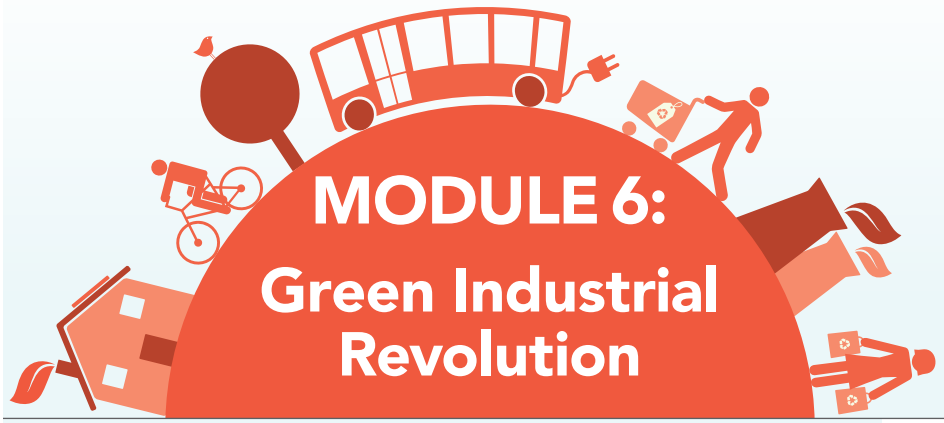

MODULE 6: Green Industrial Revolution

6

To fight against catastrophic climate change, BC needs to reduce greenhouse gas (GHG) emissions to near zero before 2050. The Climate Justice Project (CJP) calls this a "green industrial revolution" that will have transformative impacts on the economy and society. Past industrial revolutions, however, have caused great upheaval and hardship, with some sectors of society bearing a terrible burden. This module starts with BC's economic history of resource extraction, then shifts to ideas for creating new green jobs to achieve climate justice.

A key resource for this lesson is the CJP publication, *A Green Industrial Revolution: Climate Justice, Green Jobs and Sustainable Production in Canada,* www.policyalternatives.ca/publications/reports/green-industrial-revolution

There is a slightly older BC version of this paper, *Climate Justice, Green Jobs and Sustainable Production in BC* www.policyalternatives.ca/greenjobs

Managing BC's Forests for a Cooler Planet: Carbon Storage, Sustainable Jobs and Conservation www.policyalternatives.ca/coolforests

Making the Case for a Carbon Focus and Green Jobs in BC's Forest Industry, www.policyalternatives.ca/greenforests

OBJECTIVES

- Students will review BC's economic history and the role of resource development and exports.
- Students will be able to identify the essential elements of the proposed "green industrial revolution."
- Students will recognize the benefits of a BC green jobs plan.
- Students will reflect on and analyze green policy proposals for building retrofits, transportation, forestry, and energy conservation and efficiency.

COMPONENTS

1. History of BC's economy
2. Forestry: The history and potential of a sustainable resource industry
3. The green industrial revolution

Suggested Lesson Pairing: Module 7 – Imagining the Future We Want

CURRICULUM CONNECTIONS

Science and Technology 11
Social Studies 9, 10, 11
Civic Studies 11
Comparative Civilizations 12
Geography 12
Social Justice 12
Sustainable Resources 12
English Language Arts 9, 10, 11, 12
Communications 11, 12
Applied Skills 11
Business Education 8, 9, 10
Economics 12
Home Economics: Family Studies 8, 9, 10
Technology Education 9, 10
Technology Education: Industrial Design 11, 12

Visit http://teachclimatejustice.ca/the-lessons/PLOs to download a comprehensive list of BC Ministry of Education prescribed learning outcomes (PLOs) that may be addressed with this resource package.

TOTAL SUGGESTED TIME

2 hours

RESOURCES REQUIRED

- Digital projector and computer with internet access
- Whiteboard/chalkboard and markers/chalk
- Paper and pens/pencils
- PowerPoint: *Green Industrial Revolution* [Download at www.teachclimatejustice.ca]
- Printed copies of the *Elements of the Green Industrial Revolution* handout and the *Green Jobs BC infographics*

20 minutes Part 1 – History of BC's economy

Brainstorm as a class: Create a list of BC's economic industries throughout history. What were the main economic drivers over the last few hundred years? Use prompts and questions to jog students' memories and stimulate educated guesses.

