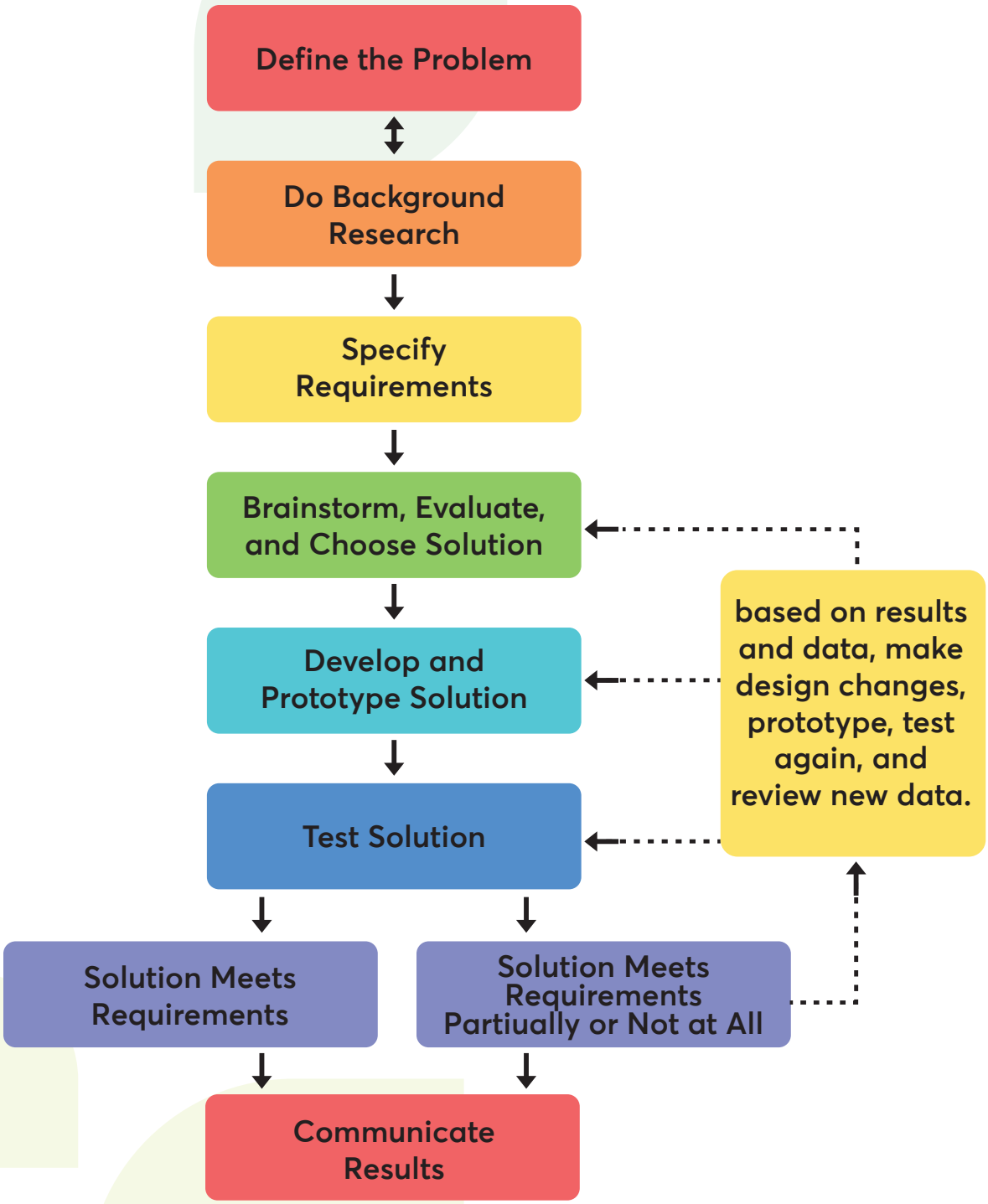
Now you should decide who is responsible for the tasks and record the names.

Step 5: Make a schedule

Using a bulletin board, white board, calendar or software, create the schedule on which you can track the task completion. Remember to schedule team meetings and updates! Don't worry if things change along the way, just revise your schedule.

Third Phase: The Design Process

The design process is a great way to tackle almost any task. If you have decided to build a clean energy prototype, create a business model, or develop a social enterprise, the design process will help you to think creatively and logically about your project. Rarely is a solution simply found and applied. Instead, engineers, designers and business people try different ideas, learn from their mistakes, and then try again. The steps used to arrive at a solution are called the design process. As you work through a challenge, use the questions below to tie their work to specific steps of the design process.



