

Roadmap to Excellent Climate Education

March 2021

Marie Tremblay

Alberta Council for Environmental Education



ACEE Alberta Council for
Environmental Education

ADVANCING ENVIRONMENTAL EDUCATION IN ALBERTA

Barriers to teaching about climate change: Do any of these resonate with you?

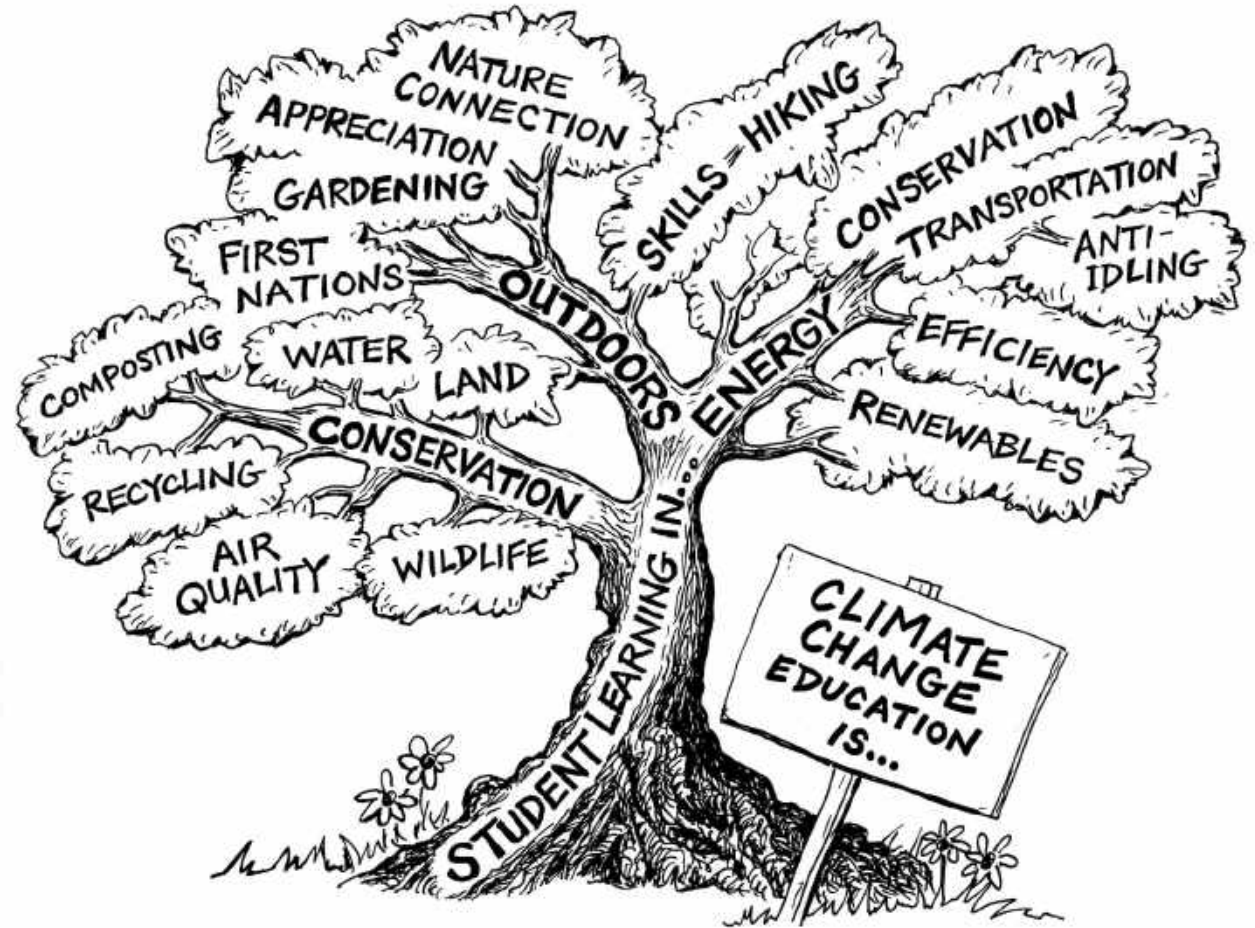
1. Low emphasis in the curriculum
2. Lack of confidence
3. Fear of pushback (students, parents, administrators)
4. Topic is depressing - causes anxiety
5. Lack of time
6. Lack of student engagement

Curriculum links

- Science
- Social studies
- Language arts
- Math

“It’s not climate change,
it’s **everything** change”

Margaret Atwood



Grade 2 Science Curriculum Links to Sustainability Education and Action

Topic D: Hot and Cold Temperature

Recognize the effects of heating and cooling, and identify methods for heating and cooling.

Links to Place and Nature

- How do we use thermometers to measure ambient temperature?
- How does temperature affect how we dress to go outside?
- How does temperature vary throughout the course of the day?
- What places in the schoolyard are warmer or cooler?
- How does the human body maintain an even temperature?
- What do local animals do to keep warm or stay cool?

Links to Indigenous Perspectives

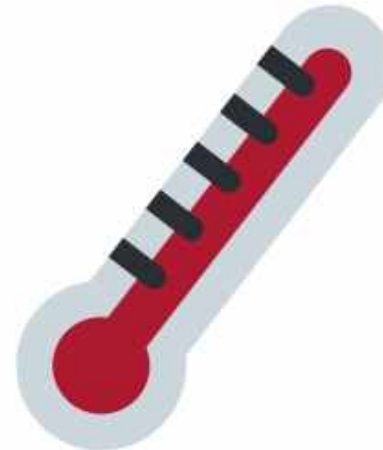
- How did Indigenous peoples in my area traditionally stay warm or cool throughout the seasons?
- How do these methods compare to modern methods of staying warm or cool?

Links to Climate Change

- How does ambient temperature affect me?
- How does extreme heat affect me?
- How does it affect plants and animals?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (2)**: Calgary's average annual temperature is increasing due to climate change. The amount of very hot days is increasing in Calgary due to climate change (p. 65-72).
- The **Climate Adaptation Action Plan (2)** includes many actions to manage our very hot days in Calgary. For example, The City of Calgary is continuing to expand naturalization programs for City parks and green space to reduce the Urban Heat Island Effect in Calgary (p.86).



<https://www.abcee.org/curriculum-links>



Curriculum links

Kindergarten - Grade 3

Environmental education needs to be age appropriate. *The focus for younger students should be on connecting with nature, and understanding the interconnections among plants, animals, ecosystems - and themselves.* Where does the water I drink everyday come from? Where does the food I eat come from? How does my own health depend on healthy ecosystems? This is also a great time to instill good environmental and climate 'habits', like turning lights and electronics off when not in use, and reducing waste. It's never too early to help students understand that the energy and resources we use to help make our lives better are precious and should not be wasted.

Kindergarten Social Studies

Grade 1 Social Studies

Grade 1 Science

Grade 2 Social Studies

Grade 2 Science

Grade 3 Social Studies

Grade 3 Science

Grade 4 - Grade 6

As students get older, they can progressively learn more about the underlying causes and complexities of our most pressing environmental issues including climate change.

Grade 4 Social Studies

Grade 4 Science

Grade 5 Social Studies

Grade 5 Science

Grade 6 Social Studies

Grade 6 Science

Grade 7 - Grade 9

Grade 7 Social Studies

Grade 7 Science

Grade 8 Social Studies

Grade 8 Science

Grade 9 Social Studies

Grade 9 Science

<https://www.abc.org/curriculum-links>

Today's roadmap

Confusion, Anxiety, Apathy

1. Approach with empathy and curiosity
2. Connect to nature and place
3. Build literacy (scientific and social)
4. Develop critical thinking and problem-solving skills
5. Help students be part of the solution
6. Inspire others to action

Informed, Prepared, Optimistic

https://www.abcee.org/sites/default/files/ACEE%20Road%20map%20to%20excellent%20climate%20change%20education_0.pdf

ROADMAP TO Excellent Climate Change Education

Insights from the Alberta Council for Environmental Education

In late 2019 we spoke with more than 170 students from nine communities across Alberta and in early 2020 we conducted province-wide polling of over 500 Alberta youth ages 15 to 24. For today's students, climate change is not controversial; in fact, the vast majority agree that it should be taught in school and should be a high priority for grades 4-12. For Alberta youth, teachers are one of the most trusted sources of information about climate change.¹ When students are not taught about environment, energy and climate change, they construct their own meanings, which are commonly incorrect - and can create feelings of confusion and anxiety.² Here are six things we can all do on the 'road' to excellent climate change education!



