

FOUNDATIONAL MODULE

Mining & Climate Justice Case Studies



CLIMATE JUSTICE
INSTRUCTIONAL
— TOOLKIT —

What's in this module?

Contents

This module focuses on the question of ethical and just resource extraction, and discusses the importance of mined materials in our daily lives. It utilizes case studies from MIT researchers and scientific articles.

Activities

3 parts
1 video
5 readings
3 activities
2 project options

Key Resources

- *How Can U.S. Safely Mine Minerals Critical to a Carbon-Free Economy?*
- *Hydrosocial Displacements: Climate Change and Community Relations in Chile's Mining Regions*
- *Indigenous Environmental Network*



Learning Objectives

01

Recognize how current mining practices affect climate justice issues

02

Understand the role and impacts of mining

03

Examine community roles and energy demands

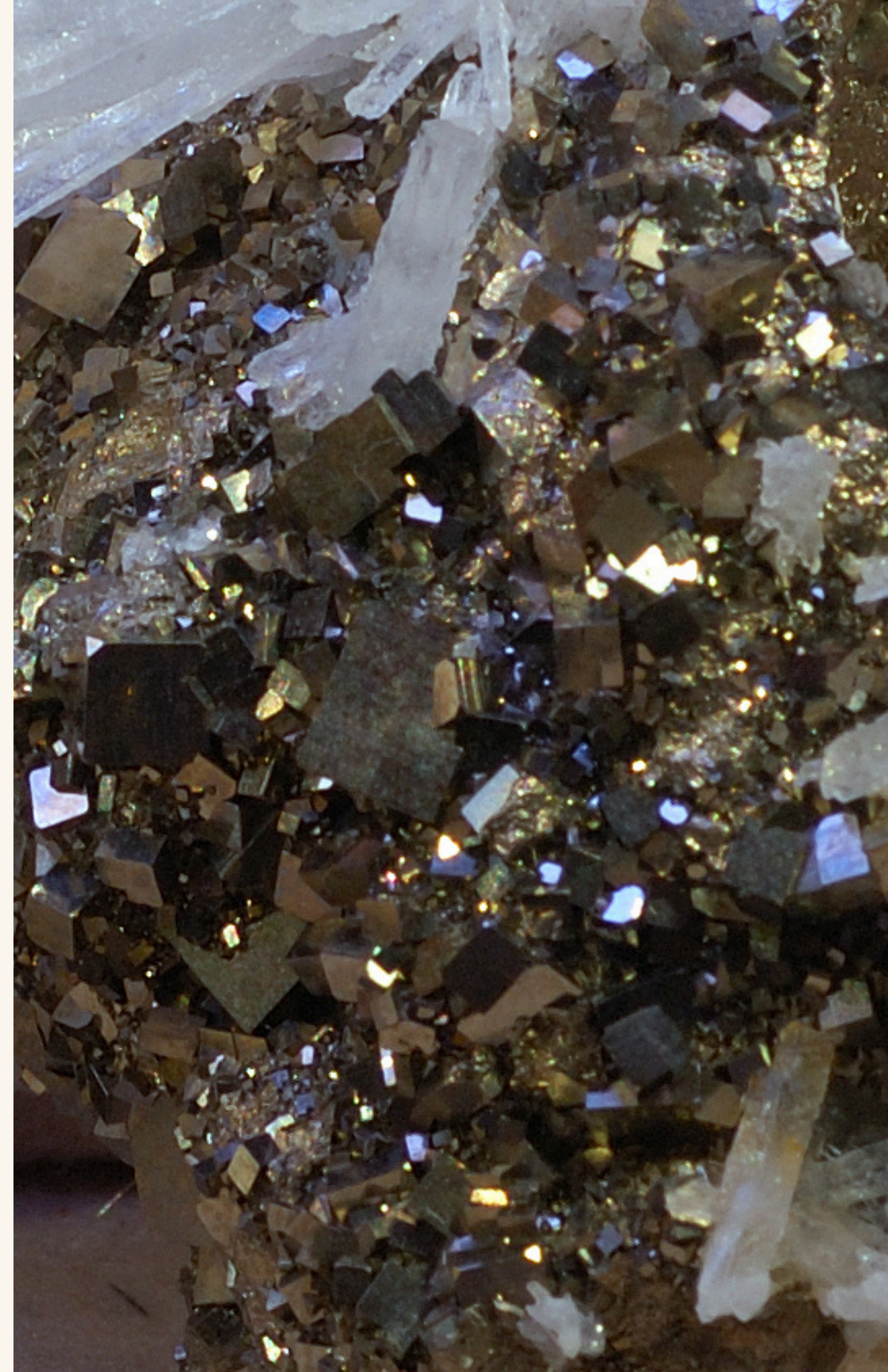
04

Discover solutions to mining issues

Warm up

Why do we mine? What minerals/metals power our daily lives?

Turn to a partner or small group and brainstorm.



Introduction

PART 1



Photo by [MiningWatch Portugal](#) on [Unsplash](#)

Mining

Definition

Mining is the process of extracting minerals of economic value from the earth's crust. ([NatGeo](#) & [Gregory, 2021](#))

Background

Mining dates back to prehistoric times where flint was used to produce tools and weaponry. Metals and minerals are separated, processed, and refined because they are most valuable in their pure form. Two common mining methods are called surface mining and underground mining.

Impacts

- Accidents, adverse health conditions and effects
- Water pollution (ex. acid mine drainage)
- Erosion
- Deforestation
- Release of contaminants such as lead, zinc, and copper



Common Metals and Minerals in Batteries



Lithium

- Also used in glass and ceramics
- Major producers: Australia, Chile, China

Manganese

- Also critical to iron and steel production
- Major producers: South Africa, Australia, China, Gabon, Brazil

Cobalt

- Also used in superalloys for turbine engines, carbides, sharp tools, chemicals
- Major producers: Congo, China, Canada, Russia, Australia, Zambia

Nickel

- Vital to stainless steel production
- Major producers: Philippines, Indonesia, Russia, Australia, Canada

