



Guide to the Science of Climate Change in the 21st Century

Chapter 26
Discussion Presentation #11,
Climate Change Canada and
Alberta

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Chapter 26.0 Discussion Presentation #11, Climate Change Canada and Alberta

26.1 Introduction

In the fall of 2023 and winter 2024 a series of presentations collectively named 'Climate Change Alberta' were provided to the Calgary Association of Lifelong Learners known as CALL. All together there were twelve presentations, the first ten of which dealt with the science of climate change as discussed in this Guide. Discussion Presentation #11 identifies web sites which describe how the Governments of Canada and Alberta, the municipalities (Calgary and Edmonton in particular) and major post secondary educational institutions in Alberta addressed the 'climate change' crisis. Only the web sites the organizations created and published themselves are presented and were discussed (as of March 1, 2024). These web sites and others of importance are listed below. I encourage readers to explore each of the web sites them selves.

Figures 26.1 illustrates a flow chart which explains how the study of science of climate change has resulted in attribution of climate change to environmental impacts, adaptation to environmental impacts that are occurring or might occur and opportunities to prevent the environmental impacts of climate change known as mitigation.

Figure 26.2 illustrates a flow chart which explains how the international community, nations, state/ provincial governments, municipal governments and individuals participate in addressing climate change - if they want to.

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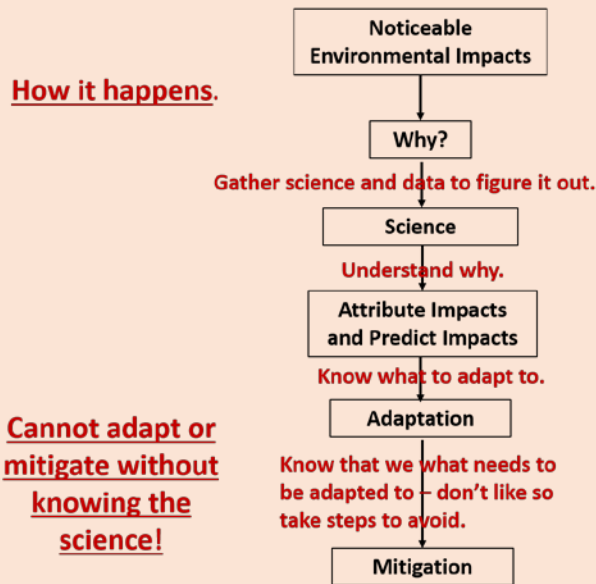


Figure 26.1 How the study of the science of climate change results in actionable adaptation and mitigation.

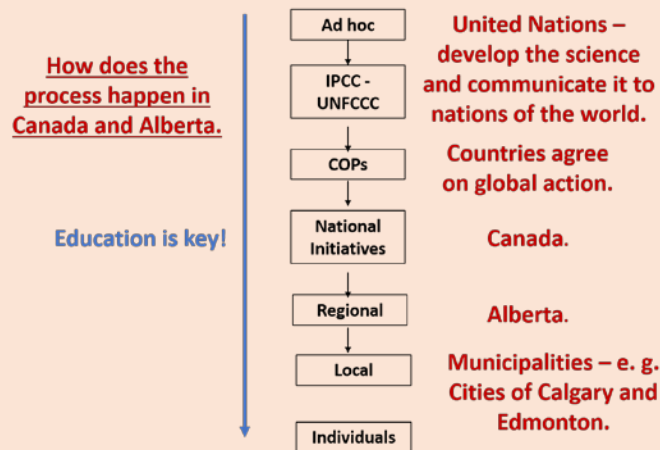


Figure 26.2 How the international community, nations, state governments, municipal governments and individuals participate in addressing climate change.