Flowchart source: sciencebuddies.org

Template: The Design Process

Step 1: Identify the problem

- What is the problem or issue at hand?
- Who does this problem affect?
- How does the problem relate to the clean energy needs in Nova Scotia?

Step 2: Identify Criteria and Constraints

- What rules and regulations must be followed?
- What time and financial constraints should be considered?

Step 3: Brainstorm possible solutions

- What have others tried to solve this problem?
- What is further needed to fully address the problem beyond existing partial solutions?
- Generate and list new ideas for solutions

Step 4: Select a design

- Choose two or more of the best ideas from the brainstormed list
- Make a brief outline or sketch of each idea
- Select the best idea! What is it?
- Justify your choice by listing the reasons you selected this design

Step 5: Build the model, prototype or plan

- Write the procedure and materials needed
- Build, plan your product using your procedure

Step 6: Test the model and evaluate

- Write a hypothesis about your design's performance during testing
- Make changes to the design based on expected or trial performance
- Record the results of your tests
- Evaluate:
  - Determine and list the strengths and weaknesses of your design
  - Discuss any changes that were made due to constraints or limitations
  - Decide if your design solved the problem you identified in Step 1

Step 7: Refine your design

- Based on the results you anticipate or from testing, make improvements on your design
- Identify the changes you would like to make
- Give reasons for the changes

Step 8: Share the design

- Organize your findings into a document applicable to the design you have chosen
- Present your finding to your group for feedback
- Discuss what you could do differently

Business Plan for a Social Enterprise

"In the context of changing the system dynamics that created the problem in the first place, a social innovation is any initiative (product, process, program, project, policy or platform) that challenges and, over time, contributes to changing the defining routines, resource and authority flows or beliefs of the broader social system in which it is introduced. Successful social innovations reduce vulnerability and enhance resilience. They have durability, scale and transformative impact." *Frances Westley*

A social enterprise uses business strategies to maximize social, environmental and financial goals. For a non-profit social enterprise, any financial gain is invested back into the business to achieve further growth.

To read about local examples of social enterprises, search the Social Enterprise Network of Nova Scotia (SENN) website. The Social Innovation Group (SiG) hosts a Knowledge Hub of Canadian.

A business plan is a key component of both for-profit and not-for-profit enterprises. Here are the typical sections of a business plan that you may want to include:

Executive Summary

- The first, and probably the most important feature of a business plan
- Highlights the most important sections of the business plan
- Short: be short and concise - no more than a page
- Write the executive summary LAST, after the rest of the business plan is done

Business Strategy

- What is the purpose of the social enterprise?
- How does the enterprise meet the need for clean energy solutions in Nova Scotia?
- Who are the customers or beneficiaries?
- How will the customers be served by the social enterprise?
- What specifically does the program look like?
- Why is your business plan better than something that is already on the market?
- What is your plan for growth?
- Where do you see your enterprise in 3-5 years?
- What are your short- and long-term goals?

Marketing Strategy

- What promotional strategies will you undertake to market your enterprise?
- Example: television, Internet, social media, radio, posters, brochures, business cards, networking, newspapers, special events, sponsors, etc.

Operational Plan

- What do your day-to-day operations look like?
- How many hours will you need to work in a week to operate the enterprise?
- What are your requirements in terms of infrastructure, facilities, and supplies?

Business Plan for a Social Enterprise

Strengths, Weaknesses, and Threat Analysis (SWOT)

- **Strengths**
  - What will your business do exceptionally well?
  - What makes it innovative and sets it apart from other initiatives?
- **Weaknesses**
  - Where do you foresee difficulties or vulnerabilities in your business plan?
  - How will you compete with other businesses?
  - Who will you need to hire to be successful?
  - How will the business be funded?
- **Opportunities**
  - Where are the sources of growth in the market?
  - What trends will encourage people to buy your products/services?
  - What regulations could help your enterprise?
  - How do people feel about your industry or product?
- **Threats**
  - What competitors might enter your market?
  - Do you have access to all the materials you need?
  - How could technology change to affect your enterprise?
  - Are people's behaviours or habits changing in a way that could negatively impact your enterprise?
  - What market trends could be a problem?

Human Resources Plan

- Write a brief organizational layout of your social enterprise. Include:
  - What are the roles in your organization? Include a job description for each
  - What other skills or education are required for staff
  - Will the organization employ paid staff or volunteers?
  - Are there any other human resources you may require?