Copper

- Used in building construction, electronics (cables, plumbing heating, etc)
- Major producers: Chile, Peru, China, US, Australia

Indigenous Perspectives Against Mining

Indigenous people are often against the idea of 'green mining', and for the move towards the Just Transition.

Examine Indigenous perspectives

[HonorEarth](#) and [Indigenous Environmental Network](#) talk about the importance protecting sacred places. Take 10 minutes to look through these resources.

Discussion

- What is 'green colonialism'?
- What are some examples of green colonialism that you came across in your reading?
- What are some ways in which green colonialism is perpetuated?



Indigenous Perspectives on Inclusive Mining

Reading

I'm Indigenous Australian, and I work for a mining company

Discussion

- What do you think of this alternate perspective?
- How does Lees frame his work?
- How has his work been accepted or rejected by people in his community?
- How can inclusivity in mining help bring a more just transition?



Aerial view of a mine near Mount Isa by denisbin (CC BY-ND 2.0)

Terrascope Case Study

One particular indigenous organization that has protested against major mining projects in Nevada through lawsuits and community advocacy efforts is the Western Shoshone Defense Project, founded by Western Shoshone sisters Carrie and Mary Dann in 1991.

Key Readings for Background

- *Western Shoshone Defense Project*
- *The Dann Sisters: Searching for Reciprocity for the Western Shoshone*

Listen to this podcast*

A Rock in a Hard Place: The Lithium Conundrum in Nevada

Discussion

- What impact has the Western Shoshone Defense Project had on mining operations?
- How can their methodologies with protesting against mining be applied to other aspects of climate justice?



*Additional project information of [Terrascope](#), an MIT First-Year Learning Community

Mining and Climate Justice

PART 2



Photo by [Matthew de Livera](#) on [Unsplash](#)

ACTIVITY #1

AN INTRODUCTION TO MINING AND CJ: THE IMPACTS OF LITHIUM MINING

Watch

The True Cost of The Lithium Mining
Boom Powering Electric Cars

Before watching

- Where is the thumbnail photo from?
- What are the pools in the photo?
- Where is lithium mined?