BC's economic industries include:

- Fur trade
- Gold rush
- Fishing
- Forestry
- Mining
- Railway
- Agriculture
- Energy (coal, hydroelectric, natural gas)
- Proposed industries: Oil (e.g. pipelines), liquefied natural gas

NOTE TO TEACHERS:
Please be sensitive to the fact that some of your students may have family members who work in the fossil fuel industry. The point of this module is not for them to feel badly about this. We are all dependent on that existing economy. The goal of this module is to understand that we all need economic and employment opportunities, and that our collective challenge is to transition to a sustainable economy with well-paying green jobs.

Question: What thoughts come to mind when you look at this list?

- Much of BC's economic past has been based on resource extraction and export. Income from these exports allows us to buy imported goods from outside of BC.
- BC's economy has grown because of resource extraction, but sometimes this conflicts with climate change action.
- Older resource industries have established infrastructure, political power and money, and will be resistant to change that potentially impacts their economic interests.

Questions:

- What makes a resource industry environmentally sustainable? Do all resource industries have the same potential to be sustainable?
  Some are renewable (e.g. forestry can be renewable if the rate of cutting is not greater than the rate at which new trees grow) and some are not (e.g. coal or natural gas reserves are finite).
- Who has benefited from resource development? Who has been negatively impacted or exploited?
  Those who have benefited may include: companies and their owners, international customers, workers who earn high wages, local businesses. Those who have been negatively impacted or exploited may include: local First Nations communities, Chinese labourers during the gold rush/railway construction, people whose water or air quality has been polluted by industrial activity.
- BC's current economic strategy emphasizes fossil fuel extraction (increased exports of natural gas and coal from BC to Asia). How will this impact our GHG emissions?

35 minutes Part 2 – Forestry: The history and potential of a sustainable resource industry

READ

Read aloud: Forestry is an example of a local resource-based industry that can be sustainable if developed in certain ways. Forestry is one of BC's most important industries and is at the heart of what built BC as a province. But forestry has also been controversial due to company practices such as clearcutting of old growth forests. Because of our vast forestry resources, existing infrastructure, skills, rich legacy and potential for sustainability, it makes sense for us as a province to reimagine how sustainable forestry can be part of BC's future.

Many BC forestry towns have experienced great prosperity, but also some very hard times. Let's look at a video that tells the story of how we got from there to here, and what we could possibly do to turn it around.

VIDEO

Show video: *Town at the End of the Road*, a story about Mackenzie, BC and its history and possible future as a forestry town (17 minutes) vimeo.com/37208285

Questions:

- What factors contributed to the loss of Mackenzie's forestry industry and local jobs?
- What actions are the people in the video suggesting the province take to revitalize BC's forestry sector? *(Local control, local processing and local manufacturing.)*
- What factors contribute to a resource industry being both economically and environmentally sustainable?
- What would it mean to you if the BC forestry industry was redeveloped in a sustainable way?

45 minutes Part 3 – The green industrial revolution

READ

Read aloud: Human societies have gone through various "revolutions" in the past that have transformed our economies and the ways we live. We began as hunter-gatherers, then, beginning several thousand years ago, many shifted to agricultural societies. About 200 years ago, the way many people lived shifted again with the Industrial Revolution.

Activity: As a class, discuss what you remember as the key features of the Industrial Revolution.

- Shift from farming in rural settings to working in factories and living in cities
- Spread of ideas and new technology (engines, machines, electricity)
- Rise of transportation and communications linkages over large distances
- Emergence of a wealthy "business class"
- Burning fossil fuels in large quantities for energy
- Economic shift to mass production of low-cost consumer goods

Question: During the Industrial Revolution, who benefited from the change and who was left behind?

Read aloud: The key challenge of climate change is to decarbonize our economy – that is, to reduce and eventually eliminate the use of fossil fuels for our energy needs. This is a massive change that has been called a "green industrial revolution" and includes shifting to clean energy supplies, using our energy much more efficiently and redesigning our communities. How to do this in a manner that is fundamentally fair is central to climate justice.

Elements of the green industrial revolution include:

- Transitioning from an unsustainable fossil fuel economy to a sustainable green economy.
- Fair distribution of the costs and benefits of economic transition.
- Implementing tools like taxes on carbon to increase the financial cost of using fossil fuels, and investing the resulting revenues in climate action.
- Creating well-paying jobs through systems that are designed to reduce carbon emissions, and that make communities more resilient to climate change impacts.

