The CLEAN website offers background information and teaching tips for educators of grades 6-16 about how to teach climate and energy science. We follow a literacy-based approach by using the framework provided by the Climate Literacy Principles and the Energy Literacy Principles. For each of the principles we summarize the relevant scientific concepts and provide a detailed discussion of what makes the topic important, and why it can be challenging to teach. We offer suggestions for grade-level specific teaching strategies and links to relevant teaching materials and reference materials.

We have designed a rigorous and transparent peer-review process for the CLEAN collection. A peer-review process is designed for curriculum developer as well as collection development to ensure quality of the collection, its implementation is non-trivial. Our experiences provide general guidelines that can be used to judge the quality of digital teaching materials across disciplines.

We have established a multi-stage review process. The steps in this process include:

1. Identification of teaching materials

Our team of CLEAN resource collectors searches educational websites to find existing digital teaching resources that are a) relevant

2. Formal Triage/Scanning

Any teaching activity that seems relevant to the collection, with a promising pedagogic design and seemingly solid evidence, is entered into our informal review for further consideration by the core team. The initial set of questions in our informal review form addresses the relevance of the resource to the collection (topic, age level, educational material, grade level) and conclude with a qualitative recommendation of the overall quality of the resource.

3. Reviews

General Review: Review criteria have been developed for activities, videos, visualizations, modules/units and demos/short investigations. These include criteria for a) scientific accuracy, b) pedagogical effectiveness, and c) technical quality/ease of use. Two general reviews are conducted for each resource, with the reviewers providing an overall qualitative assessment.

Panel Review: Resources that pass the two general reviews are presented to a panel review. This team of four specialists (educators and scientists) reviews the resources based on the prior reviews, and makes final decisions about inclusion in the CLEAN collection.

Supporting Review: Climate and energy science encompasses a wide range of disciplines so reviewing the scientific expertise of the CLEAN team. Therefore an expert science review is conducted for resources that pass the panel review. Comments from all reviewers along with teaching tips are compiled in annotations (notes to the user) that are included when cataloging the resource in the collection. Resources that include cutting edge science are flagged and will be reviewed in as science evolves.

4. Cataloging and alignment with benchmarks/standards/guidelines

CLEAN resources are aligned with the Climate Literacy Essential Principles for Science Literacy as well as the new Energy Literacy Principles. The CLEAN collection is also aligned with the Benchmarks for Science Literacy (AAAS 2005). For each activity functionality, the CLEAN team develops a set of terms (“vocabulary”) that define relevant topics of climate science, climate change, and energy.

CLEAN Selected resources are cataloged into the collection by matching with the climate and energy principles, benchmarks, vocabularies, and include comments from all reviewers. Resources will also be aligned with the national Science Education Standards and the NAAE Excellence in Environmental Education Guidelines.

To provide students with accurate information about climate and energy science, educators require scientifically and pedagogically robust teaching materials. This is especially important for topics in which scientific understanding is rapidly evolving like climate science.

The CLEAN collection is currently 360 vetted climate and energy science educational resources aligned with the AAAS Project 2061 Benchmarks for Science Literacy. The effort also includes guidance for teachers teaching about climate and energy, and professional development opportunities for secondary teachers and undergraduate faculty.

CLEAN offers online workshops focused on teaching climate and energy topics for undergraduate faculty. Each workshop runs over 4 days with a blend of synchronous sessions and asynchronous work time. Workshop activities include presentations about the science, examples of teaching resources from the CLEAN collection proven to be successful in the classroom, and time to devote new classroom activities for teaching the science concepts, and opportunities to collaborate and network with other faculty.

To help educators explore how climate and energy topics can be organized into a logical scope and sequence, we present the CLEAN collection in a tool that visually connects CLEAN resources with relevant benchmarks from the AAAS Project 2061 Benchmarks for Science Literacy. These maps can also be used to plan lessons around climate science and energy awareness.

CLEAN offers monthly interactive 2-hour webinars for middle and high school educators. Each webinar focuses on one of the Climate Literacy Essential Principles. The webinar presenters explore misconceptions that exist around the topic, present the scientific background and suggest how to teach the content of the respective principle from an educator perspective. Participants discuss in interactive breakout sessions how the CLEAN collection can support them in teaching. Presenters are scientists and educators with expertise in the respective topic covered.

CLEAN provides professional development on teaching climate literacy. These two workshops were designed to help K-12 teachers foster their knowledge about climate literacy.

CLEAN offers webinars to educators teaching energy awareness. These resources are funded by the National Science Foundation under grants # 0937941, #0938020, #0938051. This work is currently supported by the National Science Foundation.

This example of Teaching Climate and Energy Topics Webpages on the CLEAN website (cleanet.org).