Discussion questions

- What is the "lithium triangle" and how does the massive yield of water for lithium refinement affect one of the driest regions on earth?
- How many gallons of brine produce enough lithium for one electric car battery? Do you consider electric cars a viable sustainable solution? Why or why not?
- With the use of desalinated water proposed as a solution to freshwater depletion due to lithium mining, what issues would still remain? Is the use of desalinated water a viable solution? Why or why not?
- Why do locals working for mining companies not experience the increased profits of this rapidly-growing industry? How will the increased demand for water likely affect communities economically?
- How has colonialism affected the mining industry?

Pillars of Mining and Climate Justice

01

Economy

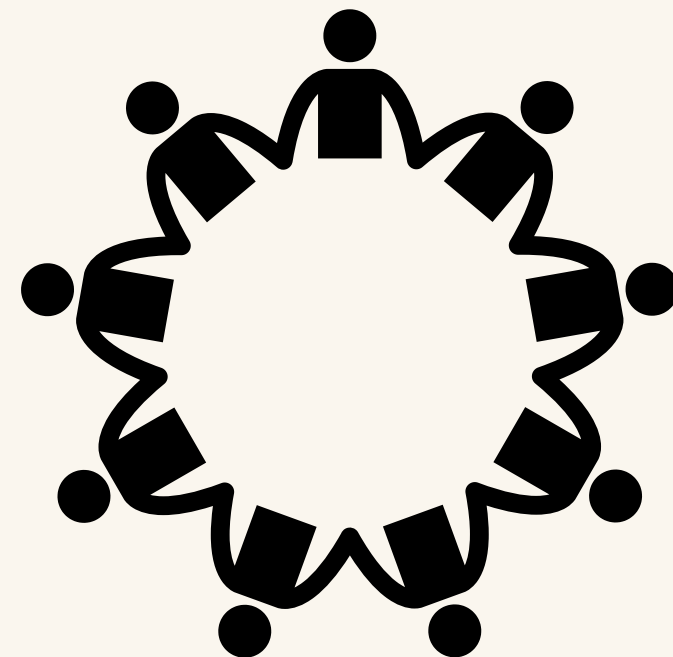
Can an equal distribution of profits cover the cost of mining effects?



02

Community

Must communities suffer in order to support energy demands?



03

Sustainability

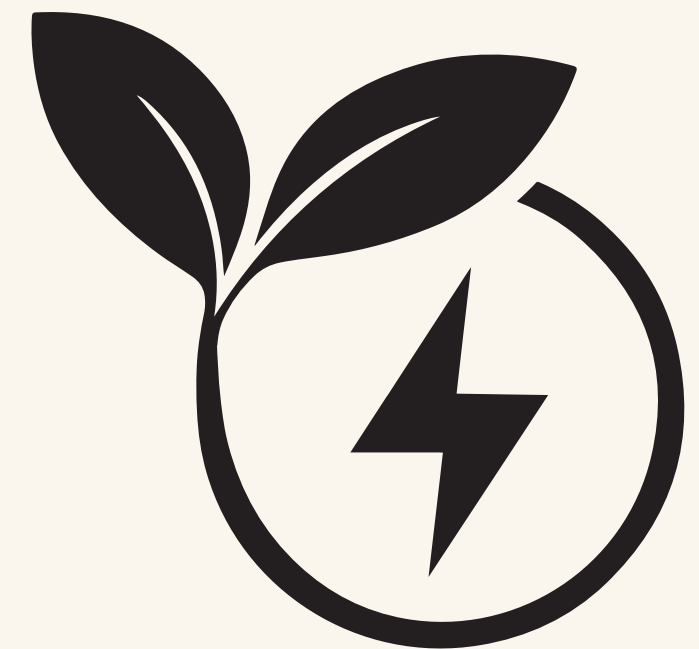
What does sustainability entail in a fundamentally unsustainable industry?