Social Responsibility Strategy

- How will your social enterprise contribute to communities and/or the province?
- How will you ensure your enterprise has good environmental practices?
- How will you ensure your enterprise has good labour practices?

Financial Forecast

- What initial funds will be needed to get the social enterprise running (estimate with a budget)?
- Where will you obtain funding for the start-up costs?
- Will you sell your service/ product or provide a free service?
- If sales are involved, estimate your sales for the first year.
- Provide a profit and loss forecast — this is the level of profit you expect to make, given your projected sales, the costs of providing goods and services, and your overhead costs.

Business Exit Strategy

- Will your social enterprise have a defined starting and end, or will it be ongoing?
- If your enterprise is ongoing, will you continue to manage it, or transfer the ownership and management to another party? How will that transfer occur?

Slideshow Presentation and Video Guidelines

Format

- Presentation must be in the format of slideshow or video
    - Supported video formats: 3GPP, AVI, FLV, MOV, MPEG4, MPEGPS, WebM and WMV, and post to YouTube
- Audiovisual equipment will be provided by the Challenge event, therefore presentations must be submitted in advance to ensure compatibility

    - Slideshow Best Practices
        - Keep your slides consistent. Use the same style throughout the presentation. If you must change styles, the transition should flow naturally.
        - Don't use text-heavy slides or lots of bullet points. Text on a slide should support what you are saying, not repeat or distract from it.
        - Pictures say a thousand words! Use images, charts, graphs, gifs and videos wherever possible. It will make your presentation more interesting and memorable.
        - Make sure your slides tell a continuous story
        - Use font size 30 pt or greater, in a standard text font like Arial, Times, Calibri, or similar. No handwriting fonts, bubble letters, or Wingdings please!

    - Video Best Practices
        - What is the narrative of the video? Develop the story through storyboarding, and plan sequences of visuals and the script
        - Show, don't tell
        - Use as few written words as possible
        - Use high quality sound and appropriate lighting
        - Use software to edit and do post-production work
        - Consider variety

Time Limit

- Presentation time limit of 5-10 minutes (including a video, if applicable)
- Q&A time limit of 5 minutes

Participants

- A maximum of three students/learners may participate in the presentation
- Educators and mentors may not participate in the presentation

Student Handouts: Deliverables Checklist

Submission dates

- o ☐ Submit completed Registration Form by December 6, 2019
- o ☐ Submit Project Proposal by December 6, 2019
- o ☐ Submit written component of project: business plan or design plan of a prototype by April 3, 2020

Project Work

- o ☐ Brainstorm solutions
- o ☐ Decide on social enterprise or prototype
- o ☐ Contact appropriate mentor
- o ☐ Complete remainder of design process
- o ☐ Submit project to teacher or co-operating adult
- o ☐ Revise, as needed

Presentation Checklist (Finalists)

- o ☐ Develop presentation
- o ☐ Practice!
- o ☐ Presentation timing: between 5-10 minutes, not including Q & A
- o ☐ Format: slideshow or video

Mentor Communication Guidelines

Central to a successful and rewarding mentoring relationship are your enthusiasm, preparation and ability to communicate clearly. Listen to your mentor and respect the opportunities and limitations of the relationship they can provide for you. When communicating with your mentor, always be courteous and respectful. Before you touch base with your mentor, think about the type of information which would be helpful for your group and your Clean Energy Revolution project. The following guidelines are meant to help you get started.

Before you first communicate with your mentor, answer these questions:

1. What do you need to be mentored in? For example, what goals do you want to achieve? What information would you like to gain access to?
2. What specific questions would you like to be answered by a mentor?
3. What experience in a mentor do you think will help you achieve your goals?
4. How often would you like to communicate with your mentor (being cognisant of their time constraints and availability)?
5. Why have you chosen this specific mentor?

First meeting guidelines

- Introduce yourself and your group, school and cooperating educator
- Ask about your mentor's role in their company or organization
- Introduce your mentor to the project and the topic you have chosen
- Ask your mentor the questions you have prepared
- Ask your mentor for any additional feedback
- Take notes as required
- Set up a time for your next meeting
- Send a follow-up email thanking your mentor for their time

Mentorship Reflection

Name(s) of group members:

School:

Mentor:

Approximately how many times did you communicate with your industry mentor during the challenge?

What forms of communication did you utilize (email, phone, in person)?

