

AB 285 Climate Science Education:

CAELI County Office of Education Innovation Hub's Overview and Recommendations for Educational Leaders

Purpose and Overview: The [CAELI](#) County Office of Education Innovation Hub developed this introductory tool to support county offices of education, districts, and schools to understand the requirements of AB 285 and begin taking next steps for implementing grade-appropriate climate change curriculum.

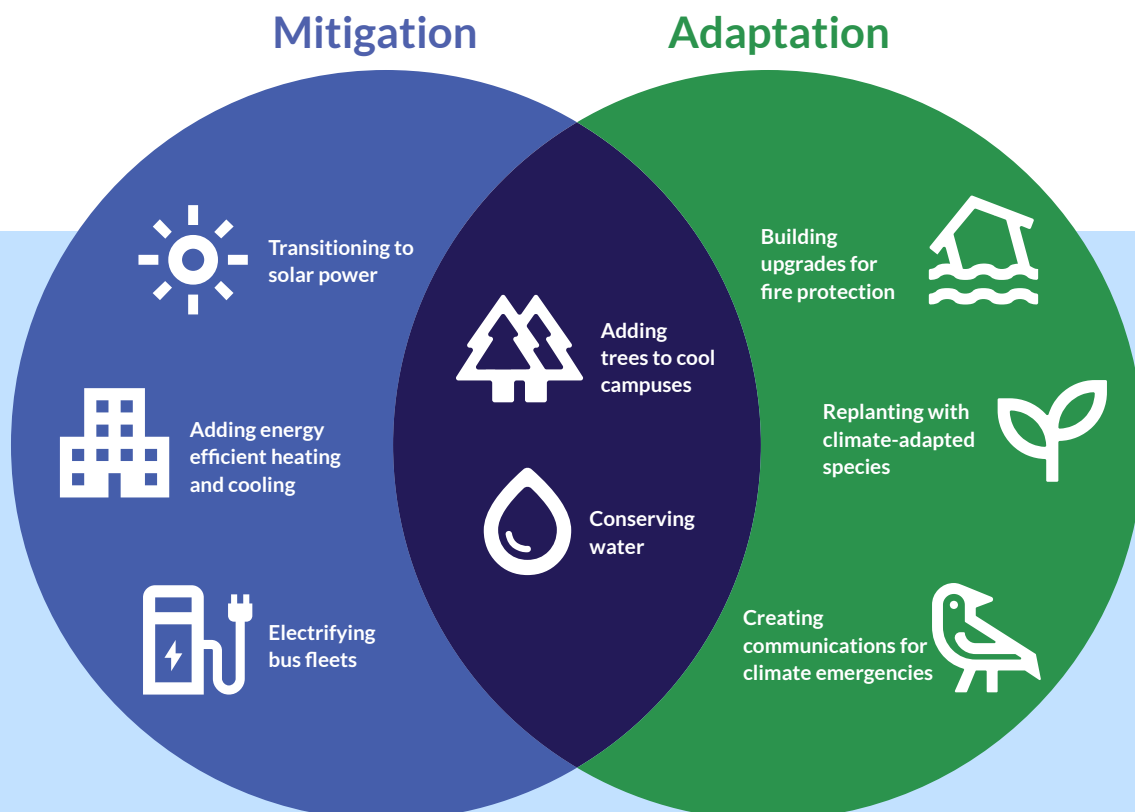
I. What Is California Assembly Bill 285 (2023)?

The bill amended [Sections 51210 and 51220 of the California Education Code](#) to require that courses of study for science in grades 1–12 include material “on the causes and effects of climate change, and on the methods to mitigate and adapt to climate change. Appropriate coursework including material **on the causes and effects of climate change and methods to mitigate and adapt to climate change** shall be offered to pupils as soon as possible, commencing no later than the 2024–25 school year.” For additional technical information about AB 285, please visit [CA AB 285: Ten Strands Overview and Resources](#).

II. What Are the Four Components of Understanding Climate Change That Are Referenced in AB 285?

In order to be climate literate, AB 285 calls out four components that students need to understand about climate change (the long-term shifts in temperatures and weather patterns):

- **Causes of Climate Change:** Some of the human-enhanced causes include burning fossil fuels, cutting down forests, and farming livestock
- **Effect:** Some of the effects of climate change include increased temperatures, sea level rise, and increased severe storms
- **Mitigation:** Preventing or reducing the emission of greenhouse gasses (GHG) into the atmosphere to make the impacts of climate change less severe
- **Adaptation:** The process of adjusting to moderate the expected or actual consequences of climate change





Fortunately, California's Next Generation Science Standards (NGSS) include climate change topics throughout many grade levels. The necessary content changes required by AB 285 are to ensure that ALL grade levels 1-12 include four components of climate literacy: the causes and effects of climate change and mitigation and adaptation efforts. To meet this mandate, students should be provided appropriate allocation of instructional minutes for science education, and teachers need to be provided professional learning opportunities to foster their own climate change knowledge and capacity to provide developmentally appropriate climate literacy content emphasizing trauma-informed practices.