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1. 2020 Youth-Riding Environment, Energy & Climate Survey. Prepared by Logan (Mother) Alberta, for the Alberta Council for Environmental Education, April 27, 2020.
2. Shaw, C. and Strong, A. (2020) Youth Narratives: Youth Recommendations for Climate and Energy Education in Alberta. Global Climate Change.
3. Ipsos. Ipsos will share their 2019 report, "Resilient 16: Youth's Perspective for Government Decision Making."
4. The double climate change to teach in schools? Dr. Stan Fultz, Pam Stokrover and Dr. Paul Steger. 50 Car Network, the Faculty of Education at the University of Alberta and Learning for a Sustainable Future.

Stop #1

Approach with empathy and curiosity

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Students are anxious about their future

“I would feel sick because I would realize exactly how many things we’re doing to destroy our planet.”
- Grade 7 student



<https://www.abcee.org/sites/default/files/ACEE-v4%20%281%29.pdf>

YOUTH NARRATIVE AND VOICE

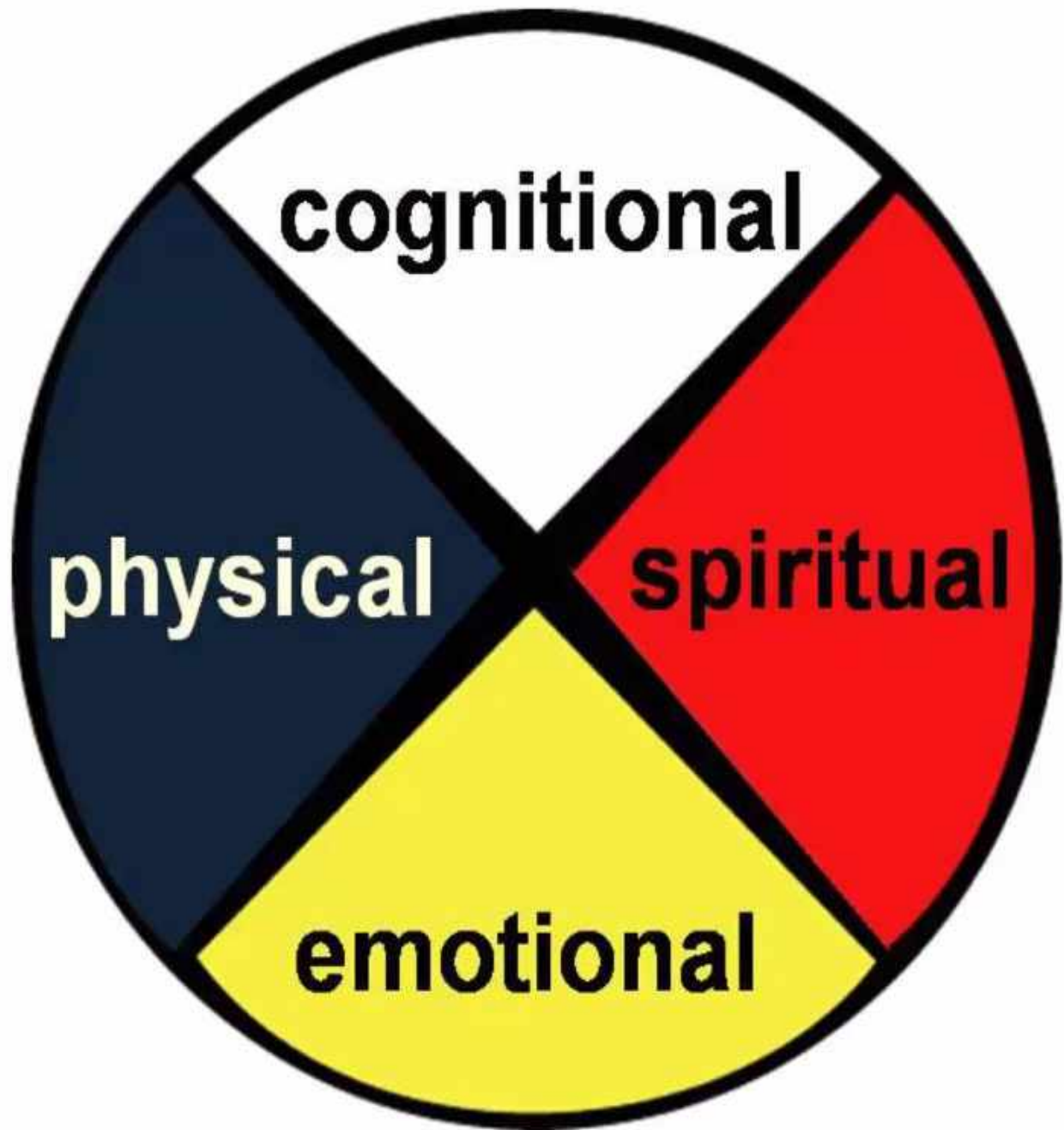
Principles for Effective Climate, Energy and Environmental Education in Alberta





“No tragedies
before grade 4.”

- Dr. David Orr



Mind
Body
Heart
Spirit

How to talk about climate change



Katharine Hayhoe,
Climate Scientist, Texas
Tech University

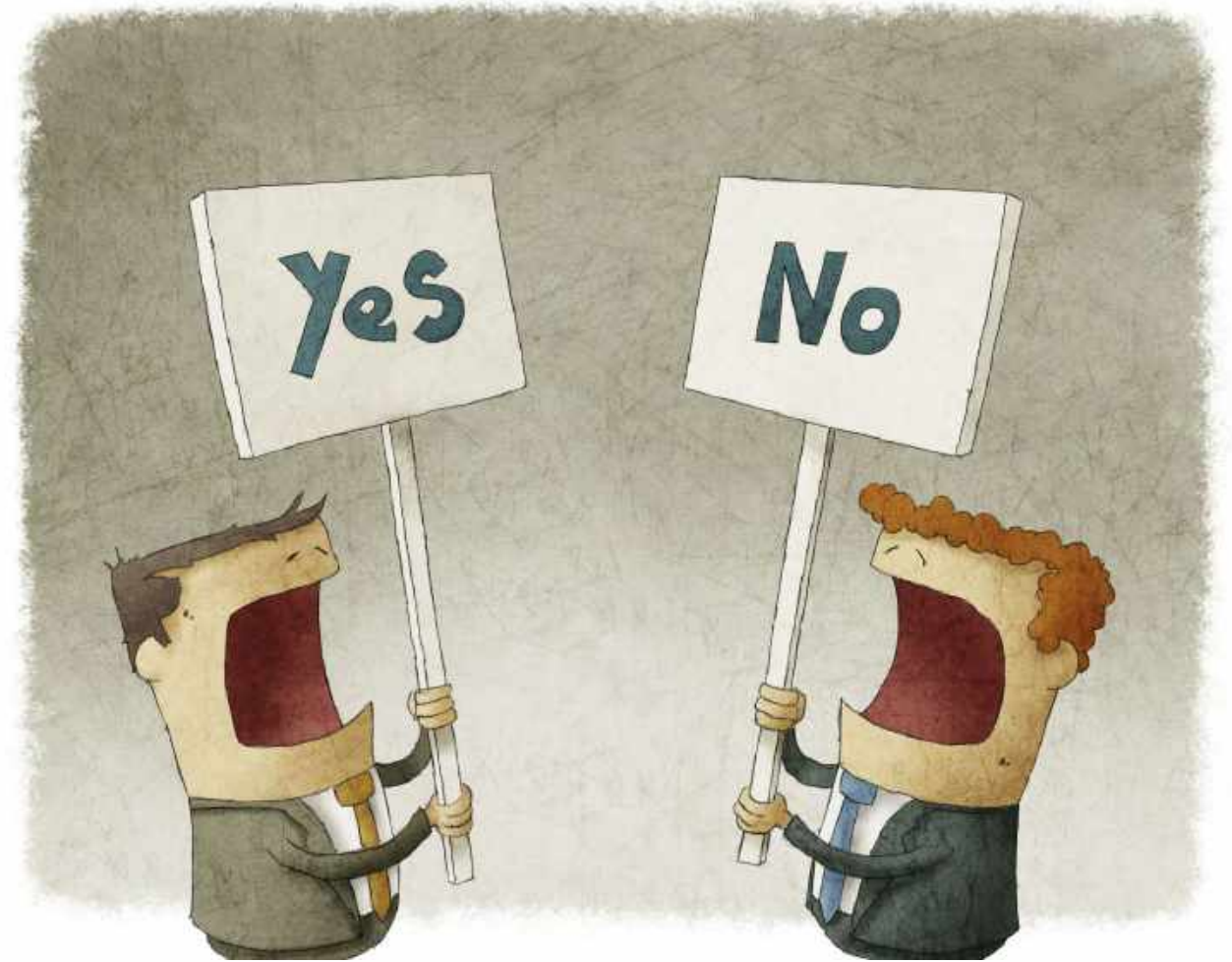
Details **Transcript** **Reading List** **Footnotes** **Comments (64)**
About the talk 17 languages Further learning Notes + references Join the conversation

How do you talk to someone who doesn't believe in climate change? Not by rehashing the same data and facts we've been discussing for years, says climate scientist Katharine Hayhoe. In this inspiring, pragmatic talk, Hayhoe

1,870,958 views

<https://www.ted.com/talks/katharine-hayhoe-the-most-important-thing-you-can-do-to-fight-climate-change-talk-about-it?language=en>

Think conversation, NOT debate!