04

Renewable energy

How do we balance energy needs with the impacts of consumption?



Activities 2-5 each address one of these pillars

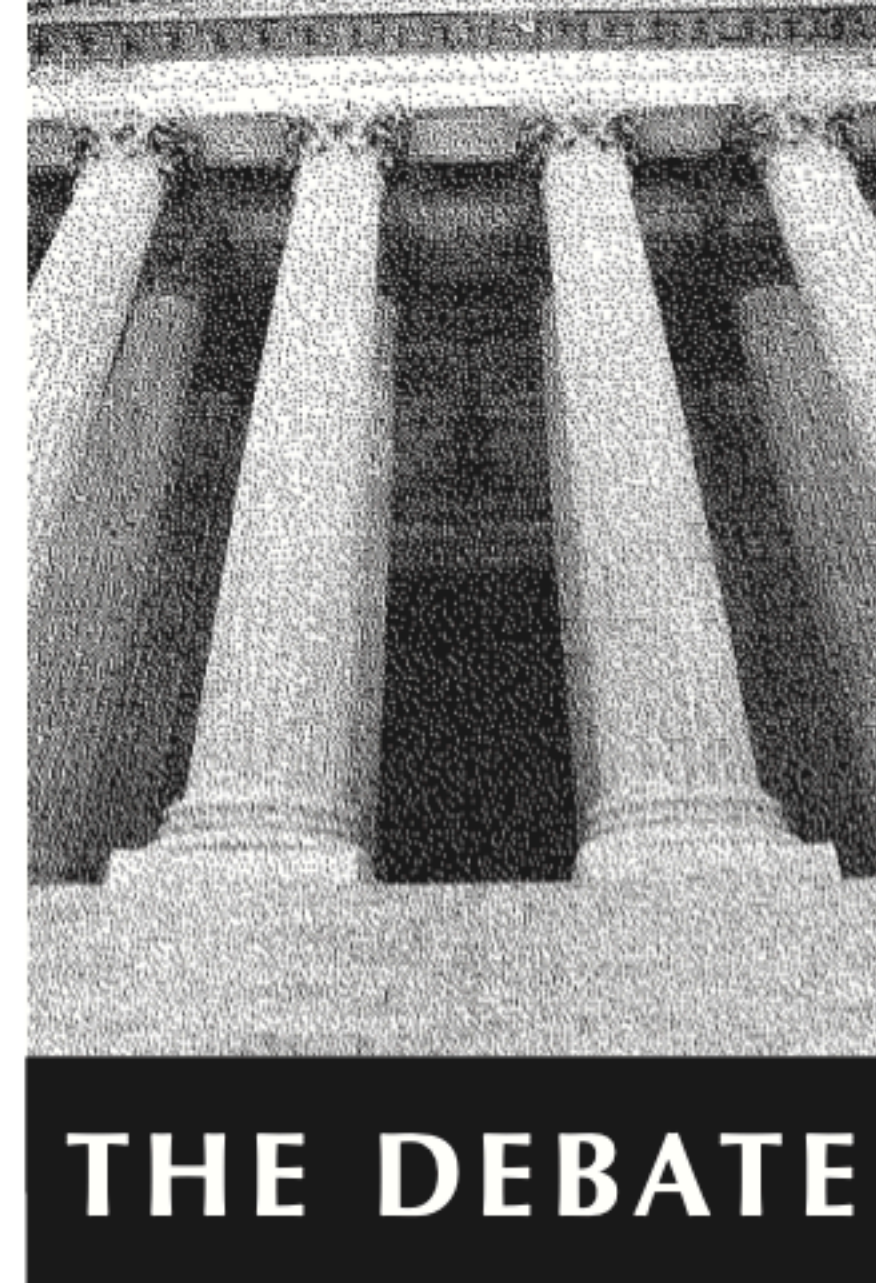
ACTIVITY #2

MINING AND THE ECONOMY

Read

How Can U.S. Safely Mine Minerals Critical to a Carbon-Free Economy?