26.2 Selected web sites

1. Intergovernmental Panel on Climate Change, IPCC
 - a. Global Warming of 1.5°C. <https://www.ipcc.ch/sr15/> .

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- b. Key aspects of the Paris Agreement. <https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement> .
- c. IPCC Sixth Assessment Report. <https://www.ipcc.ch/assessment-report/ar6/>
 - i. Synthesis Report: Climate Change. <https://www.ipcc.ch/report/sixth-assessment-report-cycle/> .
 - ii. Climate Change 2021: The Physical Science Basis. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> .
 - iii. Climate Change 2022: Impacts, Adaptation and Vulnerability. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/> .
 - iv. Climate Change 2022: Mitigation of Climate Change. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/> .

2. Government of Canada

- a. Climate Atlas of Canada: <https://climateatlas.ca/>
- b. National Inventory Report to UNFCCC 2023 https://unfccc.int/documents/627833?gad_source=1&gclid=EAlaIqobChMI3uiy0-PMhAMVGyutBh05SQhTEAAYAAEgL3Kfd_BwE
- c. G of Canada, Building Regional Adaptation Capacity and Expertise Program <https://natural-resources.canada.ca/climate-change/building-regional-adaptation-capacity-and-expertise-program/21324> .
- d. Climate change: our plan. <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan.html> .
- e. Climate action map. <https://climate-change.canada.ca/climate-action-map/App/index?GOCTemplateCulture=en-CA&zoom=6&lat=55.45652734741209&long=-112.33123350691133> .
- f. Climate data for a resilient Canada. <https://climatedata.ca/> .
- g. Climate data viewer. <https://climate-viewer.canada.ca/climate-maps.html#/?t=annual&v=tmax&d=dc&r=rcp85&cp=-95.80098000546008,59.67409464609375&z=3&ts=3> .
- h. Energy efficiency. <https://natural-resources.canada.ca/energy-efficiency/10832> .
- i. CMIP6 climate scenarios. <https://climate-scenarios.canada.ca/?page=cmip6-scenarios> .
- j. Greenhouse gas emissions. <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html> .

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- k. Canada's official greenhouse gas inventory – Main page.
<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html> .
- l. Greenhouse gas emissions projections.
<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/projections.html> .
- m. Government of Canada Report Shows Climate Change Impacts – and Adaptation Actions – Are Evident in Sectors and Ecosystems in Canada.
<https://www.canada.ca/en/natural-resources-canada/news/2023/12/government-of-canada-report-shows-climate-change-impacts--and-adaptation-actions--are-evident-in-sectors-and-ecosystems-in-canada.html> . See n.
- n. Canada in a Changing Climate - Synthesis Report.
<https://changingclimate.ca/synthesis/> .
- o. Canada Changing Climate Report. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://changingclimate.ca/site/assets/uploads/sites/2/2020/06/CCCR_FULLREPORT-EN-FINAL.pdf .
- p. Reuters, Focus: Canada's climate plan charts hard road ahead for high-polluting oil sands. <https://www.reuters.com/business/environment/canadas-climate-plan-charts-hard-road-ahead-high-polluting-oil-sands-2021-06-22/> .
- q. Net-zero emissions by 2050.
<https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html> .
- r. Net zero opportunities: A province-by-province comparison.
https://climateinstitute.ca/reports/net-zero-opportunities-provincial-perspective/?campaignid=19200827677&adgroupid=154861377086&keyword=canada%20net%20zero&device=c&gclid=EAlaQobChMI3uiy0-PMhAMVGyutBh05SQhTEAAYAiAAEgLfSPD_BwE .
- s. Canadian net-zero emissions accountability act.
<https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050/canadian-net-zero-emissions-accountability-act.html> .
- t. A healthy environment and a healthy economy.
<https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html> .