III. What Are the Current Foundations for AB 285 Implementation?

There are many current foundational elements that support school districts to meet the requirements of AB 285. This section includes an overview of these foundational elements and how they can be leveraged for planning and implementation of AB 285.

State-Adopted, NGSS-Aligned Curriculum Includes Climate Change:

By using NGSS-aligned curriculum, many grade levels already cover the four components of understanding climate change. The table below displays major climate-change-related topics throughout each grade span. Each topic has been identified in relation to the key themes of AB 285 (cause, effect, mitigation, and adaptation). While NGSS addresses most of the four climate literacy components explicitly in grades 6–12, additional coursework may be required in all grades to address the cause, effect, mitigation, and adaptation related to climate change. It is also recommended that a local context is used, when possible, to learn about the four components that are addressed in AB 285.

| Grade Span | Climate-Related Topics Already Included in Materials Aligned to the NGSS for California Public Schools | Climate Connection |
|-------------------------------------|--|---|
| Primary K–2 | <ul style="list-style-type: none"> weather conditions and their effects on the earth’s surface (cause and effect) effects of changing habitats on plant and animal needs over time (adaptation) pace of Earth events (quick or slow) (cause and effect) impact of people on the environment in both positive and negative ways (mitigation and adaptation) | Building block concepts focus on interdependence of human and natural systems |
| Upper Elementary 3–5 | <ul style="list-style-type: none"> Earth processes, weather, and related hazards and solutions (cause and effect) environmental changes and their impacts on survival (adaptation) sustaining Earth’s natural resources, including energy and fuels (mitigation and adaptation) interactions in Earth’s geosphere, hydrosphere, biosphere, and atmosphere (cause and effect) | |

| Grade Span | Climate-Related Topics Already Included in Materials Aligned to the NGSS for California Public Schools | Climate Connection |
|------------|--|--------------------|
|------------|--|--------------------|

Middle School
6-8

- rise in global temperatures and how it affects weather, regional climates, and natural hazards (**cause and effect**)
- synthetic materials from natural resources and their impacts on society (**effect**)
- ecosystem dynamics, populations, and biodiversity (**adaptation**)
- the role of photosynthesis in the cycling of matter (**cause and mitigation**)

Explicit climate change content

High School
9-12

- the flow of energy into and out of Earth’s systems and resulting changes in climate (**cause and effect**)
- global climate models and how climate influences human activity (**cause and effect**)
- technological solutions to reduce the impact of human activities (**mitigation**)
- mathematical representations of the impacts on ecosystem dynamics (**cause and effect**)
- biodiversity, carrying capacity, and population dynamics; changing conditions, extinction, and speciation (**cause, effect, and adaptation**)
- evaluating solutions including mitigation and adaptation (**mitigation and adaptation**)

Explicit climate change content and engineering solutions to monitor and reduce negative human impact

Key Resource: This [Climate Change Concepts in the California Next Generation Science Standards](#) (NGSS) table is a detailed list of performance expectations that address climate change at each grade level. California educators may find additional topics across other subject areas that lend themselves to discussions of climate change mitigation or adaptation in their local context.

The [Environmental Principles and Concepts](#) Support Climate Literacy:

AB 285 is also supported through the intentional implementation of the California Environmental Principles and Concepts (EP&Cs). The EP&Cs are embedded in multiple California State Frameworks: [Arts](#), [Health](#), [Mathematics](#), [Science](#), [History-Social Science](#), and [World Languages](#), and they have expanded through [SB720 \(2018\)](#) to add climate change and environmental justice. Following are the five principles in the EP&Cs:

1. People depend on natural systems.
2. People impact natural systems.
3. Natural systems have cycles that people benefit from and can influence.
4. Matter, including pollution, flows between systems. (There is no “away.”)
5. Decisions affecting resources and natural systems are complex.

For science, the [Matrix of Environmental Principles and Concepts in CA NGSS](#) shows topics that are addressed in the standards at each grade band and how they connect with the EP&Cs. [Appendix 2](#) of the California Science Framework also maps connections between each performance expectation and related EP&Cs.