See the next slide for discussion questions →



How Can U.S. Safely Mine Minerals Critical to a Carbon-Free Economy?

Last year, the International Energy Agency warned that, according to current supply projections, the world may not have enough needed minerals to power a carbon-

more minerals means more mining—a process that can entail significant environmental and social impacts. They include potential water quality concerns, intrusions onto Indige-

ACTIVITY #2

MINING AND THE ECONOMY

Group 1: Supply chain

- Compton expresses skepticism regarding matching energy demand with a stream of recycled metals. Is this skepticism warranted? Why or why not?
- What solutions does Compton propose? How can these be realized on both an individual & community level?

Group 2: Reform and energy

Henderson outlines the health damage & continued neglect for native communities on public land. What solutions does Henderson outline? How can these proposed solutions be exercised on an individual & community level?

Group 3: Electricity

Mergen addresses claims that lithium mines are essential to a net-zero economy despite continued opposition and failed land protection. What solutions does Mergen propose? Do you think that this monetary proposal is enough? Why or Why not?

Group 4: International cooperation

Odell addresses the US's high GHG emissions and large import rates of mined goods causing environmental & social harms in many regions, including Latin America. What does Odell propose in terms of country relations and internal solutions? How can these proposed solutions be exercised on an individual & community level?

Group 5: Just transition

Mergen addresses claims that lithium mines are essential to a net-zero economy despite continued opposition and failed land protection. What solutions does Mergen propose? Do you think that this monetary proposal is enough? Why or Why not?

Group 6: US mineral potential

Mergen addresses claims that lithium mines are essential to a net-zero economy despite continued opposition and failed land protection. What solutions does Mergen propose? Do you think that this monetary proposal is enough? Why or Why not?

ACTIVITY #3

MINING AND SUSTAINABILITY

Read

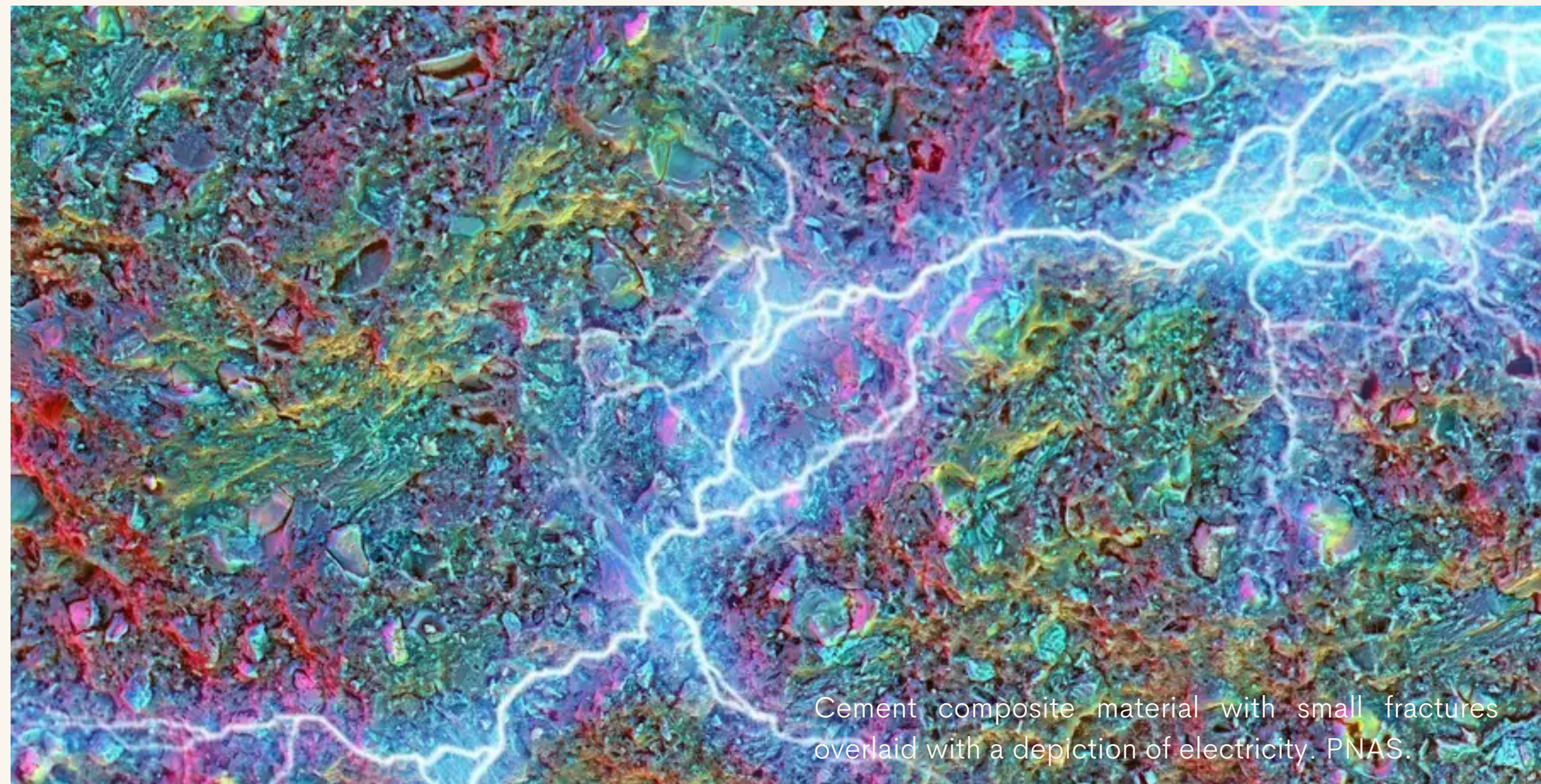
- [An overview of sustainability challenges](#)
- [A discussion of innovative technologies](#)
- [The 5 proposed solutions of the MIT Mission project](#)