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- u. 2030 emissions reduction plan: clean air, strong economy.
<https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html> .
- v. Clean fuel regulations. <https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-regulations.html> . Also, see below.
- w. Canada's clean fuel standard, Pembina Institute.
<https://www.pembina.org/pub/canadas-clean-fuel-standard-setting-the-record-straight> .
- x. Energy balances of biodiesel production from soybean and canola in Canada. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cdnsiencepub.com/doi/pdf/10.4141/CJPS06067 .
- y. Canada joins three percent club to improve global energy efficiency.
<https://eeglobalalliance.org/three-percent-club> , and
<https://www.canada.ca/en/natural-resources-canada/news/2020/07/canada-joins-three-percent-club-to-improve-global-energy-efficiency.html> .
- z. Canada to increase carbon taxes by 467%.
<https://www.nortonrosefulbright.com/en/knowledge/publications/d58ef644/canada-to-increase-carbon-taxes-by-467#:~:text=The%20Canadian%20federal%20government%20recently,of%20467%25%20over%2010%20years>.
- aa. Canada confirms its support for the Global Methane Pledge.
<https://www.canada.ca/en/environment-climate-change/news/2021/10/canada-confirms-its-support-for-the-global-methane-pledge-and-announces-ambitious-domestic-actions-to-slash-methane-emissions.html> .
- bb. Net-zero hub: Resources for turning strategy and commitments into action. PWC. https://www.pwc.com/ca/en/today-s-issues/environmental-social-and-governance/net-zero.html?WT.mc_id=CT7-PL57-DM1-TR4-LS40-ND30-TTA1-CN_CA22NZ--GOASTD&gclid=EAIaIQobChMI7__-ee89gIVBR6tBh2magnUEAAYASAAEgl6w D BwE&gclsrc=aw.ds .

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3. Government of Alberta

(Has virtually no capacity to inform citizens of the relationship between what is causing climate change, its local impacts and why and how Albertans need to address the problems.)

- a. Municipal Climate Change Action Centre. <https://mccac.ca/> .
- b. Free e-course on climate change literacy for communities across southern Alberta <https://www.ucalgary.ca/sustainability/mobilizing-alberta/preparing-albertans-climate-change-e-course> . (Inadequate guidance.)
- c. Condition of the environment – climate indicators: <https://www.alberta.ca/condition-of-the-environment-changing-climate-indicators> .
- d. Emissions reduction and energy development plan: <https://www.alberta.ca/emissions-reduction-and-energy-development-plan> .
- e. Renewed path forward for renewable energy: <https://www.alberta.ca/release.cfm?xID=898196983D0FA-AECA-5F92-FF655CE1369C4E28> . (In effect an attempt to continue promoting fossil fuels.)
- f. Climate smart agriculture – adaptation: <https://www.alberta.ca/climate-smart-agriculture-adaptation#:~:text=extreme%20weather%20events%20may%20increase,increase%20the%20need%20for%20pesticides>)
- g. Understanding inactive and orphan wells in Alberta. <https://www.canadianenergycentre.ca/understanding-inactive-and-orphan-wells-in-alberta/> . (Estimated cost of dealing with this issue is now \$28 billion.)

4. City of Edmonton.

- a. Edmonton Declaration: https://www.edmonton.ca/city_government/environmental_stewardship/change-for-climate-edmonton-declaration .
- b. Climate Atlas of Canada – Edmonton. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://climateatlas.ca/sites/default/files/cityreports/Edmonton-EN.pdf
- c. Preparing for climate change: https://www.edmonton.ca/programs_services/emergency_preparedness/preparing-for-climate-change .
- d. Climate change adaptation: https://www.edmonton.ca/city_government/environmental_stewardship/climate-change-adaptation .