Think conversation, NOT debate!



Stop #2

Connect with nature and place

https://www.abcee.org/sites/default/files/ACEE%20Road%20map%20to%20excellent%20climate%20change%20education_0.pdf

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To help you, we curate some great climate education resources from many sources and organizations!
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Alberta Youth Leaders for Environment and Energy Education (AYLEED)
<https://www.abcee.org/4to18t-youthleaders/>

Our relationship with the Earth is broken



How is climate change affecting Alberta, here and now?

- Wildfires
- Floods
- Pine beetle
- Droughts
- Extreme weather events



Fort McMurray 2016



Edmonton 2019



Calgary 2013



Alberta wheat field



Jasper (ongoing)

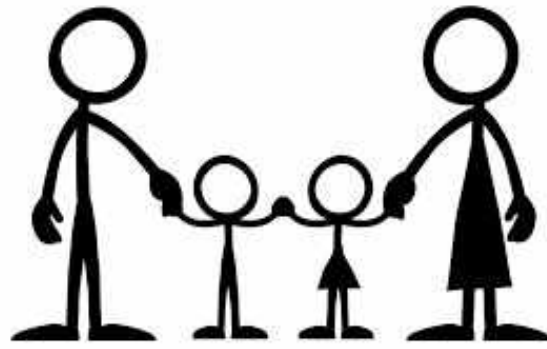


Seeking guidance from Indigenous perspectives

- People as part of nature, rather than separate from it
- Healing our relationship with Mother Earth
 - connectedness
 - reciprocity
 - responsibility



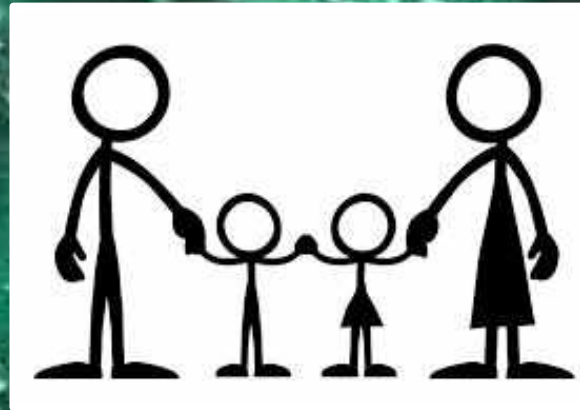
Western perspective



Relationship

Responsibility

Respect



Reciprocity

Upcoming Workshops:

Exploring Sustainability Through an Indigenous Lens - Getting Started with Elementary Students (April 20 & 27)

Exploring Sustainability Through an Indigenous Lens - Getting Started with Secondary Students (May 4 & 11)



Donna Ross & Marie Tremblay



Outdoor learning: connecting to nature and place

- Fosters love and respect for nature
- Makes learning local and relevant
- Provides a fun and engaging learning environment
- Contributes to student wellness



Stop #3

Build scientific AND social literacy

https://www.abcee.org/sites/default/files/ACEE%20Road%20map%20to%20excellent%20climate%20change%20education_0.pdf

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Welcome to an *exploration*

- Forget being an expert!
- Demonstrate commitment to lifelong learning
- Use your students' questions as a starting point, and grow from there...



Let's start with the basics - time for a quiz!

QUIZ YOURSELF

CLIMATE CHANGE QUIZ

[HOME](#) > [CLIMATE CHANGE QUIZ](#)

SHARE



How much do you know about the world's greatest threat? We're talking, of course, about climate change.

<https://www.earthday.org/the-climate-change-quiz/>

What are your most ‘burning’ questions when it comes to climate change?

Five essentials of climate change

1. The earth is warming
2. It's bad
3. It's because of humans
4. Experts agree
5. We can fix it

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99% agree:

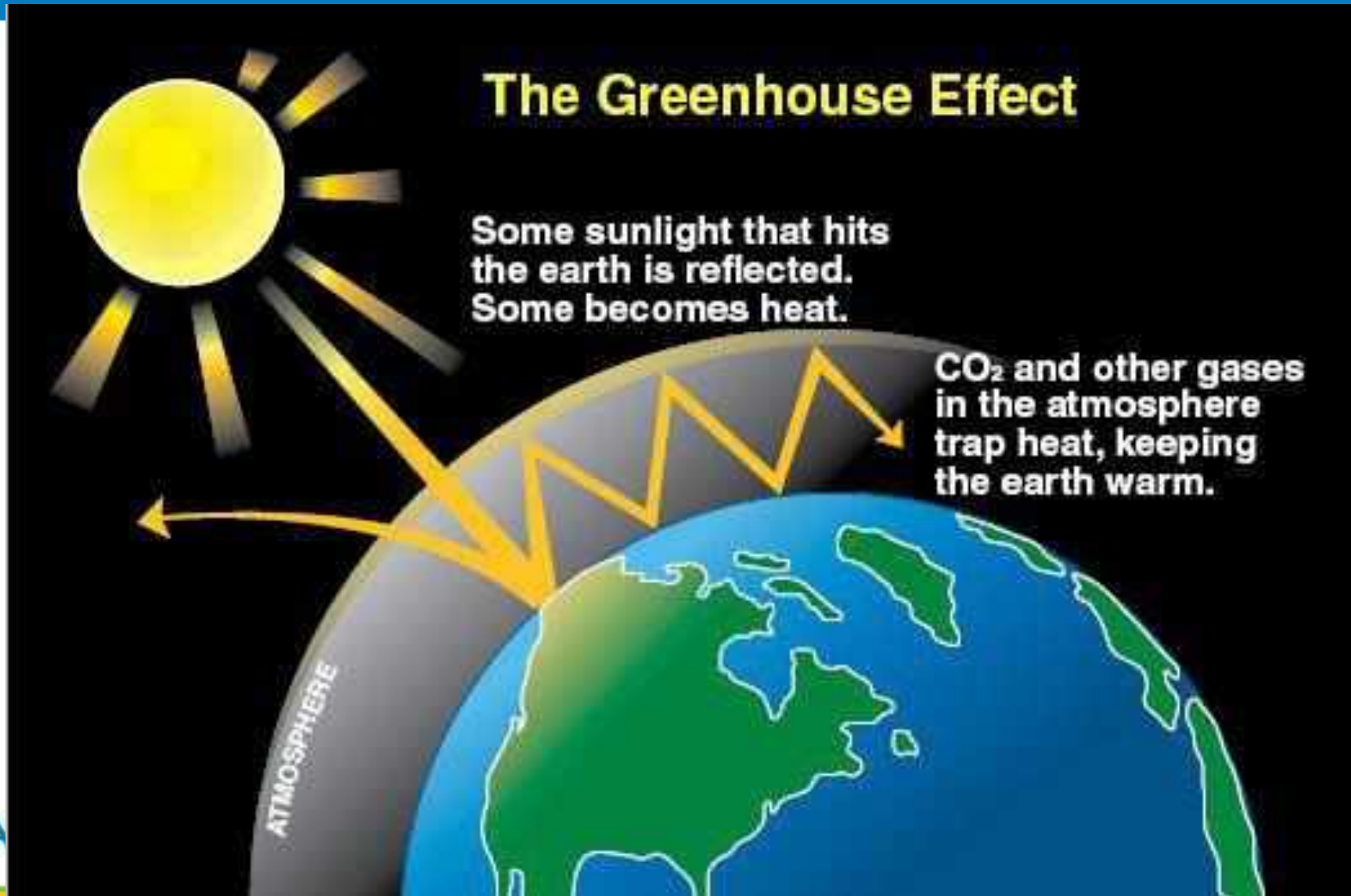
- climate change is happening and is caused by human activity
- urgent action is needed

