

The Climate Literacy and Energy Awareness Network (CLEAN)

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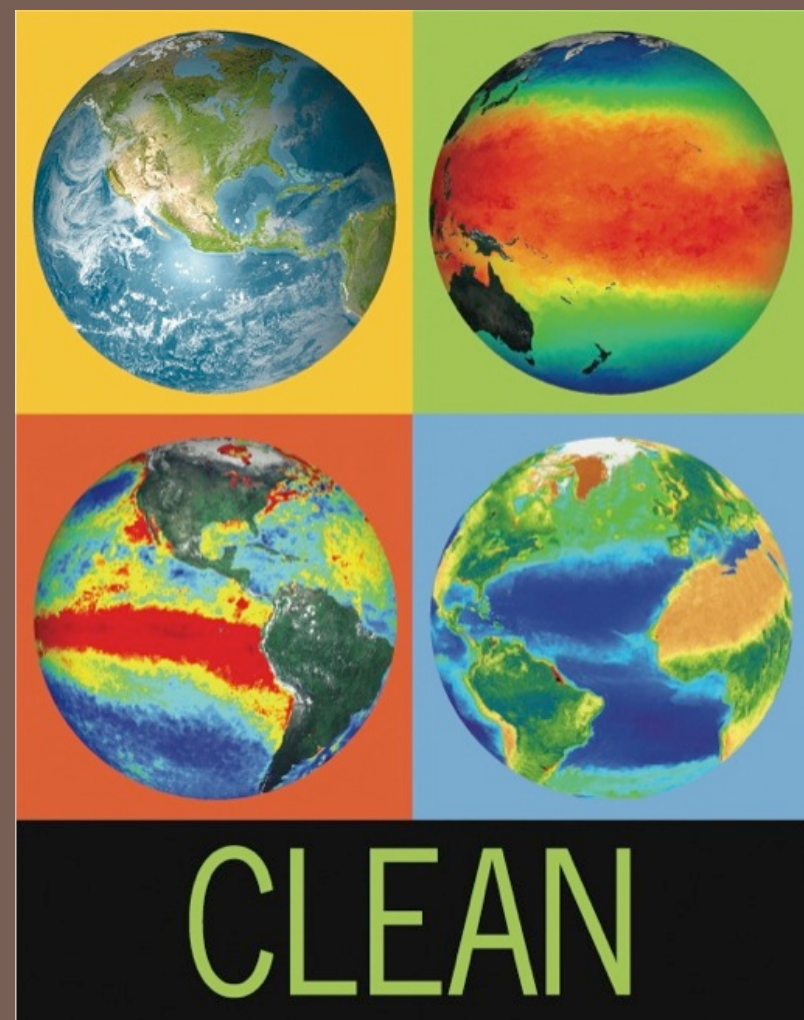
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Abstract

It is important that we prepare tomorrow's scientists, decision makers, and communities to address the societal impacts of a changing climate. In order to respond to, manage, and adapt to those changes, citizens of all ages need accurate, up-to-date information, knowledge of the sciences, and analytical skills to make responsible decisions and long-term resiliency plans regarding these challenging topics. The Climate Literacy and Energy Awareness Network (CLEAN, <http://cleanet.org>) is 1) providing teaching resources for educators through the CLEAN Collection and pedagogical support for teaching climate and energy science; and 2) facilitating a professionally diverse community of climate and energy literacy stakeholders, called the CLEAN Network, to share and leverage efforts to extend the reach and effectiveness of climate and energy education. This presentation will provide an overview of the CLEAN web portal and techniques we have used to market it. We will showcase the CLEAN Collection, which is comprised of 700+ resources (curricula, activities, videos, visualizations, and demonstrations/experiments) that have been reviewed for scientific accuracy, pedagogical effectiveness, and technical quality. Recent activities of the CLEAN Network will be highlighted. We will present findings from our web analytics work, which monitors visitor use of the CLEAN web portal. Through analytics data, we will show evidence of successful CLEAN marketing efforts. The results of our recent pop-up survey, which has been completed by CLEAN visitors from six continents, will also be discussed. Survey results will provide detailed information about how our audiences use the web portal. We anticipate that our insights from the CLEAN network can aid other climate and energy education programs in effectively increasing the visibility of their vital work.