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- e. Environment and climate resilience: https://www.edmonton.ca/city_government/environmental-stewardship .
- f. Climate change adaptation and resilience strategy: https://www.edmonton.ca/city_government/city_vision_and_strategic_plan/climate-change-adaptation-strategy .
- g. Energy and climate change FAQ: https://www.edmonton.ca/city_government/environmental_stewardship/energy-climate-change-faq .
- h. Edmonton’s Climate Change Almanac: <https://gis.edmonton.ca/portal/apps/Cascade/index.html?appid=da972b3ec996454388cb5535e538c0bc> .
- i. Environment, climate change and energy videos: https://www.edmonton.ca/city_government/environmental_stewardship/change-for-climate-videos .
- j. Community energy transition strategy: https://www.edmonton.ca/city_government/city_vision_and_strategic_plan/energy-transition .
- k. Report on the environment: https://www.edmonton.ca/city_government/facts_figures/videos-booklets-annual-report-environment .
- l. Change for Climate: <https://homes.changeforclimate.ca/> .
- m. Neighbouring for climate: https://www.edmonton.ca/city_government/environmental_stewardship/neighbouring-for-climate .
- n. Edmonton Climate Hub: <https://www.edmontonclimatehub.ca/> .
- o. Becoming a more climate-resilient city: <https://medium.com/mayorsohi/becoming-a-more-climate-resilient-city-f6fade5c870f> .
- p. Partners for climate protection: <https://www.pcp-ppc.ca/about> .
- q. The City of Edmonton’s assessment of the net costs of climate change: <https://changingclimate.ca/map/the-city-of-edmontons-assessment-of-the-net-costs-of-climate-change/> .
- r. Environmental actions: https://www.edmonton.ca/programs_services/environmental/actions-what-you-can-do .

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- s. Sustaining Momentum: Edmontonians’ Views on Climate Action in 2023: <https://www.publicnow.com/view/4225C3E90F7AA1BFBC6FC4994E4E45CE3A4F372C?1698252465> .
5. City of Calgary.
- a. Climate change program: <https://www.calgary.ca/environment/climate/climate-change.html?redirect=/climateprogram>
 - b. City of Calgary Webinar Series: <https://www.calgary.ca/environment/climate/climate-change-webinar-series.html> .
 - c. 2023-2026 Climate implementation plan: <https://www.calgary.ca/environment/climate/implementation-plan.html> .
 - d. Measuring Calgary’s climate action: <https://www.calgary.ca/environment/climate/climate-action.html> .
 - e. Net zero emissions by 2050: <https://www.calgary.ca/environment/climate/net-zero-by-2050.html> .
 - f. Climate advisory committee: <https://bm-public-calgary.escribemeetings.com/BoardDetails/BoardInformation/106> .
 - g. Calgary climate strategy – Pathways to 2050: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://pub-calgary.escribemeetings.com/filestream.ashx?DocumentId=209458
 - h. Calgary climate hub: https://www.calgaryclimatehub.ca/climate_emergency_a_net_zero_target .
 - i. Actions you can take to adapt to climate change: <https://www.calgary.ca/environment/climate/preparing-for-climate-change.html> .
 - j. Climate ready home guide: <https://www.calgary.ca/environment/climate/climate-ready-home-guide.html> .
 - k. Climate Atlas of Canada – Calgary: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://climateatlas.ca/sites/default/files/cityreports/Calgary-EN.pdf
 - l. Climate equity: <https://www.calgary.ca/environment/climate/equity.html> .
 - m. Calgary climate change action plan target 50: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://uccrnn.org/wp-

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What sort of education on the science of global warming and climate change are we getting in Alberta?

- Universities.
- Technical schools.
- Public schools.

No education means no action.

6. University of Calgary

- a. Energy and the environment, <https://www.ucalgary.ca/about/our-history/energy-and-environment>
- b. BMC 138 Global Warming and Climate Change Delivery Options: Online Asynchronous UCalgary Continuing Education.
- c. GEOG 303 LEC01 Introduction to Climate Change GFC Hours 3-0 Fall 2022 classes: September 6th – December 7th, 2022
- d. ENGG686 – Climate Change Adaptation for Engineers – Winter 2024.
- e. Free e-course on climate change literacy for communities across southern Alberta <https://www.ucalgary.ca/sustainability/mobilizing-alberta/preparing-albertans-climate-change-e-course> . (This e-course is sponsored by the Government of Alberta. It does not connect the science of climate change to any actionable adaptation or mitigation needs.)
- f. This e-course does not connect the science of climate change to anything!
- g. Atmospheric and Environmental Physics, Global Climate Change, Vision Statement. <https://www.ucalgary.ca/environmental-physics/about> .

