

Port Operations and Logistics – Sustainability and STEM Careers

LESSON PLAN

Subject: Science Technology Engineering and Math (STEM)

Unit: 2

Lesson Title: Green Ships

Sessions Number: 2

Number of Sessions:
approximately 10 - 90 minute
blocks

Objective(s): After given instruction, the student will:

1. Research

- a. Apply digital tools to gather, evaluate, and use information.
- b. Explore careers in green ship transportation and technical visualization.

2. Design

- a. Plan and manage activities to develop a solution or complete a Green ship sustainability system.
- b. Develop and analyze a storyboard.
- c. Demonstrate creative thinking, construct knowledge, and develop innovative products and processes.
- a. Work as a member of a design team.
- b. Apply existing knowledge to generate new ideas, products, or processes.

3. Model Creation

- a. Model a transportation, distribution, or warehousing process in a port facility.
- b. Create visualizations using basic design skills, graphing, image processing, 2D and 3D modeling, animation and simulation.

4. Presentation

- c. Demonstrate understanding of technological concepts, and systems in maritime operations for commerce.
- d. Manipulate and manage data, including the use of spreadsheets and application of mathematical principles.
- e. Use computer data input and output devices that handle audio, video, static graphic, and alphanumeric-based information.
- f. Create and deliver multimedia presentations.

g. Use appropriate marine terminal, modeling, and simulation terms in context.

5. Develop 21st Century Skills – [A Vision of K-12 Students Today](http://www.youtube.com/watch?v=A-ZVCjfWf8&feature=fvw) (Show students this video and discuss their reaction prior to beginning instruction) [http://www.youtube.com/watch?v= A-ZVCjfWf8&feature=fvw](http://www.youtube.com/watch?v=A-ZVCjfWf8&feature=fvw)

- a. Use flexibility and adaptability throughout the project process.
- b. Develop self-directed skills to produce quality products.
- c. Work in diverse teams to complete projects on time.
- d. Develop leadership, responsibility, social skills, collaboration skills, and cultural awareness.

Materials/Technology Integration:

Text:

- Word processing software
- Presentation software (e.g. 3ds Max, Sketch Up, Premiere Elements, Movie maker, Photo Story, Powerpoint)
- Computer with Internet access and a web browser that is Java –enabled
- Electronic Portfolio
- [Storyboard template](#)

- Multimedia Projector
- Graph paper
- Pencil and paper

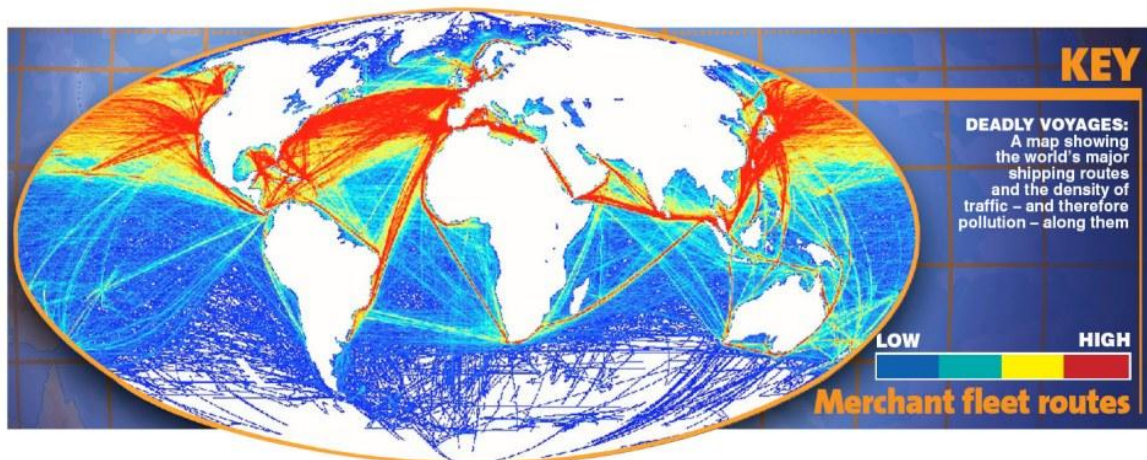
Anticipatory Set: On board one big container ship, the MOL Efficiency, Capt. Hitatoshi Ito says he has already tried lower-sulfur fuel in his engines, and it works. "We can use [it], no problem," Ito says. "The problem is cost."