<https://www.theguardian.com/science/2019/jul/24/scientific-consensus-on-humans-causing-global-warming-passes-99>

Five essentials of climate change

1. The earth is warming
2. It's bad
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What is the mechanism?

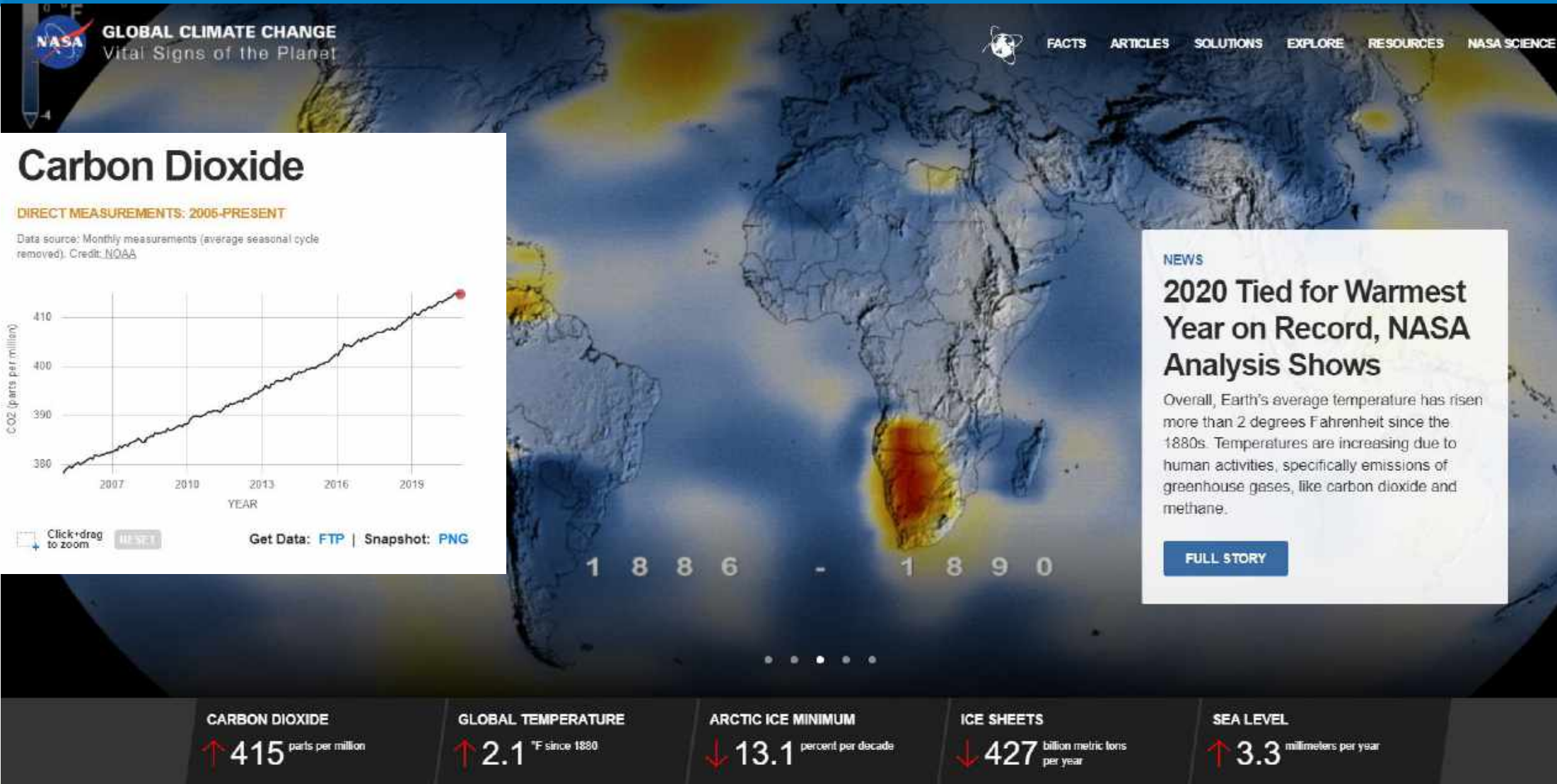


https://www.google.com/search?q=greenhouse+effect+diagram&rlz=1C1CHBF_enCA883CA883&tbm=isch&source=iu&ictx=1&fir=WW9ttjbmGE8bcM%253A%252Cg_Ex_9iAsYTaCM%252C_&vet=1&usg=AI4_-kSu6EMbQMtpgDS3BGY4ICA0tbVLWw&sa=X&ved=2ahUKewjvrqeQ-f7nAhXoHzQIHTQ3Bj0Q9QEWAhOECAoQLg#imgsrc=OULYdM_Bwlrvm



What is the evidence?

NASA Global Climate Change - REAL data in REAL time



<https://climate.nasa.gov/>



Big Questions



Weather &
Climate



Atmosphere



Water



Energy



Plants & Animals

What Is Climate Change?



The Short Answer:

Climate change describes a change in the average conditions — such as temperature and rainfall — in a region over a long period of time. NASA scientists have observed Earth's surface is warming, and many of the warmest years on record have happened in the past 20 years.

Weather vs. Climate

Local Weather



Global Climate

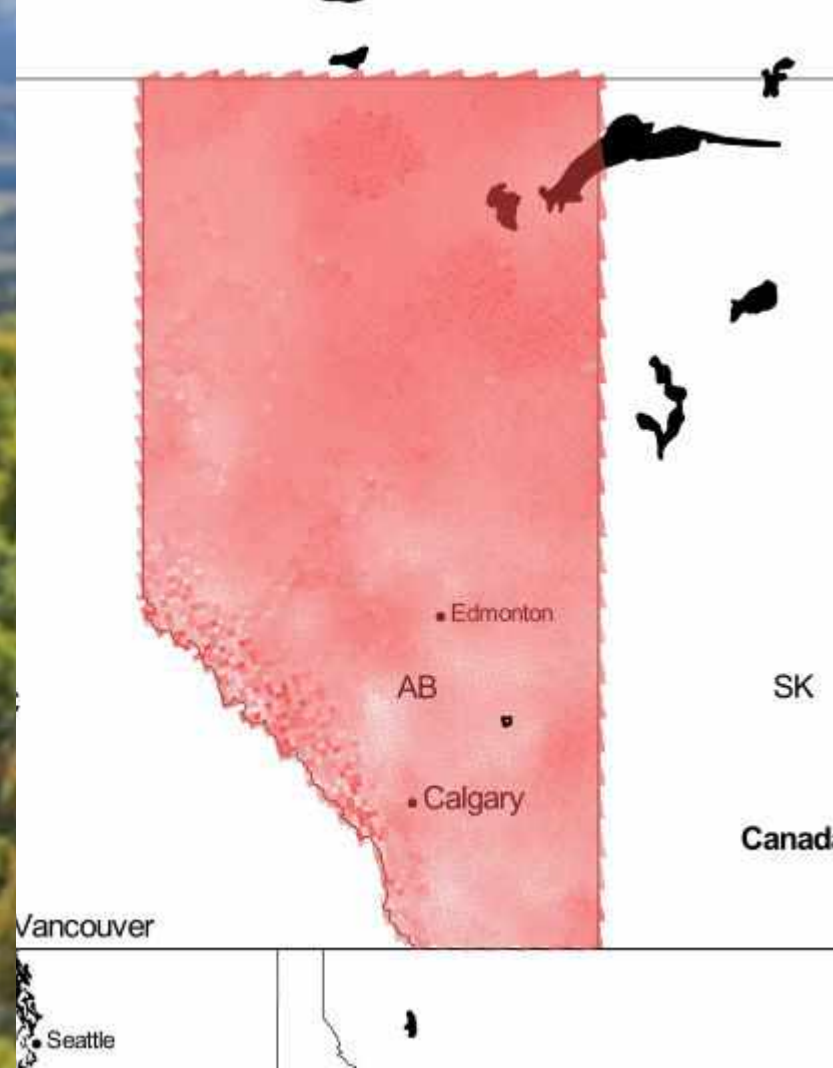


ALBERTA CLIMATE RECORDS

Visualizing Climate Change Past & Present

START →

Not your first time? Get right into the data
or Review the 2019 updates



+VARIABILITY)

INDEX CHANGE

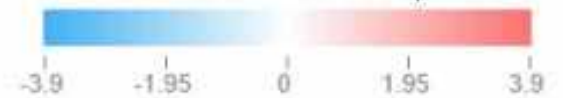
Calgary

Trendline:



Difference from 1951 - 2017:

+2.1 °C



<http://albertaclimaterecords.com/>

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- Floods
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Social dimensions to explore...