Do you think you used your mentor's industry experience to enhance your project? Please comment.

What were the most useful pieces of information or advice you received from your mentor?

Do you have any additional questions or comments for your mentor? List:

Please write down any additional comments your have about the mentorship component of the Clean Energy Revolution.

Appendix: Rubrics

Rubric for Evaluating Clean Energy Revolution

Participating Groups will be Evaluated on:

1. Innovation of product
    - IDEAS: Defining the Revolution Challenge and solution
    - RESOURCES: Use of innovative resources and mentors to build knowledge and skills
    - DESIGN PROCESS: Design and/or engineering process using ingenuity and creativity
    - PRODUCT PRESENTATION: Innovation of product presentation and/or final outcome of model

2. Prototype design or business design plan, depending on chosen outcome
    - Assessment of solution quality and effectiveness
    - Design process well thought out and evident
    - Real-world application of innovation
    - Benefits and limitations outlined in final review

3. Presentation of final product
    - Content and delivery of message
    - Live presentation
    - Video or slideshow

Additional value will be awarded for the submission of an initial project proposal and schedule.

EVALUATING THE DESIGN PROCESS

Category	No Points 0	Below Standard – Poor 1	Meets Standard –Good 2	Exceeds Standard –Exceptional 3
Identify Problem and Constraints	• Problem not named, and • Constraints and solutions not listed, and • Solutions not listed	• Complete brainstorming • Name the problem • Explore at least one constraint • List at least one solution from brainstorming	• Complete brainstorming • Explain the proble • Explore at least one possible solution • List and explain at least one constraint List and explain at least one possible solution from the brainstorming session • Show the contributions of all group members	• Complete brainstorming • Explain problem realistically • Explore possible solutions • List and explain at least three constraints • List and explain more than one possible solution from the brainstorming session • Show, clearly, the contributions of all group members
Brainstorming and Design Decisions	• No list provided, and • No sketches created, and • No design selected, or • Justifications for design choice not provided	• List at least one idea from brainstorming • Create a sketch that is lacking in some details • Indicate design choice	• List at least two ideas from brainstorming • Create sketches that include labels, dimensions, and materials for most components • Indicate design choice • Provide some justification for the design choice	• List more than three ideas from brainstorming • Create sketches with a highly professional appearance including labels, dimensions, and materials for all components • Articulate design choice is clearly • Provide clear and detailed justifications
Modeling and Prototyping	• Material list has major omissions, and • Procedure list has major omissions, or • Safety rules were not followed or respected	• List most materials • List most procedures • Follow safety rules at all times	• List all materials • List all procedures • Handle and store materials appropriately • Follow safety rules at all times	• List all materials • List all procedures, in a clear and well-written manner • Handle and store materials appropriately • Follow safety rules at all times
Testing and Model Evaluation	• Hypothesis missing or incorrect • Strengths and weaknesses of design not included • Results missing or inaccurate • Problem is not addressed by the design at all	• Form a hypothesis • List some strengths and/or weaknesses of the design • Record some results • Describe the problem and the design	• Form a hypothesis that follows the correct format • Provide a list of the strengths and weaknesses of the design • List compromises that were necessary when producing the design • Record results • Keep complete accounts of data • Explain how the problem is effectively addressed by the chosen design	• Form a hypothesis and follow the correct format • Provide a detailed list of the strengths and weaknesses of the design • Describe compromises that were necessary when producing the design • Record results accurately • Keep complete and well-organized tables of data • Explain how the problem is effectively addressed by the chosen design compared to other options
Iteration	• No significant iteration occurred throughout the project, or changes that were made were not documented in any way	• Modify design but not always based on test results Record some modifications made to the design Make several changes without testing	• Modify design at least once based on test results Record most modifications made to the design Test the design after major modifications Reflect on the effects significant changes made to the design	• Modify design several times based on an analysis of test results Record all modifications made to the design Test the design after every modification Reflect on the effects of all changes made to the design
Design Presentation	• Presentation is incomplete, unprofessional, or did not occur	• Present the design to the class but omit major details • Omit some aspects of the design process in the presentation • Communicate with some use of data, graphs, or pictures	• Present the design to the class • Cover the design process in the presentation • Communicate clearly with supporting data, sketches, graphs, or pictures • Include contributions from all team members	• Present design to the class • Cover all areas of the design process concisely and in detail • Communicate clearly and professionally using appropriate and well-done data, sketches, graphs and/or pictures • Include detailed contributions from all team members