Climate Literacy and Energy Awareness Network (CLEAN)

CLEANET.ORG | Building a foundation of support for climate and energy educators



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CLEAN Review Process

A rigorous and transparent peer-review process is used for the CLEAN collection. Resources that are relevant to one of the climate and energy literacy principles and useful for grade levels K-16 are reviewed. (Gold, A. U., et al. (2012). Peer-review of digital educational resources—A rigorous review process developed by the Climate Literacy and Energy Awareness Network (CLEAN). *Journal of Geoscience Education*, 60(4), 295-308.)

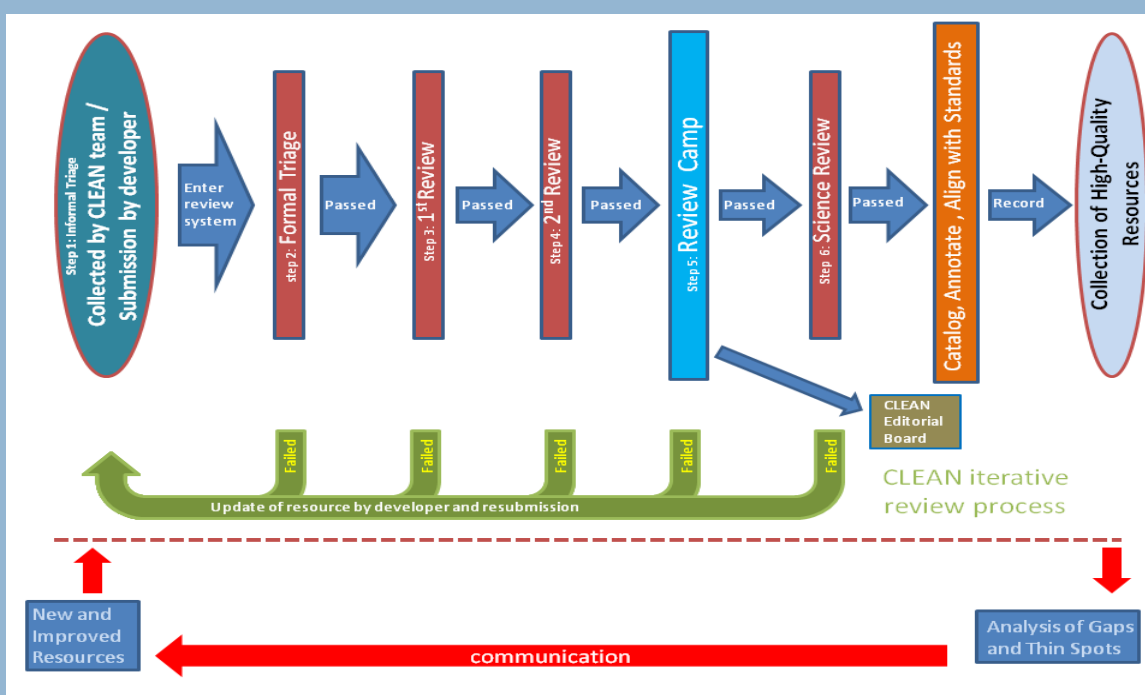
Review Process

Review for: a) scientific accuracy, b) pedagogic effectiveness, c) technical quality/ease of use.

Panel Review: Team of four educators and scientists discusses each resource and makes decision about inclusion in CLEAN.

Expert Science Review: Content expert in the field of the resource reviews for scientific accuracy.

Maintenance Review: Ensures ongoing quality of collection.



CLEAN For Educators

Alignment with Next Generation Science Standards (NGSS)

NGSS and CLEAN at a Glance

Clicking the blue text below will display videos with the NGSS Performance Expectations (PE) and Disciplinary Core Ideas (DCI) that address climate and energy topics. The tables include links to relevant CLEAN resources. Hovering on the green DCI concept button will display the full text.

Middle School
<ul style="list-style-type: none">Show Middle School - Life Science in CLEANShow Middle School - Physical Science in CLEANShow Middle School - Earth and Space Science in CLEANShow Middle School - Engineering, Technology, and Applications of Science in CLEAN
High School
<ul style="list-style-type: none">Show High School - Life Science in CLEANShow High School - Physical Science in CLEANShow High School - Earth and Space Science in CLEANShow High School - Engineering, Technology, and Applications of Science in CLEAN

- Each resource has been tagged with:
 - Performance Expectations
 - Disciplinary Core Ideas
 - Science & Engineering Practices
 - Crosscutting Concepts
- CLEAN Website has guides for creating units aligned to NGSS.