Before reading

Define hydrosocial conflict. What are some examples?

Discussion prompt

Form connections between these three readings by discussing the feasibility of replacing batteries with new technologies.



Cement composite material with small fractures overlaid with a depiction of electricity. PNAS.

ACTIVITY #3

MINING AND RENEWABLE ENERGY

Read

How does the environmental impact of mining for clean energy metals compare to mining for coal, oil, and gas?

Propose solutions

Odell discusses three fundamental changes in order for clean energy mining to be possible:

1. Reduce energy consumption by investing in public transportation and walkable cities
2. Reuse minerals to advance the circular economy
3. Raise industry standards and adopt regulations for responsible mining

Propose solutions on an individual and community level for these fundamental changes.



Climate Portal

Climate 101 ▾ Explore ▾ MIT Action ▾ Q

ASK MIT CLIMATE

How does the environmental impact of mining for clean energy metals compare to mining for coal, oil and gas?



Mining, whether for fossil fuels or metals used in clean energy technologies, has serious environmental impacts, and it's hard to make apples-to-apples comparisons—except in terms of their impact on climate change, where clean energy mining is clearly better.



by Fernanda Ferreira, MIT Climate Portal Writing Team



featuring guest expert Scott Odell, MIT Environmental Solutions Initiative Visiting Scientist

Beyond the Module

PART 3



Photo by [Dominik Vanyi](#) on [Unsplash](#)

Additional Resources

COBALT
MINING

COSMETIC
MINING

METALS &
CLIMATE
JUSTICE

E-WASTE

ENVIRON-
MENTAL
RISKS

SACRIFICE
ZONES

CLEAN
ENERGY
REQUIRE-
MENTS

MINING
FOR CLEAN
ENERGY

PUBLIC &
PRIVATE
COMPANIES

MODERN
COMPUTING

E-WASTE &
SOLUTIONS

PROJECT OPTION #1

Topic-Specific Exploratory Project

Prompt suggestion

Within a group or individually, pick a topic within the intersection of mining and climate justice to present in any format to the class.



For more resources on climate and environmental justice: **Please explore other modules in the Climate Justice Instructional Toolkit.**



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