Small group activity: Give each group a copy of the *Elements of the Green Industrial Revolution* handout and one of the four Green Jobs BC infographics (on the following pages): retrofits, transportation, forestry, energy. More than one group will have the same infographic.

Questions:

- What is being proposed in your group's infographic?
- How do the recommendations reflect the elements of the green industrial revolution?

Ask groups to report back to the class with their findings and thoughts.

Questions:

- Which groups in our society could have greater difficulties transitioning to a low- or zero-carbon BC?
  E.g. Low-income households, car-dependent households, workers in GHG-intensive industries.
- How can we ensure that no one gets left behind as we contemplate such a major shift?

ADDITIONAL RESOURCES

- **Green Jobs BC**
  www.greenjobsbc.org
- **Closing the Loop: Reducing Greenhouse Gas Emissions Through Zero Waste in BC**
  www.policyalternatives.ca/publications/reports/closing-loop
  In particular, see Table 2: Green Jobs Potential from 100% Recycling in BC

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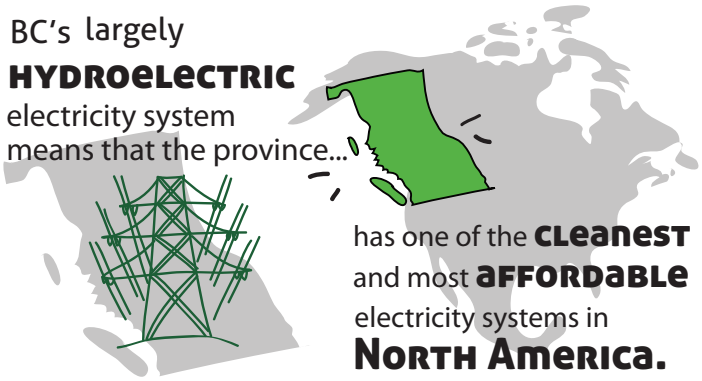
Energy

GREENJOBSBC
BUILDING A GREEN ECONOMY

BC's largely **HYDROELECTRIC** electricity system means that the province...



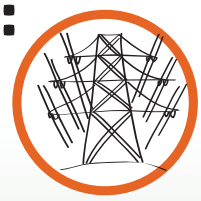
has one of the **CLEANEST** and most **AFFORDABLE** electricity systems in **NORTH AMERICA.**

With the right **POLICY CHOICES,**

BC can build on this legacy to become a **GREEN ECONOMY LEADER**

FOCUSING ON:

Energy conservation



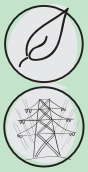
Renewable energy generation

Manufacturing and Development 'clean technology'

Energy Conservation and Efficiency

Energy conservation & efficiency

frees up 'clean' BC **ELECTRICAL POWER**



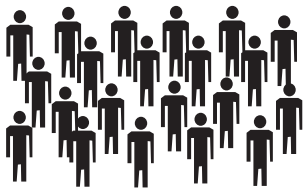
to use as a substitute for **FOSSIL FUELS**

which means

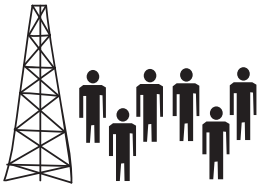
LESS GHG greenhouse gas emissions.

Economic activity associated with **ENERGY EFFICIENCY** and **CLEAN TECHNOLOGIES**

creates significantly **MORE JOBS PER $1 MILLION** in increased output



than activity in the **FOSSIL FUEL SECTOR.**



From the perspective of job creation, investments targeting growth in energy efficiency and clean technology are likely to be more cost-effective than ones focused on stimulating the fossil fuel sector.[1]

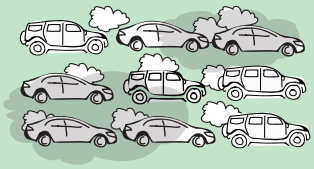
1. Sources: BC Stats (2008), Provincial Economic Multipliers and Lee and Carlaw (CCPA, 2010) Climate Justice, Green Jobs and Sustainable Production in BC

Moving to a low GHG **FREIGHT** and **PASSENGER** transportation model...

Transportation

GREEN JOBS BC
BUILDING A GREEN ECONOMY

1. can create 10,000s of **JOBS**



2. can improve **HEALTH**, the **ECONOMY** and quality of **LIFE** by reducing problems associated with traffic congestion and long commutes.