Search the CLEAN Collection

With over 600 lesson plans, activities, videos, and classroom demos, we understand that it can be hard to find exactly what you're looking for. We've provided different pathways to help you get straight to what you want.

SCIENCE Search the CLEAN collection by NGSS topics

Climate system and climate change

- climate data
- climate change
- weather patterns
- earth's energy balance
- weather systems
- climate change
- and more

On search by flexible filters

- Grade level
- Topic
- Type of activity or resource

Why these two choices?

- climate data
- climate change
- weather patterns
- earth's energy balance
- weather systems
- climate change
- and more

Learn more

- climate data
- climate change
- weather patterns
- earth's energy balance
- weather systems
- climate change
- and more

Teaching Guidance

Teaching Guidance is provided following the framework of the Climate Literacy and Energy Literacy Principles. Each page summarizes the relevant **scientific concepts**, provides discussion of what makes the **topic important**, and why it can be **challenging to teach**. Grade-level-specific **teaching strategies** are provided, along with links to relevant **teaching materials** and **reference materials**.

Support for Educators

The CLEAN Network provides support for educators through an active email list, online resource pages, and webinars. Teachers can use these resources to get additional support for teaching complex topics of climate and energy. The community is responsive to requests for input.

Get Involved

- Use teaching resources (collection, guidance, webinars)
- Join the CLEAN Network
- Sign up for the STEM Flash Newsletter
- Submit a resource to the collection
- Become a CLEAN Ambassador
- Become a resource reviewer

Contact: katie.boyd@colorado.edu cleanet.org

CLEAN Supports Climate & Energy Education

CLEAN Collection: Contains 720+ peer-reviewed educational resources such as activities, lab demos, visualizations, and videos for grades 6-16.

Guidance for Teaching Climate and Energy Science: Pedagogical support for teaching climate and energy topics, including misconceptions and best classroom practices.



CLEAN Network: A professionally diverse community of climate and energy literacy stakeholders. Activities:

- Weekly teleconferences and presentations
- Vibrant email list
- Workshops and networking opportunities at large events and conferences

The CLEAN Network is free to join and is open to anyone.

CLEAN Collection

The CLEAN Collection is located at cleanet.org and is syndicated to the NOAA Teaching Climate portal, climate.gov/teaching, as the official federal government collection of climate and energy teaching resources.

Search the Collection

Educational Resources: Search the CLEAN Collection

Scientifically and pedagogically reviewed digital resources for teaching about climate science, climate change, and energy awareness.

Test Search: Searching for glaciers. Remove this link

Current Search Limits

Results 1 - 10 of 59 matches

Glaciers

Activity: 12 matches

Visualization: 12 matches

Video: 12 matches

Climate and Energy Topics

Climate System: 12 matches

Causes of Climate Change: 12 matches

Measuring and Modeling Climate: 12 matches

Impacts of Climate Change: 12 matches

Human Response to Climate Change: 12 matches

Nature of Climate Science: 12 matches

Energy Use: 12 matches

Glaciers Then and Now

This video from a 2005 NOVA program features scientists who study how the Jakobshavn Isbrae glacier in western Greenland is shrinking and moving faster due to increased melting over the past ten years.

Fastest Glacier

This video from a 2005 NOVA program features scientists who study how the Jakobshavn Isbrae glacier in western Greenland is shrinking and moving faster due to increased melting over the past ten years.

Glacier (in National Park)

This activity engages learners in examining data pertaining to the disappearing glaciers in Glacier National Park. After calculating percentage change of the number of glaciers from 1850-1950 to...

Changing Planet: Melting Glaciers

This NRC Learn video features climate scientists doing their research on Mt. Kilimanjaro to study the climate of the past. The scientists put the recently observed changes on the glacier into...

Regional Focus

North America: 12 matches

Asia Region: 12 matches

Europe: 12 matches

Catalog Record

Glaciers

<http://phet.colorado.edu/en/simulation/glaciers>

PHET Team, University of Colorado at Boulder

An interactive simulation that allows the user to adjust mountain snowfall and temperature to see the glacier grow and shrink in response.