Climate Literacy Curriculum and Resources:

For additional curriculum and guidance to meet all four components of climate literacy, refer to the resources below:

- List of [vetted climate literacy resources for grades TK-12](#)
- The [Climate Change and Environmental Justice Program](#) will offer free, open-source curricular resources for grades K-12. The Seeds to Solutions curriculum, which is focused on integration in ELA, math, science, and social studies, will be available in spring 2025. Complete this [interest form](#) to stay updated.
- County offices of education for support of curriculum adoption, implementation, professional learning, sustainability resources, and more.

CALIFORNIA'S ENVIRONMENTAL PRINCIPLES
Highlighting the Deep Relationship Between Humans & the Natural World

PRINCIPLE 1
People Depend on Natural Systems

PRINCIPLE 2
People Influence Natural Systems

PRINCIPLE 3
Natural Systems Change in Ways that People Benefit from and Can Influence

PRINCIPLE 4
There are no Permanent or Impermeable Boundaries that Prevent Matter from Flowing Between Systems

PRINCIPLE 5
Decisions Affecting Resources and Natural Systems are Complex and Involve Many Factors

www.californiaeei.org/abouteei/epc/

IV. What Are CAELI Recommendations and Resources for AB 285 Implementation?

This final section includes recommendations and resources from CAELI for how to implement AB 285, including implementation steps, classroom snapshots of integration at each grade level, and a team discussion guide.

Implementation Steps:

Perform a team review of what your teachers, administrators, and systems are already doing to support science across each grade band, including ensuring sufficient time is built into the calendar to support science instructional minutes. See [Implementation Discussion Guide](#) below.

As a team, review current scope and sequence documents and curriculum resources.

Identify gaps in resources and identify appropriate supplemental curriculum as needed.

Provide professional learning support for teachers with developmentally appropriate climate change resources and trauma-informed practices.

Examples of Climate Literacy Education at Each Grade Band:

These snapshots exemplify how climate change instruction unfolds in classrooms, starting with connecting to nature and understanding human-nature interdependence and progressing to exploring climate change and justice in later grades.



Grades K-2

Grades 3-5

Growing Campus Green Spaces

Reducing Food Waste

Adaptation & Mitigation

Trees lower temperatures and sequester carbon.

Mitigation

Diverting food from landfills reduces greenhouse gasses.

EP&C 1: People depend on natural systems.
NGSS K-ESS3-3

EP&C 4: Matter flows between systems.
NGSS 5-ESS3-1

At Santa Cruz Gardens Elementary School, a transitional kindergarten teacher bolstered her adopted science curriculum, which focuses on observing trees, by forming a student Green Team engaged in campus care and beautification. The projects addressed her goal of teaching environmental awareness as a crosscutting concept to her transitional kindergarten students.

Students were given the opportunity to care for plants and trees, and they gained knowledge of what natural resources are and how people depend upon them.

*This is an example of developmentally appropriate climate understanding for kindergarten by way of exploring the role of trees, their cooling effect, and the ecosystem benefits they provide.

At Gault Elementary School, teachers teamed up to focus on reducing food waste as a climate change solution the whole school could get involved in.

The librarian read books to each grade level about reducing waste for the “Gault Great Food Waste Challenge.”

After this introduction, students in grades K-1 learned about food waste during science with “big buddy” fifth graders. Additionally, students in grades 3-5 collected, sorted, analyzed, and weighed school food waste. Students then created posters about food waste and climate change facts and composting for the school cafeteria.

*This example highlights the developmental shift from a grade K-1 classroom understanding of our role in the environment and our impacts to upper grades diving further into analysis of a problem and solutions they can implement.



Grades 6-8

Analyzing Climate Impacts of Campus Construction

Adaptation & Mitigation

Students identified adaptation strategies such as green roofs, increased tree canopy, and reduced water usage.

EP&C 2: People impact natural systems.
NGSS MS-LS2-5

Students in a sixth-grade science class assessed the environmental impact of an ongoing campus-wide renovation and major construction project at San Lorenzo Valley Middle School.

Adapted from an existing unit in the school’s adopted curriculum, the project had students work in teams, taking the roles of different scientists to produce an environmental impact report and present it to the community and school board.

Their board presentations identified environmental impacts, proposed mitigation and adaptation strategies, and suggested overall recommendations for making the campus construction project more climate friendly.



Grades 9-12

Exploring Urban Heat Islands and Climate Justice

Adaptation & Mitigation

Increasing urban tree canopies lowers temperatures and sequesters carbon.