TRANSPORTATION EMISSIONS are moving in the **WRONG DIRECTION.**

Fortunately, **TRANSPORTATION** that is **GOOD** for the **ENVIRONMENT** is **GOOD** for the **ECONOMY.**

TRANSPORTATION is the single largest source of **GHG EMISSIONS IN BC.**

38% OF ALL EMISSIONS.

28% above 1990 baseline levels

since 1990:

ALMOST DOUBLED

HEAVY DUTY DIESEL

MORE THAN 2X

LIGHT DUTY TRUCKS (pickups and SUVs)

almost as much carbon as gasoline trucks in 2010

LIGHT DUTY GASOLINE (cars and motorcycles)

$1 m → **JOBS**

Investments in mass transit and railways in North America create between 9 and 22 jobs per $1 million.[2]

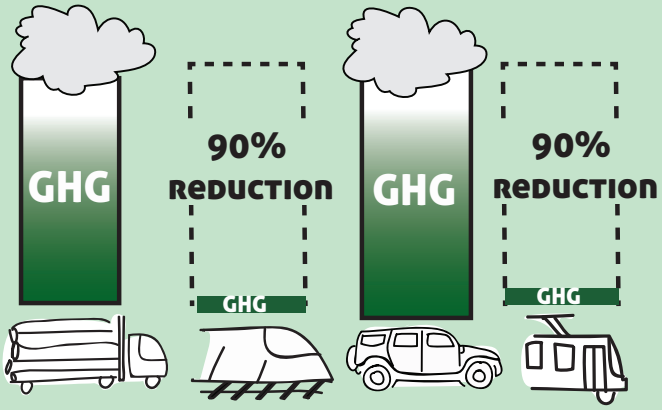
bus and train drivers

warehouse & shipping work

vehicle manufacturing & maintenance

trades & construction[3]

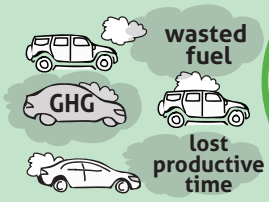
Investments in needed public transit and railway upgrades in BC could create **230,000 TO 270,000 PERSON-YEARS** of employment



Moving freight by rail reduces GHG emissions by almost 90% compared to moving the same goods with conventional fossil fuel powered trucks.

Public transit use can reduce GHG emissions by 90% or more per person compared to automobiles travelling the same distance.[1]

CONGESTION



Traffic congestion costs Vancouver's economy between $400 - $628 million annually.

An example: Policies to reduce commuting distances in Portland Oregon = **$2.6 billion in savings per year.**[4]

1. Canadian Urban Transit Association (2010), The Economic Impact of Transit Investment: A National Survey.

2. See Canadian Urban Transit Association(2010), The Economic Impact of Transit Investment: A National Survey and "Measuring Success: the Economic Impact of Transit Investment in Canada,"; Pollin, Heintz, and Garrett-Peltier (2009), The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation will boost U.S. economic growth and employment. Center for American Progress.

3. Thompson and Duffy (2010), Jobs, Justice, Climate: Building a Green Economy for BC.

4. Joe Corteight/ CEOs for Cities (2007), "Portland's Green Dividend."

CEP 2040

Forestry

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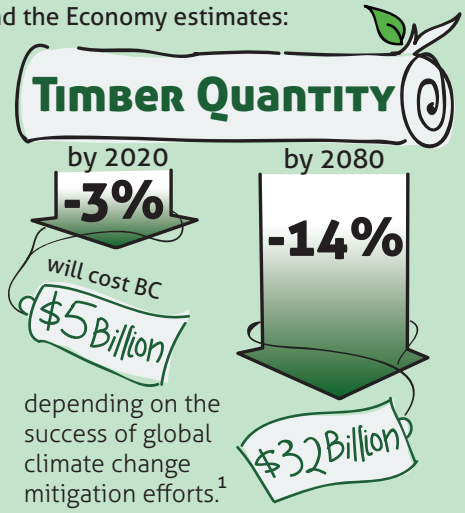
BUILDING A GREEN ECONOMY