EVALUATING THE PROJECT PROPOSAL			
Category	Specification	✓ Complete	✓ Incomplete
Description of the product or business plan for a social enterprise	The focus of the project is clear		
	The project is within the Challenge specifications		
Target Audience	Students have identified the individuals, groups, communities who will benefit from their project		
	Included rationale as to why target audience was chosen		
Goal of Project	Goal of project is clearly stated		
	Project has measurable outcomes		
Benefits	Anticipated benefits of project are listed		
Tasks	General overview of project broken down into several major tasks		

EVALUATING INNOVATION AND CREATIVITY

The term "product" is used in this rubric as an umbrella term for the result of the process of innovation during a project. A product may be a constructed object, proposal or business plan, solution to a problem, a social enterprise, an invention, event, an improvement to an existing product, etc.

Category	No Points 0	Below Standard Poor 1	Fair 2	At Standard Good 3	Very Good 4	Above Standard Excellent 5
Defining the Revolution Challenge	• Not done, no clear purpose or goal is evident	• May just "follow directions" without understanding the purpose for innovation or considering the needs and interests of the target audience	• Beginning to understand the goal or purpose of the innovation and target audience	• Understands the basic purpose for innovation but does not thoroughly consider the needs and interests of the target audience	• Understands the purpose driving the process of innovation (Who needs this? Why?) Develops insight about the particular needs and interests of the target audience	• All of previous level, of excellent quality
Building Knowledge, Understanding, and Skills & Identify Sources of Information	• Not done, no information sources identified	• Uses only typical sources of information (website, book, article) • Sources limited to 1- 3	• Uses typical sources of information but investigates more than 3 sources	• Finds one or two sources of information that are not typical • Offers new ideas, but stays within narrow perspectives	• In addition to typical sources, finds unusual ways or places to get information (adult expert, community member, business or organization, literature) • Promotes divergent and creative perspectives	• All of previous level, of excellent quality
Developing and Revising Ideas and Products	• Not done	• Stays within existing frameworks; does not use idea-generating techniques to develop new ideas for product(s) • Selects one idea without evaluating the quality of ideas • Does not ask new questions or elaborate on the selected idea • Reproduces existing ideas; does not imagine new ones • Does not consider or use feedback and critique to revise product	• Develops some original ideas for product(s), with emerging idea generating techniques • Evidence of emerging evaluation of idea quality • Asks a few new questions but does not apply them to ideas • Reproduces existing ideas; does not imagine new ones • Does not consider or use feedback and critique to revise product	• Develops some original ideas for product(s), but could develop more with better use of idea-generating techniques • Evaluates ideas, but not thoroughly before selecting one • Asks a few new questions but may make only minor changes to the selected idea • Shows some imagination when shaping ideas into a product, but may stay within conventional boundaries • Considers and may use some feedback and critique to revise a product, but does not seek it out	• Uses idea-generating techniques to develop several original ideas for product(s) • Carefully evaluates the quality of ideas and selects the best one to shape into a product • Asks new questions, takes different perspectives to elaborate and improve on the selected idea • Uses ingenuity and imagination, going outside conventional boundaries, when shaping ideas into a product • Seeks out and uses feedback and critique to revise product to better meet the needs of the intended audience	• All of previous level, of excellent quality
Product Presentation	• Not done	• Presents ideas and products in typical ways (text-heavy PowerPoint slides, recitation of notes, no interactive features)	• Presents ideas and products in typical ways with emerging attempts at adding interesting features	• Adds some interesting touches to presentation media • Attempts to include elements in presentation that make it more lively and engaging	• Creates visually exciting presentation media • Includes elements in presentation that are especially fun, lively, engaging, or powerful to the audience	• All of previous level, of excellent quality