EP&C 5: Decisions affecting resources and natural systems are complex.
NGSS HS-ESS3-4

At Watsonville High School, students in an environmental science course [explored urban heat islands in their own community](#).

Imagining themselves as city planners, students collected data over time to identify factors impacting temperatures to consider how they would allocate funding for a climate action grant.

They compared heat island data sets with historical redlining maps to discover relationships between neighborhood grade, tree canopy, impervious surfaces, and temperature.

They used journaling and trauma-informed practices to process the patterns of environmental injustice they found and then made recommendations for solutions and community empowerment.

Implementation Discussion Guide for Addressing AB 285

This discussion tool is designed to guide teams in their thinking about how to meet the requirements of AB 285. Although the bill directly targets classroom curriculum and instruction, we know teachers require the support of the broader system to ensure successful implementation. This discussion tool can be used to create initial action items to support AB 285 implementation or in conjunction with broader initiatives such as the Local Control and Accountability Plan.

Directions: Individually read each question in a section, and reflect on your current district and/or site conditions. Then, as a team, discuss current conditions, and identify action items that can improve implementation toward ensuring that all students in grades 1–6 and 7–12 are learning about the causes and effects of climate change and methods to mitigate and adapt to climate change. Teams may then move on to the next section or assign responsible members to action items. This tool is meant to initiate conversation and help districts/sites consider action steps for implementation, but it is not intended as a comprehensive checklist for all contexts. Please use this tool in a manner that best suits your unique context and community.

District/Site _____ Grade(s) _____

Questions to Consider

CURRICULUM: Review your current science curriculum and classroom implementation of NGSS, the EP&Cs, and climate science.

| Current District or Site Conditions | Actions for Meeting the Requirements of AB 285 |
|--|--|
| 1. Is your curriculum aligned to NGSS and EP&Cs with age-appropriate climate science ideas and solutions? | |
| 2. Where in your scope and sequence are climate science ideas and solutions addressed? Is there vertical alignment to ensure developmentally appropriate content? (For example, content that starts with connecting to nature and understanding human-nature interdependence and progresses to exploring climate change and justice in later grades.) | |

Questions to Consider

CURRICULUM: Review your current science curriculum and classroom implementation of NGSS, the EP&Cs, and climate science.

| Current District or Site Conditions | Actions for Meeting the Requirements of AB 285 |
|--|--|
| <p>3. How much time is dedicated in your grade TK–6 schedule to teach NGSS? Are the minutes equitable across core subjects and student groups? (See this related CASE Policy Statement.)</p> | |
| <p>4. What professional development opportunities are provided to support your teachers with NGSS implementation, trauma-informed practices, climate science, and the EP&Cs?</p> | |
| <p>5. What district or site resources are available to support the identified professional learning needs or implementation of the professional learning in the classroom?</p> | |
| <p>6. What measures are used to identify student success in meeting the requirements of AB 285?</p> | |

Questions to Consider

CAMPUS: Evaluate your campus as a learning laboratory.

| Current District or Site Conditions | Actions for Meeting the Requirements of AB 285 |
|--|--|
| 7. How are you modeling climate-ready and sustainable practices on all campuses for students to learn from? | |
| 8. What opportunities does your campus have as a learning laboratory? | |
| 9. What opportunities are students given to engage with or design solutions that build climate resilience on their campuses? | |

COMMUNITY & CULTURE: Partner with your community to support climate science and solutions.

| Current District or Site Conditions | Actions for Meeting the Requirements of AB 285 |
|---|--|
| 10. How are you communicating with parents and caregivers about climate science ideas and solutions? | |
| 11. How is teacher professional learning incorporating trauma-informed practices specific to climate change topics? | |
| 12. How are you involving counselors/ student services to help with trauma-informed practices around climate science ideas? | |

Questions to Consider

OTHER CONSIDERATIONS: What is already happening around climate change education in your district/site that will support meeting the legislation of AB 285?

| | Current District or Site Conditions | Actions for Meeting the Requirements of AB 285 |
|---|-------------------------------------|--|
| <p>13. District or Site Initiatives</p> <p>Does your district or site currently have opportunities for student learning and leadership in connection to these efforts:</p> <ul style="list-style-type: none"> • Sustainability initiatives • Celebration and recognition opportunities • Campus greening initiatives or decarbonization • Green Ribbon School awards • Outdoor learning spaces and tools • Projects or curriculum related to the UN Sustainable Development Goals • State Seal of Civic Engagement | | |
| <p>14. What other ways is your district or site supporting climate change education?</p> | | |