There is no coherent program at the University of Calgary that can address the science of climate change, adaptation needs or mitigation needs.

7. University of Alberta

- a. Climate Action Coalition at the University of Alberta: <https://caua.ca/about/>
- b. Climate change related courses at the UAlberta, 2023-2024 <https://caua.ca/climate-change-related-courses-at-ualberta-2023-2024/> .

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- c. School of Public Health, Graduate embedded certificate in climate change and health: <https://www.ualberta.ca/public-health/programs/graduate-certificates/graduate-embedded-certificate-in-climate-change-and-health.html>
- d. Climate change and human health: <https://apps.ualberta.ca/catalogue/course/sph/556>
- e. Department of Earth and Atmospheric Sciences, The climate system EAS373: <https://www.ualberta.ca/earth-sciences/course-details.html?course=EAS%20373>
- f. Introduction to the Arctic: Climate. Coursera. <https://www.coursera.org/learn/arctic-introduction-climate> .
- g. Electricity and the environment: <https://ext.ualberta.ca/course/EXERM4312> .

There is no coherent program at the University of Alberta that can address the science of climate change, adaptation needs or mitigation needs.

8. Mount Royal University

- a. Environmental Science, B.Sc. is the best program preparing individuals for the study of climate change. https://catalog.mtroyal.ca/preview_program.php?catoid=31&pooid=5720&return_to=2514 . (A great start!)
- b. Climate change through time, GEOL 3503. https://catalog.mtroyal.ca/preview_course_nopop.php?catoid=29&coid=45377
- c. Sustainability Hub. <https://www.mtroyal.ca/AboutMountRoyal/Sustainability/index.htm> .

9. Concordia University – Edmonton

- a. McNeil Centre for Applied Renewable Energy. <https://concordia.ab.ca/external-affairs/mcneil-centre-for-applied-renewable-energy/> . (A start.)
- b. Climate Innovation Fund. <https://concordia.ab.ca/learn-about-the-climate-innovation-fund/> .

There is no coherent program at Mount Royal University that can address the science of climate change, adaptation needs or mitigation needs.

10. Athabasca University

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- a. Environmental change in a global context – ENVS 243.
https://www.google.com/search?q=Athabasca+University+climate+change&oq=Athabasca+University+climate+change&gs_lcrp=EgZjaHJvbWUyBggAEEUYOdIBC Dk2MjNqMGo3qAIAA&sourceid=chrome&ie=UTF-8 .
- b. Nukskahtowin – Meeting Place, Climate Change.
<https://www.athabascau.ca/indigenous/resources/climate-change.html> .
- c. Environmental Studies, ENVS 343.
<https://www.athabascau.ca/syllabi/envs/envs343.html> .

There is no coherent program at Athabasca University that can address the science of climate change, adaptation needs or mitigation needs.

11. University of Lethbridge

- a. Experts' data base climate change: <https://www.ulethbridge.ca/experts-database/topics/climate-change> .

There is no coherent program at the University of Calgary that can address the science of climate change, adaptation needs or mitigation needs.

12. SAIT – Southern Alberta Institute of Technology

- a. WATR 300 – Water and Climate Change
- b. Integrated Water Management <https://www.sait.ca/programs-and-courses/diplomas/integrated-water-management#courses>
- c. Sustainability <https://www.sait.ca/about-sait/campus/facilities-services-and-maintenance/sustainability> .
- d. Green building technologies <https://www.sait.ca/research-and-innovation-services/green-building-technologies> .
- e. Centre for Energy Research and Clean Unconventional Technology Solutions <https://www.sait.ca/research-and-innovation-services/centre-for-energy-research-and-clean-unconventional-technology-solutions> .
- f. SNRG 003 – Low-Carbon Hydrogen: What Canadians Need to Know <https://coned.sait.ca/search/publicCourseSearchDetails.do?method=load&courseId=8471527> . (Also see <https://natural-resources.canada.ca/energy-efficiency/transportation-alternative-fuels/infrastructure/education-and->

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[awareness-project-funding-clean-transportation-and-clean-fuels/education-and-awareness-project-funding-clean](#))

There is no coherent program at SAIT that can address the science of climate change, adaptation needs or mitigation needs.