- Social justice
- Global citizenship
- Sustainable Development Goals

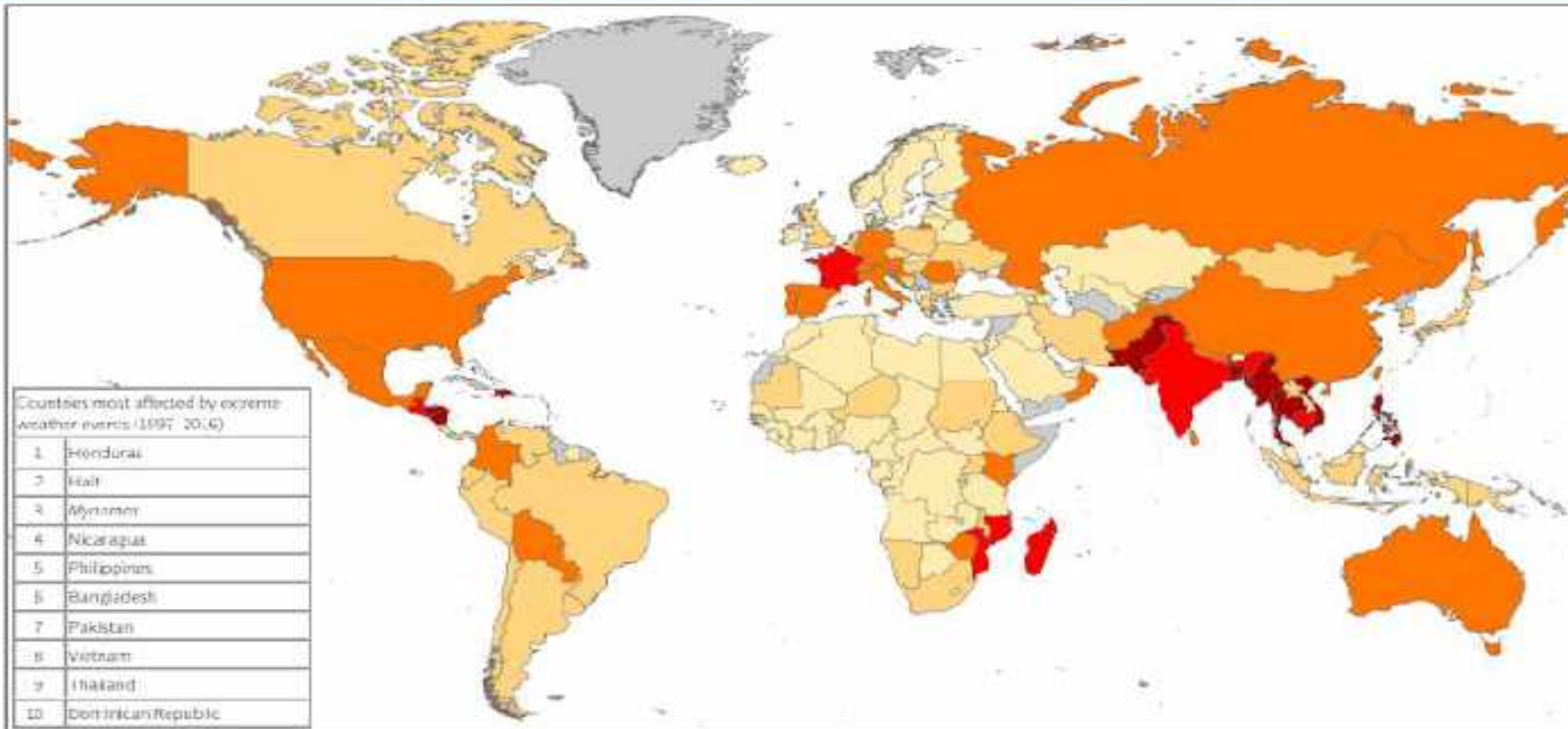
2015 Pope's Encyclical on the Environment - *Caring for Our Common Home*



Climate change: the moral issue of our time.

We must look after the earth and the poor.

Global climate risk: some nations are more vulnerable than others...



(Note: Countries where more than 90% of the losses/deaths occurred in one year)

Climate Risk Index: Ranking 1997-2016 ■ 1-10 ■ 11-20 ■ 21-50 ■ 51-100 ■ >100 ■ No Data

Figure 1: World Map of the Global Climate Risk Index for 1997-2016

Source: Germanwatch and Munich Re NatCatSERVICE

Source:
<https://germanwatch.org/de/14638>

United Nations' Agenda 2030: Fostering global citizenship

SUSTAINABLE DEVELOPMENT GOALS



Stop #4

Develop critical thinking skills

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https://www.abcee.org/sites/default/files/ACEE%20Road%20map%20to%20excellent%20climate%20change%20education_0.pdf

A great opportunity to develop critical thinking skills

- **Ask** good questions
- **Identify** important similarities and differences
- **Judge** the accuracy of statements
- **Rate** the direct and indirect effects
- **Create** an accurate illustration
- **Support** reasons with evidence
- **Develop** an effective hypothesis
- **Assess** proposed solutions
- **Support** or refute conclusions
- **Assess** the adequacy of evidence

Critical Thinking Consortium

<https://tc2.ca/>

Dispelling climate myths

<https://skepticalscience.com/>

The image shows the homepage of the Skeptical Science website. At the top, there is a navigation bar with links for Home, Arguments, Software, Resources, Comments, The Consensus Project, and Translations. Below the navigation bar is a search box with a 'GO' button and social media icons for Twitter, Facebook, YouTube, and Pinterest. There are also icons for RSS feeds and an email subscription link. The main content area features a section titled 'MOST USED Climate Myths' with a list of 10 myths and a 'View All Arguments...' link. To the right of this list are three buttons: 'Newcomers, start here', 'History of Climate Science' (with a timeline from 1930 to 1960), and 'The Big Picture'. Below these buttons is a section for 'Skeptical Science New Research for Week #43, 2019', posted on 29 October 2019 by doug_bostrom. This section includes a banner for 'Skeptical Science Weekly Research Posts' and a photo of a desk with papers and a calculator. At the bottom, there is a section for 'IPCC FACTS Guide to RCPs' and a 'Look up a Term' search box.

Skeptical Science
Getting skeptical about global warming skepticism

Home Arguments Software Resources Comments The Consensus Project Translations

Search...
GO

Twitter Facebook YouTube Pinterest
RSS RSS Email
Posts Connects Email

MOST USED Climate Myths
and what the science really says...

- 1 Climate's changed before
- 2 It's the sun
- 3 It's not bad
- 4 There is no consensus
- 5 It's cooling
- 6 Models are unreliable
- 7 Temp record is unreliable
- 8 Animals and plants can adapt
- 9 It hasn't warmed since 1995
- 10 Antarctica is gaining ice

View All Arguments...

Newcomers, start here **History of Climate Science** **The Big Picture**

Skeptical Science New Research for Week #43, 2019
Posted on 29 October 2019 by doug_bostrom

Skeptical Science Weekly Research Posts

62 articles, 11 open access
[Late breaking]

IPCC FACTS Guide to RCPs
the TREND
Look up a Term

MOST USED Climate Myths

and what the science really says...

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- 1 - Climate's changed before
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 - 7 - Temp record is unreliable
 - 8 - Animals and plants can adapt
 - 9 - It hasn't warmed since 1998
 - 10 - Antarctica is gaining ice
- [View All Arguments...](#)

<https://skepticalscience.com/>

Stop #5

Help students be part of the solution

https://www.abcee.org/sites/default/files/ACEE%20Road%20map%20to%20excellent%20climate%20change%20education_0.pdf

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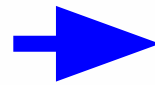
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Problem Space



Problem Space



Solution Space



Students are interested in climate **solutions**

Hearing about solutions to environmental problems made students feel more hopeful about the future.

