

Mining & Climate Justice Case Studies



ENVIRONMENTAL
SOLUTIONS
INITIATIVE



What's in this module?

Activities

1 video
5 readings
2 project
options

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.

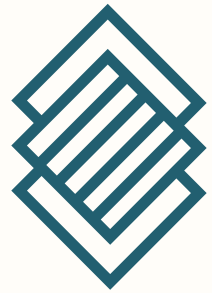
Key Resources

[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](#)

Agenda and Learning Objectives



Recognize how current mining practices affect climate justice issues



Understand the role and impacts of mining



Examine community roles and energy demands



Discover solutions to mining issues

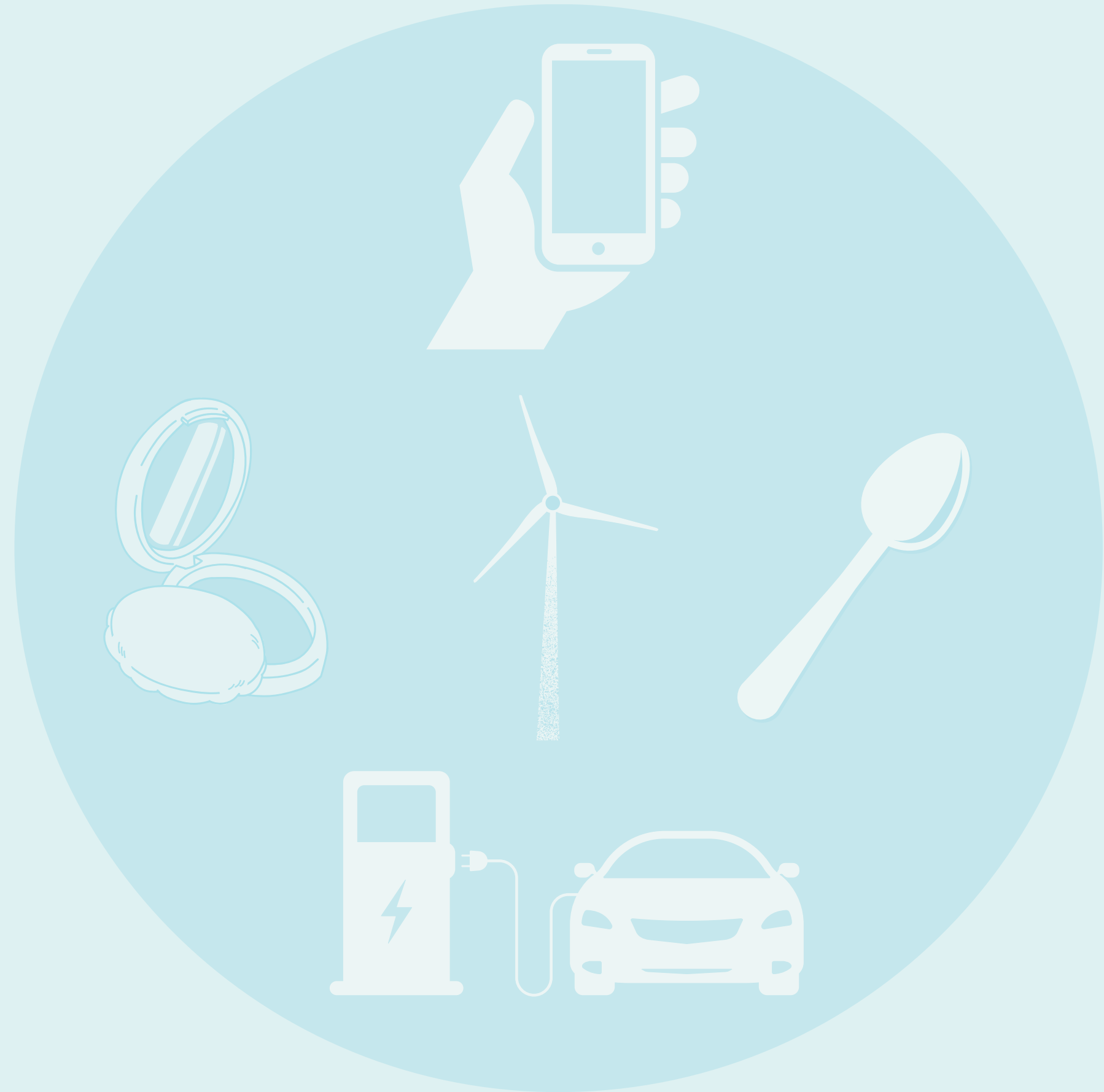
Warm-Up:

Turn to a partner or small group and discuss these questions

Why do we mine?

and

**What
minerals/metals
power our daily
lives?**



Introduction

Mining

Definition *(NatGeo & Gregory, 2021)*

Mining: the process of extracting minerals of economic value from the earth's crust

Background

- Dates back to prehistoric times where flint was used to produce tools and weaponry
- Meant to be separated, processed, and refined as metals and minerals are most valuable in their pure form

Common Methods

- Surface & Underground

Some Impacts *(laborers & nearby communities)*

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

Indigenous Perspectives Against Mining

Against the idea of ‘green mining’, and for the move towards the Just Transition, [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?