13. NAIT – Northern Alberta Institute of Technology

- a. Centre for energy and environmental sustainability.
<https://www.nait.ca/applied-research/about/centres/technology-access-centre-for-energy-and-environmen> .
- b. Cleaner energy. <https://www.nait.ca/applied-research/research-areas/cleaner-energy> .
- c. Renewable resources and environmental services.
<https://www.nait.ca/nait/schools-programs/school-of-applied-sciences-and-technology/programs/renewable-resources> .
- d. Bachelor of Technology, sustainability management concentration.
<https://www.nait.ca/programs/btech-sustainabilitymanagement?term=2024-spring&intake=3d3d7b23-dd6a-4f6e-b67d-5ece13c1d3f3> .
- e. Understanding environmental disaster risk, EMGT2350.
<https://www.nait.ca/creditcourse?coursecode=EMGT2350> .

There is no coherent program at NAIT that can address the science of climate change, adaptation needs or mitigation needs.

Other resources

1. Pembina Institute: <https://www.pembina.org/> .
 - a. Alberta’s roadmap to the new energy economy
<https://www.pembina.org/pub/albertas-roadmap-new-energy-economy>
 - b. Alberta hamstrings renewables sector with rules not required for other industries: news@pembina.org 2024-02-28.
 - c. Pembina available for comment on Alberta Budget 2024: news@pembina.org 2024-02-29.
2. Prairie Climate Centre <https://prairieclimatecentre.ca/> .

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3. Canadian Climate Institute <https://climateinstitute.ca/> . See Independent assessment: National Adaptation Strategy, https://climateinstitute.ca/reports/safer-and-more-resilient-canada/?campaignid=19574506956&adgroupid=146898007322&keyword=canada%27s%20climate%20plan&device=c&gad_source=1&gclid=EAlaIqobChMIqIGCqIvRhAMVKiytBh0xQQgNEAAYASAAEgL3jPD_BwE .
4. Alberta Water and Wastewater Operators Association, Climate change adaptation options for Water and Wastewater systems in the Prairies <https://www.awwoa.ca/courses/details/climate-change-adaptation-options-for-w-ww-systems-in-the-prairies/>
5. Climate Outreach <https://climateoutreach.org/> .
6. Alberta Wilderness Association: <https://albertawilderness.ca/climate-change/#:~:text=Alberta's%20watersheds%20face%20an%20increased,to%20meet%20our%20basic%20needs.>
7. Nature United: https://www.natureunited.ca/what-we-do/our-priorities/innovating-for-climate-change/?gad_source=1&gclid=EAlaIqobChMI6KfRolzRhAMV_QetBh3WPQOUEAMYASA_AEgLOsvD_BwE .
8. Alberta Council for Environmental Education, ACEE. <https://www.abcee.org/about-acee/> . (Has stopped providing resources to public schools pertaining to education on climate change science. Schools barely introduce the subject.)

December 12, 2020 – Fifth Anniversary of the Paris Agreement

August 9, 2021 – Publication of IPCC AR6 WG1, Climate Change, The Physical Science Basis, February 28, 2022 IPCC AR6 WGII, Climate Change: Impacts, Adaptability and Vulnerability and April 4, 2022 IPCC AR6 WGIII, Climate Change: Mitigation

Guide to the Science of Climate Change in the 21st Century, August 14, 2021