<https://www.abcee.org/narratives>

YOUTH NARRATIVE AND VOICE

Principles for Effective Climate, Energy
and Environmental Education in Alberta

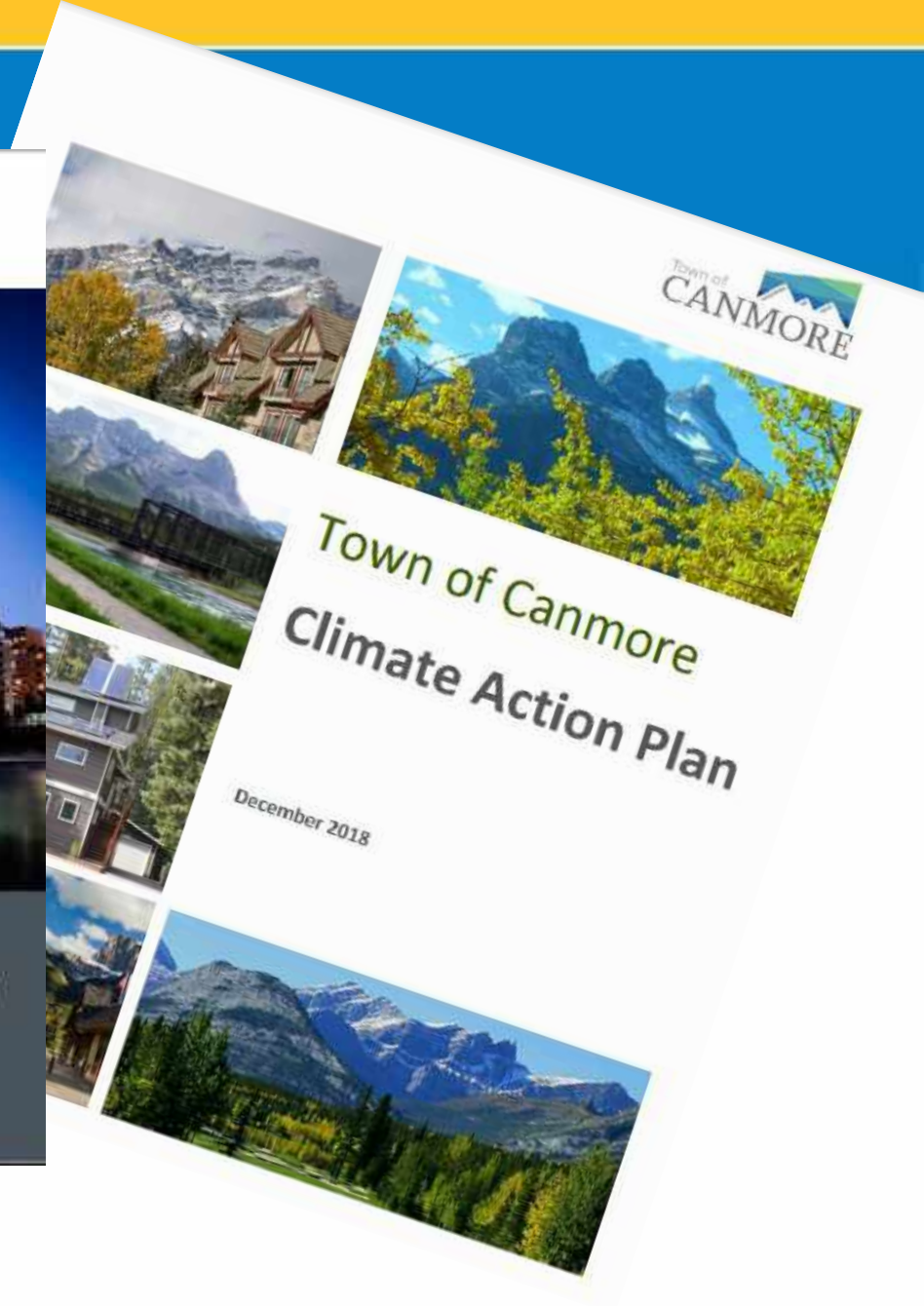
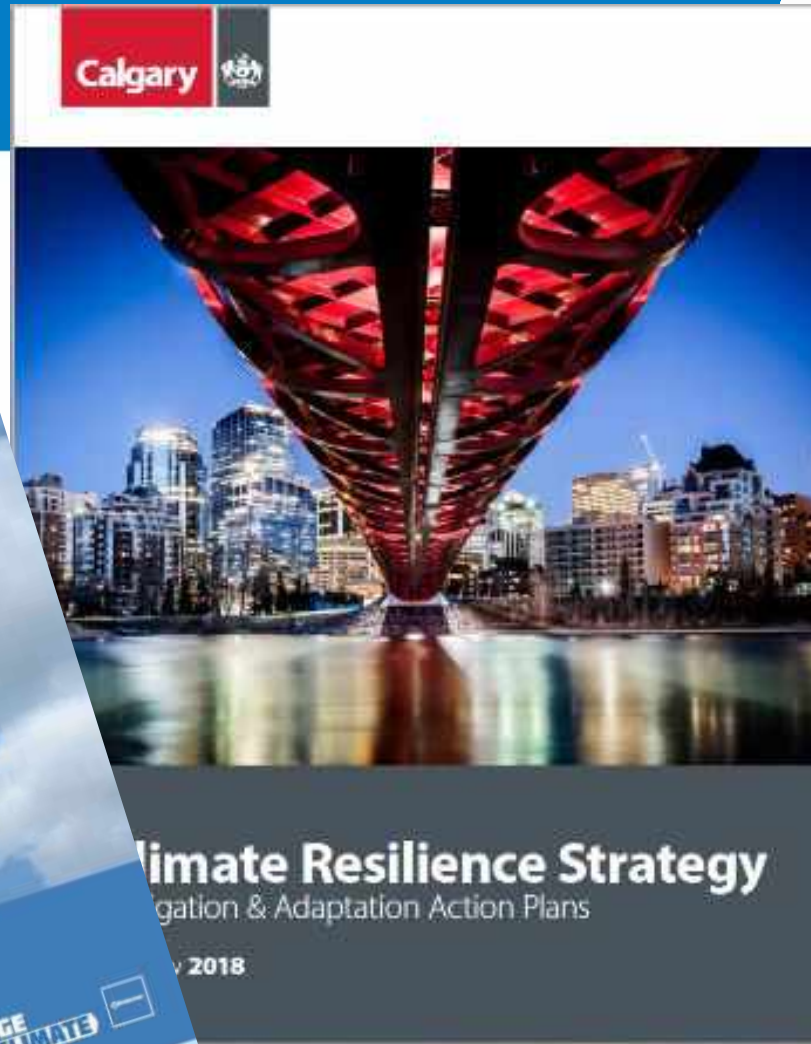


Enough talk then....



Enough talk then....

Let's get after it!



Municipal Climate Change Action Centre

Municipalities planning for climate change in Alberta

<https://mccac.ca/alberta-municipalities-planning-for-climate-change/>

Cities

- [City of Airdrie](#)
- [City of Calgary](#)
- [City of Edmonton*](#)
- [City of Leduc](#)
- [City of Red Deer](#)
- [City of Spruce Grove](#)
- [City of St. Albert](#)

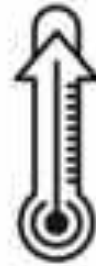
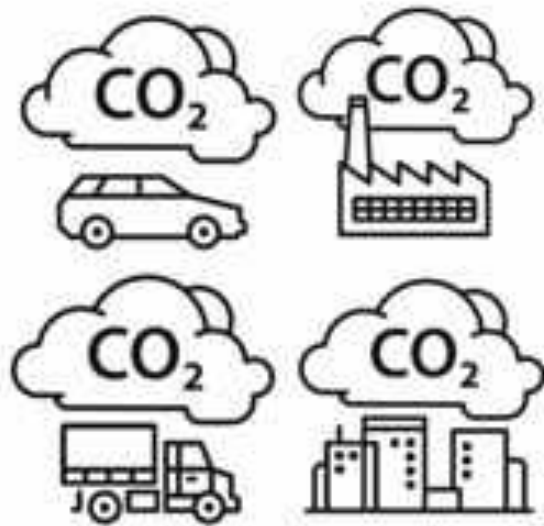
Towns

- [Town of Banff](#)
- [Town of Canmore*](#)
- [Town of Cochrane](#)
- [Town of Devon](#)
- [Town of Black Diamond](#)
- [Town of Drayton Valley](#)
- [Town of Okotoks](#)
- [Town of Stony Plain](#)
- [Town of Sylvan Lake](#)

Counties

- [Brazeau County](#)