But if that's the price of entry into the Port of Los Angeles, his company, Mitsui OSK Lines, is ready to pay it. Because this is where they do the most business. " *NPR News source*

David Freeman, "the green cowboy," also plans to slash emissions from ships. Right now, ships use something called bunker fuel, which is 50-100 times dirtier than the fuel used by diesel trucks. He says ships could plug into electric power from shore, or they could use cleaner fuel and pollution-control equipment. Either way, he says, ships *will* do something to clean up their act. *NPR News source*

As ships get bigger, the pollution is getting worse. The most staggering statistic of all is that just 16 of the world's largest ships can produce as much lung clogging sulfur pollution as all the worlds' cars.

Because of their large engines, each as heavy as a small ship, these super vessels use as much fuel as small power stations. But unlike power stations or cars, they can burn the cheapest, filthiest, high sulfur fuel: the thick residues left behind in refineries after the lighter liquids have been taken, The product nobody on land is allowed to use. <http://www.dailymail.co.uk/sciencetech/article-1229857/How-16-ships-create-pollution-cars-world.html>



Ask students: What are some other pollution sources found on ships? Allow students the opportunity to discuss their understanding of ship borne pollution and its impacts on their community.

Estimated Time: 15 Minutes

Correlation with Virginia Standards of Learning:

English: 10.4

Mathematics: A.1, A.2, A.4, G.2, G.3, G.10, G.12 and All-T.2

Science: PH.1, PH.2

History and Social Science: WHII.1, WHII.6, WHII.8

The overall goal of these activities is to empower students to use 21st century tools in a learning process that requires critical and creative thinking, collaboration, and problem solving. The immediate goal is to engage students in hands-on, less abstract learning. The ultimate goal is preparing students for work and life in a changing economy that demands participants who are creative and innovative thinkers in addition to being skilled digital-age workers. *The following activities are designed to be used in order or randomly as the teacher sees fit based on student needs. The activities were developed with differentiation in mind for both product and process.*

Evaluation: Assigned Activities

1. Students successfully answer 75% of the post test questions.
2. Review storyboard for correctness.
3. Students complete an animated model or 2d drawing of a Green Ship innovation or operation.
4. Students present and explain their portion of the project to their team and the other members of the class.
5. Present completed model/design to the class for peer critique.
6. Review Notes: It is suggested that each student have a project notebook to organize their work throughout the projects. If possible, this notebook can be an online project notebook. Online notebooks may be created with

Closure:

<p>many different free online tools. Two possibilities are: Google Docs (http://docs.google.com) and Wiki spaces (http://www.wikispaces.com/). Teams working together may organize their work in a shared online project notebook.</p> <p>Estimated Time: As Noted</p>	
<p>Homework: None</p>	<p>Reflections:</p>
<p>Procedure: Guided Practice (Instructional Strategies)</p> <p>Project #1: Administer the Green Ships Pre Test section to students. Explain that The results on this test will help identify their understanding and learning needs.</p> <p>Estimated Time: 3 Minutes</p> <p>Project #2: Present Port Operations and Logistics PowerPoint presentation section on Green ships to students. Estimated Time: 25 Minutes</p> <p>Project #3: Assign students the activity of defining the terms on Terminology worksheet and use them in context. This can be a team assignment where one member defines and the other team member using the word in context Estimated Time: 5 Minutes</p> <p>Project #4: Invite guest speaker to discuss Green Ship Design Solutions with students. Estimated Time: 15 Minutes</p>	<p>Procedure: Independent Practice:</p> <p>Project #1: Answer to the best of your ability the Green Ships Pre Test section questions. The results on this test will help identify your understanding and learning needs.</p> <p>Estimated Time: 15 Minutes</p> <p>Project #2: Listen and analyze Port Operations and Logistics PowerPoint presentation section on Green ships. Take notes to ensure understanding. Ask questions and be an active learner. Estimated Time: 25 Minutes</p> <p>Project #3: Define the terms on Terminology worksheet and use them in context as directed by your teacher. Estimated Time: 25 Minutes</p> <p>Project #4: Listen to a Port professional and ask questions about Green Ship Design. Complete the guest speaker</p>