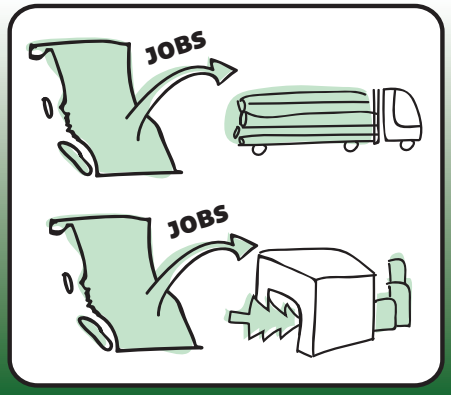
The National Roundtable on the Environment and the Economy estimates:



depending on the success of global climate change mitigation efforts.[1]

The Raw Log Export Focus

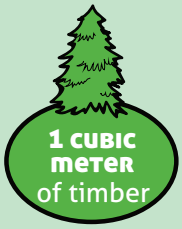
of BC's forest sector



has meant that the province has in effect been

EXPORTING THOUSANDS OF JOBS

in wood processing and manufacturing every year.



BC	Jobs
Quebec	4x Jobs
Ontario	5x Jobs

Ontario's forestry sector creates more than five times as many jobs as BC per cubic metre and Quebec performs about four times better than BC for forest sector jobs intensity.

With targeted policies, more than **15,000 new FULL TIME** forestry jobs and thousands of **ADDITIONAL SEASONAL POSITIONS** could be created while boosting the health of BC's forests.[2]

Green Job Creation: one estimate

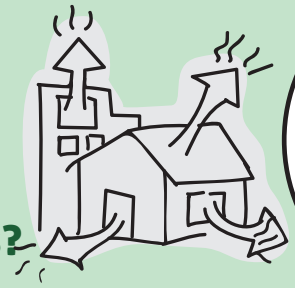
(1,000 jobs if restored to pre-2001 levels).

1. *The National Round Table on the Environment and the Economy (2011), Paying the Price: The Economic Impacts of Climate Change for Canada.*
2. *Parfitt/CCPA (2011), Making the Case for a Carbon Focus and Green Jobs in BC's Forest Industry*

Retrofits

GREEN JOBS BC
BUILDING A GREEN ECONOMY

What are building energy **retrofits?**



Upgrades to make buildings more energy **efficient**

1 **Fastest** way to **reduce** BC's **GHG emissions**

2 Potential to create **hundreds of thousands of JOBS**

construction | weatherization & insulation | installation | deconstruction & waste management | green building materials

Job Creation Estimates

If supportive policies are implemented:

448 % potential increase in employment

in the energy efficiency and green buildings sector.[1]

Residential Retrofits

4100-6600 jobs for 2 years

14,000-30,000 people directly employed

Basic upgrades 400,000 homes[2]

Intensive upgrades 100,000 homes/year[3]

Public Sector Building Retrofits

2500 new jobs

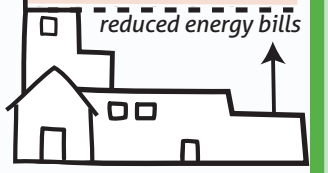
Reduce emissions in line with provincial GHG targets for 2020[4]

Other environmental & economic **benefits**

previous energy bills

Financial savings could free up Billions for other job-creating economic activity and investments.[5]

reduced energy bills



residential, institutional & commercial

Electricity saved through **Energy Efficiency** would be freed up for other uses

which could help further reduce BC's GHGs.[5]

1. The Pacific Coast Collaborative (2012), The West Coast Clean Economy
2. Thompson and Duffy (2010), Jobs, Justice, Climate: Building a Green Economy for BC .
3. Horne, cited in Thompson and Duffy (2010)
4. Calculations based on BC Government PSECA program data (2011)
5. NRCan/Office of Energy Efficiency, "Improving Energy Performance in Canada – Report to Parliament Under the Energy Efficiency Act For the Fiscal Year 2009-2010."

ABOUT THE PROJECT

Climate Justice in BC: Lessons for Transformation was designed to provide teachers with classroom-ready materials to engage their students with how climate action intersects with social justice ("climate justice"). The curriculum features eight modules designed for grade 8-12 students to explore climate justice within the context of BC's communities, history, economy and ecology. These lessons tie into subject matter and prescribed learning outcomes (PLOs) already in BC's curriculum (complete list at teachclimatejustice.ca/the-lessons/PLOs), while providing a framework to unpack modern social and environmental issues.