Two categories for climate change action



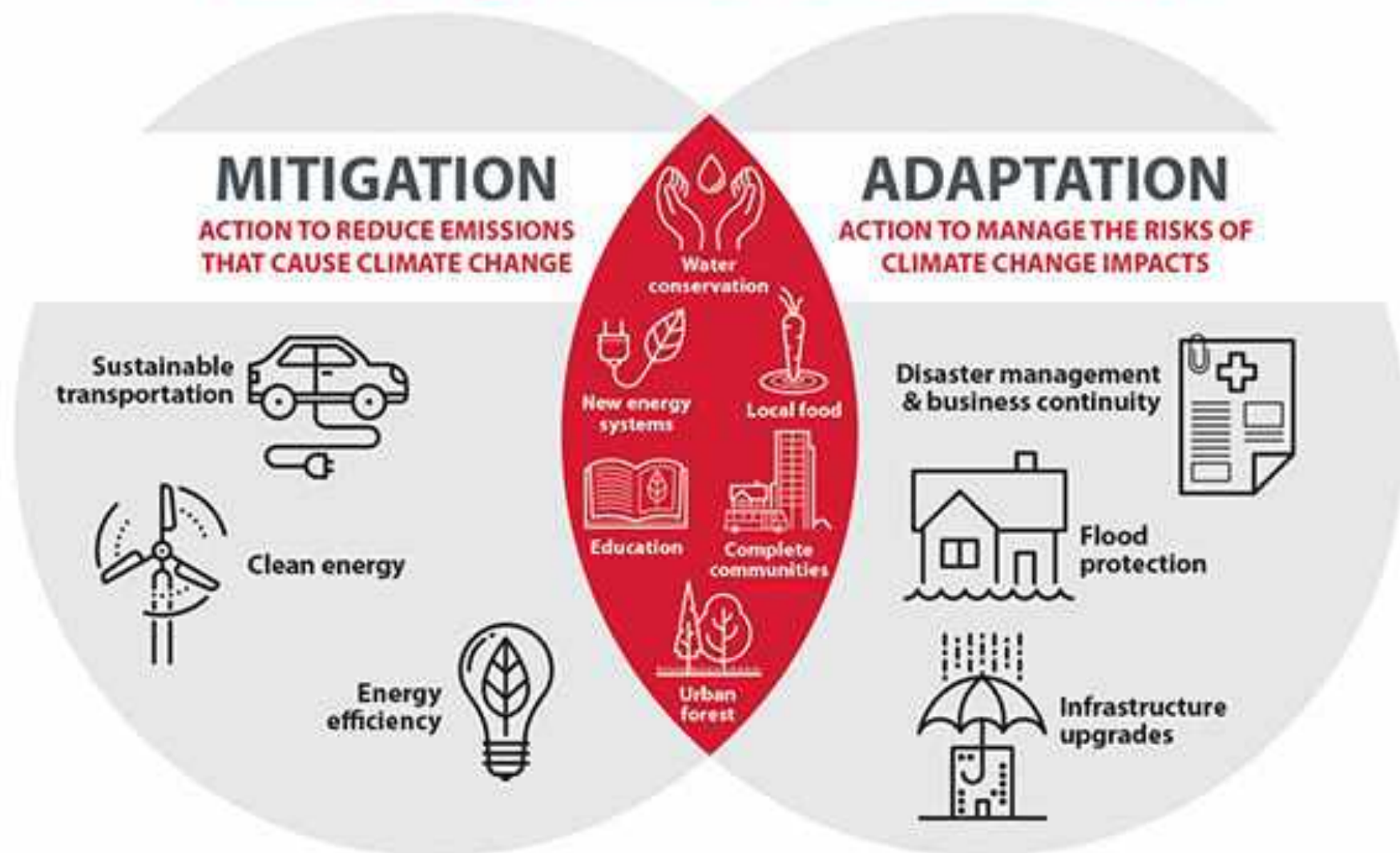
MITIGATION

action to reduce emissions that cause climate change

ADAPTATION

action to manage the risks of climate change impacts

Building Climate Resilience



Activity: Mitigation vs Adaptation

Can be downloaded for free at:

https://energy.techno-science.ca/doc/resources/TWD_English.pdf



TEACHER'S GUIDE

TO WHAT DEGREE?

Telling Climate Change Stories Through Photos

Preparing for climate-driven health impacts

A scientist explains it. Call growing in a pot! 60%...
Counting these various risks as about how much...
...is present in the engineering records, of average...
...to average.

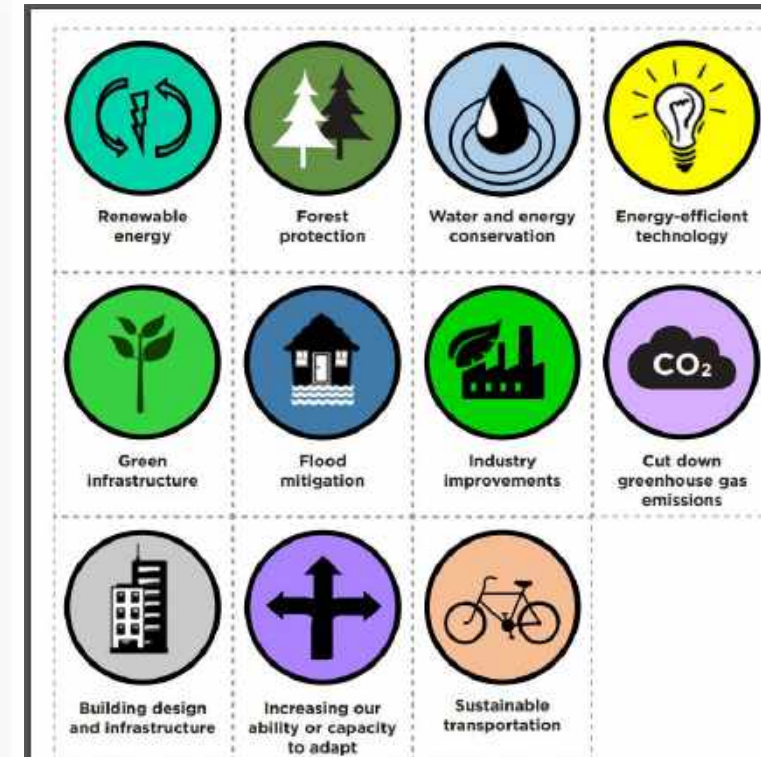
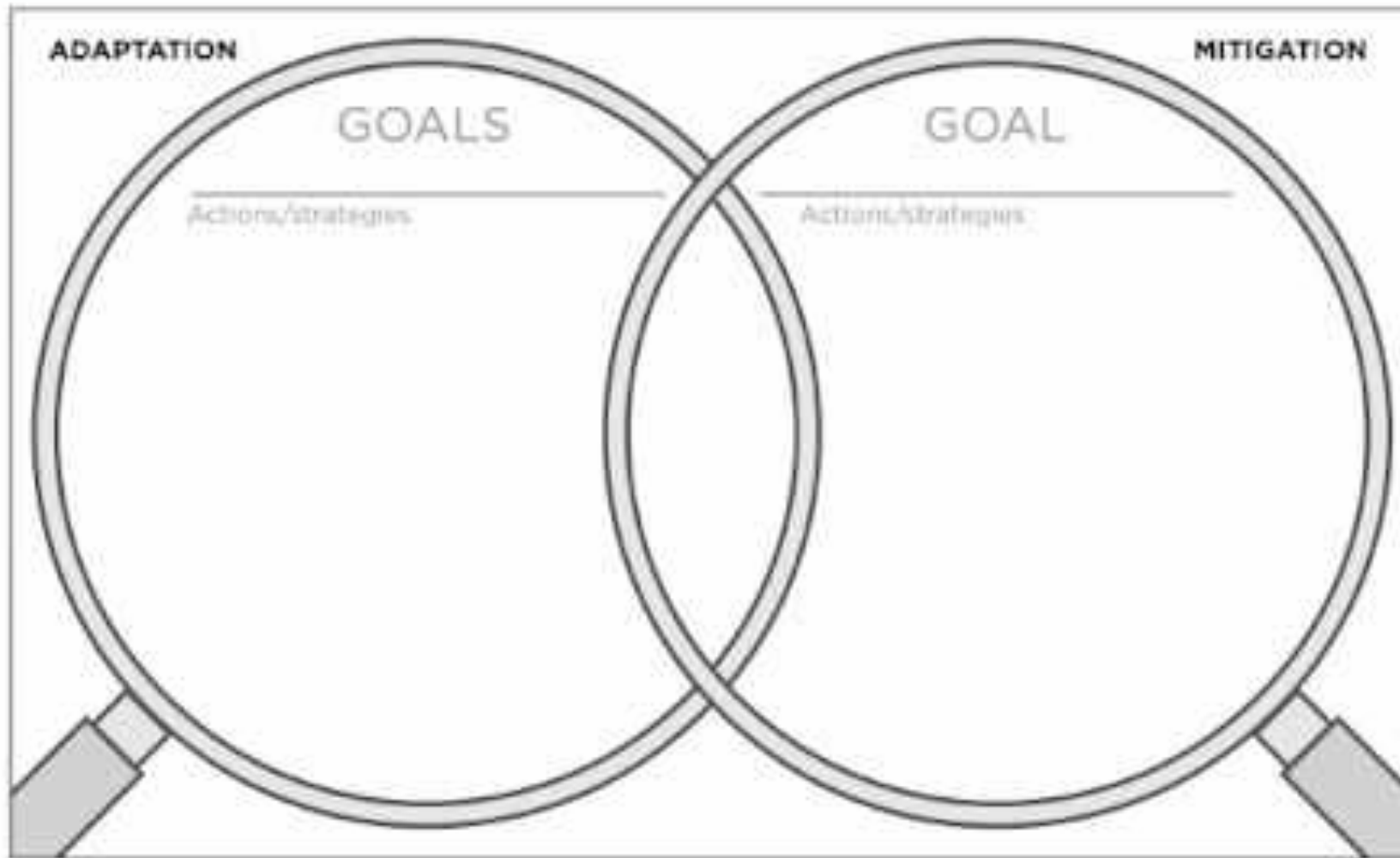
More intense weather like heavy rainfall and extreme...
temperatures per our health and well-being at risk...
...that the risk may spread disease, reduce our...
...activity, and impact our environment and resources...
...Climate scientists are preparing for these changes by...
...making advances through research, laboratory work...
...advancing and monitoring that will help us address...
...climate change impacts.