Project #5: Have students watch and later discuss the SkySails technology video. <http://www.skysails.info/english/products/the-skysails-technology/>

Estimated Time: 5 Minutes

Project #6: Have students design and model-3d (draw-2d) a Green Ship design solution. E.g. (exhaust scrubbers, hydrogen-hybrid engine, waste heat recovery system, etc.) After Labeling major parts and assemblies of their design. Have students display and present completed model/drawings to the class. *This could also be a team activity.*

Estimated Time: 10 Minutes

Project #7: Have students go to [ship-technology.com](http://www.ship-technology.com/gallery.html) <http://www.ship-technology.com/gallery.html>

and select a sustainment piece of equipment from the image gallery. Once selected the students will research the design and use of the equipment, draw or model it, then present their finding in the form of a PowerPoint presentation. Review PowerPoint Rubric with students.

Estimated Time: 10 Minutes

Project #8: Administer the Green ships [Post Test](#) section to students. Explain that The results on this test will help identify their understanding of the instruction presented.

Estimated Time: 3 Minutes

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[worksheet](#) and discuss at the conclusion of the presentation.

Estimated Time: 35 Minutes

Project #5: Have students watch and later discuss the SkySails technology video. <http://www.skysails.info/english/products/the-skysails-technology/>

Estimated Time: 20 Minutes

Project #6: Design and model-3d (draw-2d) a Green Ship design solution. E.g. (exhaust scrubbers, hydrogen-hybrid engine, bulbous bow, waste heat recovery system, etc.) Label major parts and assemblies of your design. Once completed, present your model/drawing to the class.

Estimated Time: 90 Minutes

Project #7: Go to [ship-technology.com](http://www.ship-technology.com/gallery.html) <http://www.ship-technology.com/gallery.html> and select a sustainment piece of equipment from the image gallery. Once selected, research the design and use of the equipment, draw or model it, then present your findings in a PowerPoint presentation. Use the PowerPoint Rubric for planning your work.

Estimated Time: 180 Minutes

Project #8: Answer to the best of your ability the Green ship [Post Test](#) section questions. The results on this test will help identify how well you learned the objectives of the instruction.

Estimated Time: 15 Minutes

Additional Resources:

- Green Ships - <http://www.greenships.org/>
- Green Ships Projects - <http://www.greenship.org/projekter/>
- NPR News - California Aims to Slash Port Pollution - <http://www.npr.org/templates/story/story.php?storyId=5438620>
- Transportation education and training solutions - <http://onlinepubs.trb.org/Onlinepubs/trnews/trnews257.pdf>
- US Coast Guard Vessel Search - <http://cgmix.uscg.mil/PSIX/PSIXSearch.aspx>
- Vessel Tracker - <http://www.vesseltracker.com/en/Ships/Maersk-Michigan-9255244.html>
- NOAA Green Ship Initiative - <http://www.glerl.noaa.gov/pubs/brochures/GreenShip.pdf>
- Green Logistics Resources - <http://www.mhia.org/news/green>
- Peter Sanders, "Plug-In Ships Could Reduce Port Pollution," Wall Street Journal, June 25, 2004
- Ship-Technology.com - <http://www.ship-technology.com/>