<table>
<thead>
<tr>
<th>Question</th>
<th>Rating Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is an attribution provided that represents a credible source such as a university or government agency?</td>
<td>yes, no</td>
</tr>
<tr>
<td>Video is free of scientifically out-of-date material.</td>
<td>4 definitely, 3 somewhat, 2 a little, 1 no</td>
</tr>
<tr>
<td>Does the video present valid/accurate and grade-level appropriate concepts, models, and skills?</td>
<td>4 definitely, 3 somewhat, 2 a little, 1 no</td>
</tr>
<tr>
<td>Are references given or experts cited?</td>
<td>4 definitely, 3 somewhat, 2 a little, 1 no, not applicable</td>
</tr>
<tr>
<td>Does the video avoid scientifically unsubstantiated bias?</td>
<td>yes, no</td>
</tr>
</tbody>
</table>

Draft Science Annotation - please include strengths and concerns (content to be used for catalog record):

Overall Rating of Scientific Accuracy
- Meets highest scientific standards, up-to-date e.g. IPCC 5th report
- Scientifically sound but does not meet highest standards
- Minor scientific short-comings that can be addressed in annotations
- Has major scientific short-comings or even conveys misconceptions
## Pedagogic Effectiveness

Is the video free from material that might interfere with effective use by a wide range of learners (e.g. negative stereotypes or insensitive treatment of sensitive subjects)?

- 4 yes
- 1 no
- can not answer

Is the video engaging and motivating for students?

- 4 definitely
- 3 somewhat
- 2 a little
- 1 no

Does the video provide a vehicle for asking questions or seeking further information?

- 4 definitely
- 3 somewhat
- 2 a little
- 1 no
- not applicable

Is any pedagogic scaffolding provided along with the video (e.g. a teacher's guide)?

- yes
- no

## Draft Pedagogy Annotation - please include strengths and concerns (content to be used for catalog record):

## Overall Rating of Pedagogic Effectiveness

- Pedagogically very effective and carefully designed
- Pedagogic design is good and resource is useful as a learning tool
- Pedagogical design does meet basic standards but has considerable shortcomings
- Poor pedagogical design, not recommended as a learning tool
- Can't answer this

## Technical Quality

Is the video free of distracting or off-topic advertising?

- yes
- no

Does the video present the concept and content clearly?

- Definitely
- Somewhat
- Little
- No

The video is high quality and has sufficient resolution and clarity.

- 4 definitely
- 3 somewhat
- 2 a little
- 1 no
What is the length of the video (in min)?

Draft annotation about Technical Quality - please include strengths and concerns (content to be used for catalog record):

Overall Rating of Technical Quality
- Technically robust and adequate for use in typical educational environment
- Technically good, minor shortcomings in technical aspects when used in typical educational environment
- Technically weak, minor problems when used in typical educational environment
- Technically weak, major problems when used in typical educational environment
- Not Applicable
- Can't answer this

Teaching Tips -

Teaching Tips (content will be used for catalog record):

If the resource is part of a larger collection and there is a relevant parent URL please copy the URL here (format [URL]- content will be used for catalog record):

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**Essential Principles of Climate and Energy Literacy**

Select the primary principle(s) that are addressed by the resource.

- GP Humans can take actions to reduce climate change and its impacts.
- GP a Climate science improves informed policy and decision-making
- GP b Reducing human vulnerability to and impacts on climate requires multi-disciplinary, integrated understanding
- GP c Climate change affects global/national security
- GP d Greenhouse gas reduction and carbon dioxide sequestration to mitigate climate change
- GP e Strategies to reduce greenhouse gas emission (energy conservation, renewable energies, change in energy use)
- GP f Strategies of human adaptation to climate change
- GP g Actions taken by different levels of society can mitigate climate change and increase preparedness for current and future generations

- 1 The Sun is the primary source of energy for Earth's climate system
- 1a Sunlight warms the planet
- 1 b Earth's Energy balance
- 1 c Axial tilt of Earth governs incoming sunlight and seasonality
- 1 d Milankovitch/orbital cycle
- 1 e Solar variability has no significant impact on Earth's current warming

- 2 Climate is regulated by complex interactions among components of the Earth system
- 2 a World's climate definition
- 2 b Ocean as climate control, oceanic conveyor belt; abrupt changes in thermohaline circulation
- 2 c Greenhouse effect
- 2 d Biogeochemical cycles of greenhouse gases / Carbon cycle
- 2 e Role of aerosols in climate system
- 2 f Equilibrium and feedback loops in climate system
Life on Earth depends on, is shaped by, and affects climate
- Climate's role in habitats ranges and adaptation of species to climate changes
- The Greenhouse effect supports the water cycle and makes life possible
- Climate impacts ecosystems and past species extinctions
- Holocene is unusually stable – human infrastructure vulnerable to change
- Biosphere drives the global carbon cycle

Climate varies over space and time through both natural and man-made processes
- Definition of climate and climatic regions
- Climate is not the same thing as weather – defining difference
- Climate change vs. climate variability and patterns
- Changes in climate is normal but varies over times/ space
- Global warming and especially arctic warming is recorded in natural geological and historic records
- Evidence is that human impacts are playing an increasing role in climate change
- Natural processes of CO2 removal from atmosphere is slow; Long residence time of some GHG

Our understanding of the climate system is improved through observations, theoretical studies, and modeling
- Climate system is subject to the same physical laws as the rest of the Universe
- Observations are the foundation for understanding the climate system
- Observations, experiments, and theory are used to construct and refine computer models
- Meteorology and climatology are related but different sciences, and their processes are modeled and forecast differently
- Climate models are robust enough to be used for guiding decision and actions as response to climate change