Préparation pour les effets sur la santé du climat

Un scientifique explique comment...
...croquer dans une pot! 60%...
...à compter ces divers risques en fonction de...
...à quelle fréquence ils sont présents dans les...
...documents techniques, en moyenne...
...à l'échelle de la moyenne.

Plus d'événements météorologiques extrêmes...
comme de fortes pluies et des températures...
...élevées peuvent nuire à notre santé et à...
...notre environnement et à nos ressources...
...Ces scientifiques se préparent à ces changements...
...en faisant des avancées grâce à la recherche...
...en laboratoire et à la surveillance...
...qui nous aideront à faire face aux impacts...
...du changement climatique.

Activity: Mitigation vs. Adaptation



Let's take a closer
look at mitigation...



Actions you can take in your home to help limit climate change.



1 Open/close window coverings seasonally

1 Draft-proof home

1 Program thermostat
17° C (night/away),
21° C (day)

1 Use fan instead of
air conditioning

1 Install drain water heat
recovery system

1 Install tankless on-
demand water heater

1 Wash clothes in
cold water

1 Hang clothes to dry

1 Use toaster oven for
small meals

1 Install induction stove

1 Install low flow shower
head

1 Install faucet aerators
on taps

1 Leave grass clippings
on lawn

1 Use a solar or push
lawn mower

2 Use a French press
instead of coffee maker

2 Change lightbulbs
to LEDs

2 Upgrade to ENERGY
STAR appliances

2 Install high efficiency
furnace

2 Install geothermal
exchange system

2 Install energy efficient
windows

3 Insulate home

4 Install solar energy and
photovoltaic system

4 Retrofit building
envelope

5 Buy green power

Actions you can take
on the go to help
combat climate change.



- 1 Do not idle vehicle
- 1 Carpool or carshare
- 1 Keep vehicle maintained, drive smart
- 3 Drive an electric vehicle

- 3 Take public transit to work/school
- 3 Bike or walk to work/school
- 3 Telecommute

Actions you can take
in your daily life to help
limit climate change.



- 1 Grow own food, participate in community garden
- 1 Buy local
- 1 Turn off computer and monitor each day
- 1 Use reusable water bottle and coffee mug
- 3 Switch to vegetarian or vegan diet
- 3 Vacation locally (instead of international flight)
- 4 Work and play close to where you live

[Calgary.ca/ClimateAction](https://calgary.ca/ClimateAction)

EcoSchools actions and resources

● Not Started



Make the Switch

Make the switch to conserve energy by turning off lights, monitors, and other electronics when they are not in use!

Points
0 / 10

● Not Started



Sustainable Transportation

Reduce greenhouse gas emissions and improve air quality by promoting sustainable transportation options at your school.

Points
0 / 10

● Not Started



Heating and Cooling

Optimize heating and cooling systems at your school through data collection, communication, and monitoring.

Points
0 / 10

● Not Started



Phantom Power

Reduce your school's energy footprint by monitoring and unplugging your appliances!

Points
0 / 10

● Not Started



Walk and Roll to School Day

Get walking, get rolling and get active on the way to school!

Points
0 / 10

● Not Started



Waste-free Lunch

Reduce your school's waste by encouraging students and staff to bring waste-free lunches!

Points
0 / 10



ecoschools
écoécoles
CANADA

Supporting
EcoSchools Canada
in Calgary

CALGARY FOUNDATION FOR COMMUNITY, FOREVER

ACEE Alberta Council for Environmental Education

ALBERTA ecotrust

Foundation RBC

Energy Efficiency Alberta

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FOUNDATION FOR ENVIRONMENTAL EDUCATION

[EcoSchools Canada in Calgary website](#)

[Local Resources to Support EcoSchools Actions](#)



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DRAWDOWN 2020

**THE WORLD'S LEADING RESOURCE
FOR CLIMATE SOLUTIONS**

<https://drawdown.org/>



Ocean Power

[Home](#) / [Solutions](#)

SOLUTIONS

Project Drawdown conducts an ongoing review and analysis of climate solutions—the practices and technologies that can stem and begin to reduce the excess of greenhouse gases in our atmosphere. Our work shows the world can reach Drawdown by mid-century, if we make the best use of all existing climate solutions. Certainly, more solutions are needed and emerging, but there is no reason—or

Each solution reduces greenhouse gases by avoiding emissions and/or by sequestering carbon dioxide

■
ABANDONED
FARMLAND
RESTORATION



■
ALTERNATIVE CEMENT



■ ■
ALTERNATIVE
REFRIGERANTS



■
BAMBOO PRODUCTION



■
BICYCLE
INFRASTRUCTURE



■
BIOCHAR PRODUCTION



■
BIOGAS FOR COOKING



■
BIOMASS POWER



■
BIOPLASTICS



■ ■
BUILDING
AUTOMATION SYSTEMS



■ ■
BUILDING
RETROFITTING



■
CARPOOLING



■ ■
COASTAL WETLAND
PROTECTION



■
COASTAL WETLAND
RESTORATION



■
COMPOSTING





ELECTRIC CARS

REDUCE SOURCES › ■ Transportation › *Electrify Vehicles*

11.87–15.68

GIGATONS

CO₂ EQUIVALENT
REDUCED / SEQUESTERED

\$4.48–5.79

TRILLION \$US

NET FIRST COST
(TO IMPLEMENT SOLUTION)

\$15.30–21.82

TRILLION \$US

LIFETIME NET
OPERATIONAL SAVINGS

Quick recap

Confusion, Anxiety, Apathy

1. Approach with empathy and curiosity
2. Connect to nature and place
3. Build literacy (scientific and social)
4. Develop critical thinking and problem-solving skills
5. Help students be part of the solution
6. Inspire others to action

Informed, Prepared, Optimistic

https://www.abcee.org/sites/default/files/ACEE%20Road%20map%20to%20excellent%20climate%20change%20education_0.pdf

ROADMAP TO Excellent Climate Change Education

Insights from the Alberta Council for Environmental Education

In late 2019 we spoke with more than 170 students from nine communities across Alberta and in early 2020 we conducted province-wide polling of over 500 Alberta youth ages 15 to 24. For today's students, climate change is not controversial; in fact, the vast majority agree that it should be taught in school and should be a high priority for grades 4-12. For Alberta youth, teachers are one of the most trusted sources of information about climate change.¹ When students are not taught about environment, energy and climate change, they construct their own meanings, which are commonly incorrect - and can create feelings of confusion and anxiety.² Here are six things we can all do on the 'road' to excellent climate change education!



Overcoming barriers to teaching about climate change

Barrier	Strategies for Overcoming
Low emphasis in the curriculum	Climate change is EVERYTHING change Links across the curriculum
Lack of confidence	Don't try to be an expert Learn alongside your students
Fear of pushback	Use credible sources of information Focus on the solution space
Topic is depressing; causes anxiety	Listen to your students Acknowledge their anxiety Focus on the solution space Careers of the future
Lack of time	Integrate across the curriculum
Student apathy	Focus on here, now (place) Focus on the solution space, careers of the future

Thank you to our funders!



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Energy
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Alberta

Thank you for listening!

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