EVALUATING PROTOTYPE DESIGN OR BUSINESS PLAN FOR A SOCIAL ENTERPRISE

Category	No Points 0	Below Standard Poor 1	Fair 2	At Standard Good 3	Very Good 4	Above Standard Excellent 5
Adherence to Revolution Challenge Specifications	• Project does not fall within Revolution Challenge specifications		• Project fails to meet some Challenge specifications			• Project falls within Revolution Challenge specifications
Project Proposal	• Project proposal not submitted					• Project proposal submitted
Product Utility Solves a real-world clean energy problem	• Does not solve a problem	• Solves a problem but not related to scope of clean energy innovation	• Solves a problem related to clean energy but the solution is not practical to apply	• Solves a problem related to clean energy and solution could be applied with restructuring	• Solves a problem related to clean energy which could be used with minimal restructuring	• Solves real world clean energy problem that is ready to implement
Product Utility Solution fits Nova Scotia clean energy context	• Not done	• Product/ solution would not work in Nova Scotia clean energy context • Not useful or valuable to the intended audience/user	• May not solve certain aspects of the defined problem or exactly meet the identified need for intended audience	• Useful and valuable to some extent; it may not solve certain aspects of the defined problem or exactly meet the identified need • Unclear if product would be practical or feasible to the intended audience	• Product is seen as useful and valuable, it solves defined problem or meets the identified need • Practical, feasible to intended audience	• Excellent novel product or plan that is not currently available and meets the identified need • Valuable to the intended audience
Professionalism and Quality Teamwork, communication, quality of product at all stages, mentor relationship, etc.	• Learners did not behave in a professional manner and/ or did not maintain quality in their work	• Learners occasionally behaved professionally and/or maintained a good level of quality of their work	• Learners sometimes behaved professionally and/or maintained a good level of quality of their work	• Learners often behaved professionally and/or maintained a good level of quality of their work	• Learners almost always behaved professionally and/ or maintained a high level of quality of their work	• At all times, learners behaved

EVALUATING ENERGY REVOLUTION PRESENTATION

	No Points 0	Below Standard Poor 1	Fair 2	At Standard Good 3	Very Good 4	Above Standard Excellent 5
Time Limit • Presentation is within time limit of 5 – 10 minutes	• Presentation is 5 or more minutes over, or 3 or more minutes under limit	• Presentation is 4 minutes over or 2 minutes under limit	• Presentation is 3 minutes over or 1 minute under limit	• Presentation is 2 minutes over under limit	• Presentation is 1 minute over limit	• Presentation falls within time limit
Presentation Content and Organization • Major elements: intro, body, conclusion • Logical flow: transitions • Supporting info • Appearance and professionalism of product/solution • Concise, relevant	• Poorly organized, major elements are not addressed	• Poorly organized and missing some major elements with little relevant information	• Fair organization • Contains most major elements • Some relevant supporting information • Some logical transitions	• Fulfills requirements (major elements, transitions, supporting info could be more relevant or concise)	• Well organized and contains all major elements • Supporting info could be better	• Extremely well organized • Excellent variety of supporting information providing credibility • Concise and relevant
Presentation Skills • Fluent clear, audible delivery • Correct grammar and language • Posture and practiced use of visual aids • Confident, direct and animated delivery	• Poor skills throughout presentation	• A few verbal and non-verbal skills are fairly well done but needs more practice	• Fair to good skills for the majority of presenters	• Good verbal and nonverbal skills for most presenters • Somewhat confident and direct	• Very good verbal and nonverbal skills by most of team throughout most of presentation	• Excellent verbal and nonverbal skills by most of team throughout presentation
Use of Visual Aids • Text visuals are kept minimal and support speaker rather than distract • If additional visual aids or imagery are used, they are neat and well prepared • All visual aids or imagery enhance presentation • Delivery with visual aids is well practiced	• No visual aids or images to support presentation	• Visual aids or imagery are not used effectively • Demonstration aids are poor or non-existent	• Fair use of visual aids to enhance the presentation	• Good use of visual aids to effectively enhance presentation	• Varied use of visual aids effectively illustrate product and enhance presentation	• Extremely effective and varied use of visual aids • Contributes to understanding product and greatly enhances presentation
Question and Answer • Answers questions with confidence • Accurate, complete answers	• Did not participate in question and answer	• Answers a few questions accurately but does not use supporting facts	• Answers at least half of questions correct with a few supporting facts	• Answers at least 75% of questions correctly and some supporting facts	• Answers 90% of questions accurately with supporting details	• All questions are fully, accurately and confidently answered with many supporting details
Creativity • Exciting presentation media, creating an approach beyond typical methods • Includes elements that are fun, lively, engaging or powerful to the audience	• Presentation is incomplete, unprofessional, or did not occur	• Presents ideas and products in typical ways (text-heavy PowerPoint slides, recitation of notes, no interactive features)	• Presents ideas and products in typical ways with emerging attempts at adding interesting features	• Adds some interesting touches to presentation media • Attempts to include elements in presentation that make it more lively and engaging	• Creates visually exciting presentation media • Includes elements in presentation that are especially fun, lively, engaging, or powerful to the audience	• All of previous level, and of excellent quality

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