Human activities are impacting the climate system
- Global warming is "very likely" caused by human greenhouse gas emission
- Increased GHG concentrations in atmosphere will remain high for centuries and affect future climate
- Human activities have increased GHG levels and altered global climate patterns
- Evidence shows that human-caused global warming have impacted ecosystem resulting in reduced biodiversity and ecological resilience
- Negative impacts of global warming outweigh positive

Climate change will have consequences for the Earth system and human lives
- Sea level rise and resulting impacts is due to melting ice and thermal expansion and increases the risk
- Effects of climate change on water cycle and freshwater availability
- Increased extreme weather events due to climate change
- Increased acidity of oceans and negative impacts on food chain due to increasing carbon dioxide levels
- Ecosystems on land and in the ocean have been and will continue to be disturbed by climate change
- Human health and well-being will be affected to different degrees from the impacts from climate change

Essential Principles and Fundamental Concepts for Energy Education
- Energy is a physical quantity that follows precise natural laws.
- Energy is a quantity that is transferred from system to system.
- The energy of a system or object that results in its temperature is called thermal energy.
- Energy is neither created nor destroyed
- Energy available to do useful work decreases as it is transferred from system to system.
- Energy comes in different forms and can be divided into categories.
- Chemical and nuclear reactions involve transfer and transformation of energy.
- Many different units are used to quantify energy.
- Power is a measure of energy transfer rate.

Physical processes on Earth are the result of energy flow
- Earth is constantly changing as energy flows through the system.
- Sunlight, gravitational potential, decay of radioactive isotopes, and rotation of the Earth are the major sources of energy driving physical processes on Earth.
- Earth's weather and climate are mostly driven by energy from the Sun.
- Water plays a major role in the storage and transfer of energy in the Earth system.
- Movement of matter between reservoirs is driven by Earth's internal and external sources of energy.
| 2.6 | Greenhouse gases affect energy flow through the Earth system. |
| 2.7 | The effects of changes in Earth's energy system are often not immediately apparent. |

| 3.1 | The Sun is the major source of energy for organisms and the ecosystems of which they are a part. |
| 3.2 | Food is a biofuel used by organisms to acquire energy for internal living processes. |
| 3.3 | Energy available to do useful work decreases as it is transferred from organism to organism. |
| 3.4 | Energy flows through food webs in one direction, from producers to consumers and decomposers. |
| 3.5 | Ecosystems are affected by changes in the availability of energy and matter. |
| 3.6 | Humans are part of Earth's ecosystems and influence energy flow through these systems. |

| 4.1 | Humans transfer and transform energy from the environment into forms useful for human endeavors. |
| 4.2 | Human use of energy is subject to limits and constraints. |
| 4.3 | Fossil and biofuels are organic matter that contain energy captured from sunlight. |
| 4.4 | Humans transport energy from place to place. |
| 4.5 | Humans generate electricity in multiple ways. |
| 4.6 | Humans intentionally store energy for later use in a number of different ways. |
| 4.7 | Different sources of energy and the different ways energy can be transformed, transported, and stored each have different benefits and drawbacks. |

| 5.1 | Decisions concerning the use of energy resources are made at many levels. |
| 5.2 | Energy infrastructure has inertia. |
| 5.3 | Energy decisions can be made using a systems-based approach. |
| 5.4 | Energy decisions are influenced by economic factors. |
| 5.5 | Energy decisions are influenced by political factors. |
| 5.6 | Energy decisions are influenced by environmental factors. |
| 5.7 | Energy decisions are influenced by social factors. |

| 6.1 | Conservation of energy has two very different meanings. |
| 6.2 | One way to manage energy resources is through conservation. |
| 6.3 | Human demand for energy is increasing. |
| 6.4 | Earth has limited energy resources. |
| 6.5 | Social and technological innovation affects the amount of energy used by human society. |
| 6.6 | Behavior and design affect the amount of energy used by human society. |
| 6.7 | Products and services carry with them embedded energy. |
| 6.8 | Amount of energy used can be calculated and monitored. |

| 7.1 | Economic security is impacted by energy choices. |
| 7.2 | National security is impacted by energy choices. |
| 7.3 | Environmental quality is impacted by energy choices. |
| 7.4 | Increasing demand for and limited supplies of fossil fuels affects quality of life. |
| 7.5 | Access to energy resources affects quality of life. |
| 7.6 | Some populations are more vulnerable to impacts of energy choices than others. |

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**Audience Level**

Please select the grade level for which this video is most appropriate (in your judgement) Check all that apply.

- Primary (K-2)
- Intermediate (3-5)
- Middle (6-8)
- High School (9-12)
- College Lower (13-14)
- College Upper (15-16)
- Graduate or Professional
Informal Education (museums, park displays)

Grade level notes (content will be used for catalog record):

Overall Rating of Relevance to CLEAN
○ High Priority (Resource likely to be included in CLEAN collection of excellent resources)
○ Medium Priority (Resource meets basic CLEAN standards)
○ Low Priority (Resource meets basic CLEAN standards but is of lower priority)
○ Hold for Later Review (Keep in pool for another review at later stage)
○ Excellent but Incomplete (Excellent and relevant but needs improved activity sheet)
○ Do Not Include (Resource doesn’t meet basic CLEAN standards)
○ Review in process (not yet complete)
○ Unvetted (Review not yet complete)

Other Reviewer Comments (for internal use only - not used for catalog record)