The topics are based on reports from the Canadian Centre for Policy Alternatives' Climate Justice Project – a research project that looks at the two great inconvenient truths of our time: climate change and rising inequality. (Climate Justice reports, shorter pieces and videos available at www.climatejustice.ca.)

Visit teachclimatejustice.ca for downloadable and online components of this curriculum, including PowerPoint files, links to videos and resources, and individual lesson PDFs.

Teachers are encouraged to adapt these lessons to their particular classroom needs, or pull out specific activities as appropriate. Times allocated for each module are approximate and will vary greatly depending on the grade and composition of the class. While these lessons were designed for secondary students, most modules and activities are easily adaptable for upper intermediate students. Feedback is welcome and will help us refine these modules for subsequent editions.

MODULE SUMMARIES

Module 1: Introduction to Climate Justice
Causes and effects of climate change through a fairness and equity lens.

Module 2: Reimagining our Food System
Climate change and our food systems, how climate change may affect food production in BC and elsewhere, and social justice issues, such as vulnerability to hunger and migrant farm labour.

Module 3: Transportation Transformation
How community design encourages or discourages car use, and what we can to do to better facilitate walking, biking and public transit options, create more complete communities and improve quality of life.

Module 4: Rethinking Waste
Moves beyond recycling and composting and looks at our culture of consumption and how it produces waste, both solid waste and airborne emissions like greenhouse gases.

Module 5: Fracking Town Hall
Uses a town hall simulation to explore the challenges of fossil fuel extraction and the bigger picture context of the push for a BC-based liquefied natural gas (LNG) industry.

Module 6: Green Industrial Revolution
Uses the mini-documentary *Town At The End of the Road*, to consider how resource sectors can be re-imagined as part of a green economy.

Module 7: Imagining the Future We Want
Uses a storytelling exercise and themes of intergenerational justice to discuss the challenges we face today and imagine how we can move towards a better future.

Module 8: Challenges to Change
Explores the essential elements of successful social change movements.

GLOSSARY

2°C – The amount of global warming above pre-industrial levels (200 years ago), which could lead to catastrophic outcomes for human populations (and countless other animal and plant species). The Earth has already warmed by 0.8°C above pre-industrial levels.

Carbon dioxide (CO_2) – A heat-trapping molecule, and the principal greenhouse gas of concern to climate scientists. A growing concentration of CO_2 from burning fossil fuels is warming the Earth.

Carbon tax – A tax applied to the combustion of fossil fuels. BC currently has a carbon tax that amounts to about 7 cents per litre at the gas pump.

Climate change – The altering of climate patterns (e.g. more precipitation, more intense storms, floods or droughts) on Earth caused by the burning of fossil fuels.

Climate justice – A term for viewing climate change as an ethical issue and considering how its causes and effects relate to concepts of justice, particularly social justice and environmental justice. This can mean examining issues such as equality, human rights, collective rights and historical responsibility in relation to climate change.

Fossil fuels – Fossil fuels are the underground remains of plants and animals that lived millions of years ago, which can be processed and combusted for energy use. Examples include oil, bitumen, coal and natural gas.

Global carbon budget – An estimated maximum amount of carbon dioxide and other greenhouse gases we can emit into the atmosphere before passing the 2°C critical threshold of warming.

Global warming – The heating up of the Earth caused primarily by the burning of fossil fuels (oil, coal and natural gas), which releases heat-trapping carbon dioxide into the atmosphere.

Greenhouse gas (GHG) – A gas that traps heat and contributes to global climate change.

Liquefied Natural Gas (LNG) – Natural gas that has been converted into liquid for ease of storage and transportation.

Methane (CH_4) – A potent greenhouse gas, and the principal ingredient in "natural gas."

Renewable energy – Energy that comes from resources that are continually replenished, such as sunlight, wind, rain, tides, waves and geothermal heat.

PUBLICATION INFORMATION

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Complete project credits, biographies and acknowledgements at teachclimatejustice.ca/about

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CCPA
CANADIAN CENTRE
for POLICY ALTERNATIVES
BC Office

Canadian Centre for Policy Alternatives – BC Office

The CCPA is an independent, non-partisan research institute concerned with issues of social, economic and environmental justice. www.policyalternatives.ca

British Columbia Teachers' Federation

The British Columbia Teachers' Federation (BCTF), established in 1917, is a social justice union of professionals representing public school teachers in BC, Canada. www.bctf.ca

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CLIMATE JUSTICE PROJECT

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