Discuss this Resource

Learn more about Teaching Climate Literacy and Energy Awareness

Notes From Our Reviewer: The CLEAN collection is hand-picked and rigorously reviewed for scientific accuracy and classroom effectiveness. Read our full review from here to see about this resource below or learn more about how CLEAN reviews teaching materials

Teaching Tips

- Sample lesson plan can be accessed here: <http://phet.colorado.edu/en/contributions/view/113>

About the Science

- Scientific tools are provided in this animation to measure thickness, glacier velocity, and glacial budget.
- Simulation will help students understand glacier mass balances so that they are well prepared to discuss the effects of climate change on glaciers.
- Passed initial science review - expert science review pending.

About the Pedagogy

- Very easy and well-designed simulation with two different levels (introduction and advanced).
- Can be used to meet the following learning goals: Explain how environmental conditions, temperature, and precipitation impact glacial mass budget; identify where snow accumulates in a glacier, and justify why; explain how ice moves within a glacier; describe and illustrate flow within a glacier; explain or illustrate glacial dynamics.
- Supportive information, including a lesson plan, is available from the website.

Technical Details/Ease of Use

- Simulation can be run online, embedded, or downloaded.
- Technically robust and well designed.

Related URLs: These related sites were noted by our reviewers but have not been reviewed by CLEAN

Sample lesson plan can be accessed here: <http://phet.colorado.edu/en/contributions/view/113>

Collection search option:

Open text search – grade level – resource type – Climate Literacy Principles
Energy Literacy Principles – Use of Scientific Data – Regional Focus – Topic areas
Benchmarks of Science Literacy – Guidelines for Excellence in Environmental Sciences
Next Generation Science Standards (NGSS)

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Marketing CLEAN

CLEAN has been working since 2017 to market the CLEAN collection to educators. The efforts involved are:

- Social Media Engagement
- Professional Development Webinars
- STEM Flash Newsletter
- Work with developers
 - Syndication with sites like PBS Learning & NSTA
 - CLEAN "Selected By" logo
 - CLEAN widget on websites
- Presentations at professional conferences
- Teacher Ambassador program
- Targeted outreach to states (media kits)

Climate Literacy and Energy Awareness Network (CLEAN) Webinar Series

Take your teaching about climate and energy to the next level with the CLEAN Webinar Series. Use the buttons below to register for each free webinar.

Webinar recordings of the event topics are posted below.

Watch the recording: Intro to CLEANet.org

This event occurred on Thursday, September 25, from 4:00-4:30 MT (6-6:30 ET, 5-5:30 CT, 3-3:30 PT)

Watch a guided tour of the CLEAN portal. Learn about the CLEAN collection of over 700 climate and energy educational resources that include data-based activities, demonstrations and experiments, videos and visualizations. Plus, learn about the range of supporting materials on the CLEAN website that help you effectively and accurately teach about climate and energy topics.

Watch the recording: Teaching About Climate and Energy Topics with CLEANet.org

This event occurred on Tuesday, September 25, from 4:00-4:30 MT (6-6:30 ET, 5-5:30 CT, 3-3:30 PT)

See how to use the Teaching About Climate and Energy web guides to help build an excellent foundation for teaching and learning about climate and energy concepts. Also, see how these teaching guides are integrated with the CLEAN collection of over 700 climate and energy resources on the CLEAN website.

Web Analytics and Pop Up Survey

CLEAN tracks website traffic through Google Analytics. A popup survey was implemented in summer 2018. Web analytics data show marketing efforts have been successful (see figures below).

- The CLEAN website and the syndicated CLEAN collection site at NOAA's Climate.gov have received over 2,000,000 visits since their creation.
 - Monthly average number of sessions increased from about 17,000 in 2014 (when CLEAN was syndicated to Climate.gov) to 57,000 in 2019 (a 335% increase).
- After the 2017 marketing efforts, users, new users, and pageviews increased by about 70% in 2018 compared to 2017.
- Popup survey respondents reflected CLEAN's target audience of formal and informal educators.
- Popup survey results showed most new visitors came to CLEAN through a web search. Other referrals came from presentations on CLEAN, a news article about CLEAN, and social media.
- Respondents were mostly looking for educational resources and teaching guidance.

Above Figure: Increase in CLEAN web sessions over project lifetime

Figure to the left: Yearly comparison after marketing efforts