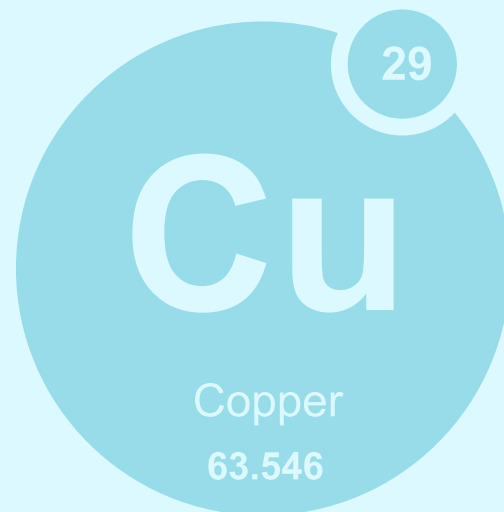
ESSAY

I'M INDIGENOUS AUSTRALIAN, AND I WORK FOR A MINING COMPANY

For Over 20 Years, I've Been Trying to Change an Industry That Has Excluded, Displaced, and Exploited Native People



Common Metals & 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

Source: National Mining Association

Mining & Climate Justice

Address these pillars during each activity

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

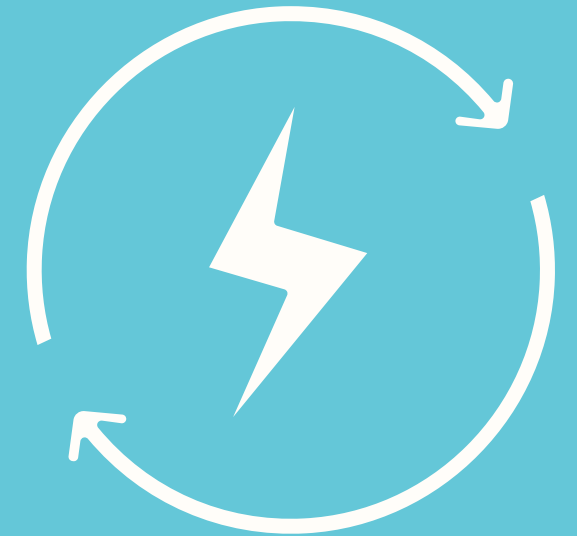
Sustainability



- What does sustainability entail in a fundamentally unsustainable industry?

04

Renewable Energy



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

Activity #1:

Watch & Discuss

[The True Cost of The Lithium Mining Boom Powering Electric Cars](#)

Before the video: Where is this photo from? What are these pools? Where is lithium mined?



Discussion Questions

- 1) What is the "lithium triangle" and how does the massive yield of water for lithium refinement affect one of the driest regions on earth?
- 2) 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?
- 3) 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?
- 4) 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?
- 5) How has colonialism affected the mining industry?

01

Mining & Economy

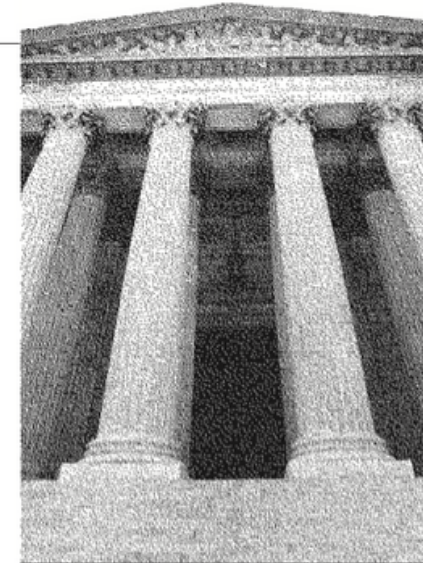


Activity #2:

Read & Discuss

[How Can U.S. Safely Mine Minerals Critical to a Carbon-Free Economy?](#)

Students answer the title question! Read introduction as a group then divide the class into 6 groups in correspondence /w each article



THE DEBATE

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-free world. Today's shortfalls, the agency alerted in a report, "Raises the risk of delayed or more expensive energy transitions." Renewable energy technologies like solar power, wind farms, and electric vehicles require more critical minerals—such as lithium, nickel, copper, and cobalt—for their technology to work than their fossil fuel counterparts. For example, the average EV requires six times as many of these vital minerals as a conventional car; onshore wind uses nine times more than a gas-fired power plant.

Recognizing this growing demand, the Biden administration announced in October an influx of \$2.8 billion under the Bipartisan Infrastructure Law toward domestic production of batteries and battery minerals. Yet extracting

more minerals means more mining—a process that can entail significant environmental and social impacts. They include potential water quality concerns, intrusions onto Indigenous nations, and harms to biodiversity, among others. Recent lawsuits over mines like the Lithium Americas mine in northern Nevada and the Rosemont copper mine near Tucson, Arizona, further highlight this growing controversy.

We ask a group of experts: How can we incentivize strong environmental and social safeguards for mining critical minerals? What reforms are needed in existing regulations, such as the General Mining Act of 1872? Could technological innovations like recycling of electric batteries and other components play a role? And fundamentally, how can policymakers ensure enough critical mineral supplies for clean energy without harming the lands and people affected by mining?

Discussion Prompts

Allow each group to share their answers with the class

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 & 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

- Sampat shares that mining metals "accounts for 10% of the world's GHG emissions" and that low-carbon energy sources will increase in demand. What concerns and solutions does Sampat share? How can these proposed solutions be exercised on an individual & community level?

Group 6: US Mineral Potential

- Sweeney expresses that domestic mining and processing is a key component for preparing for new clean energy demands. What concerns and solutions does Sweeney share? How can these proposed solutions be exercised on an individual & community level?

02

Mining & Community

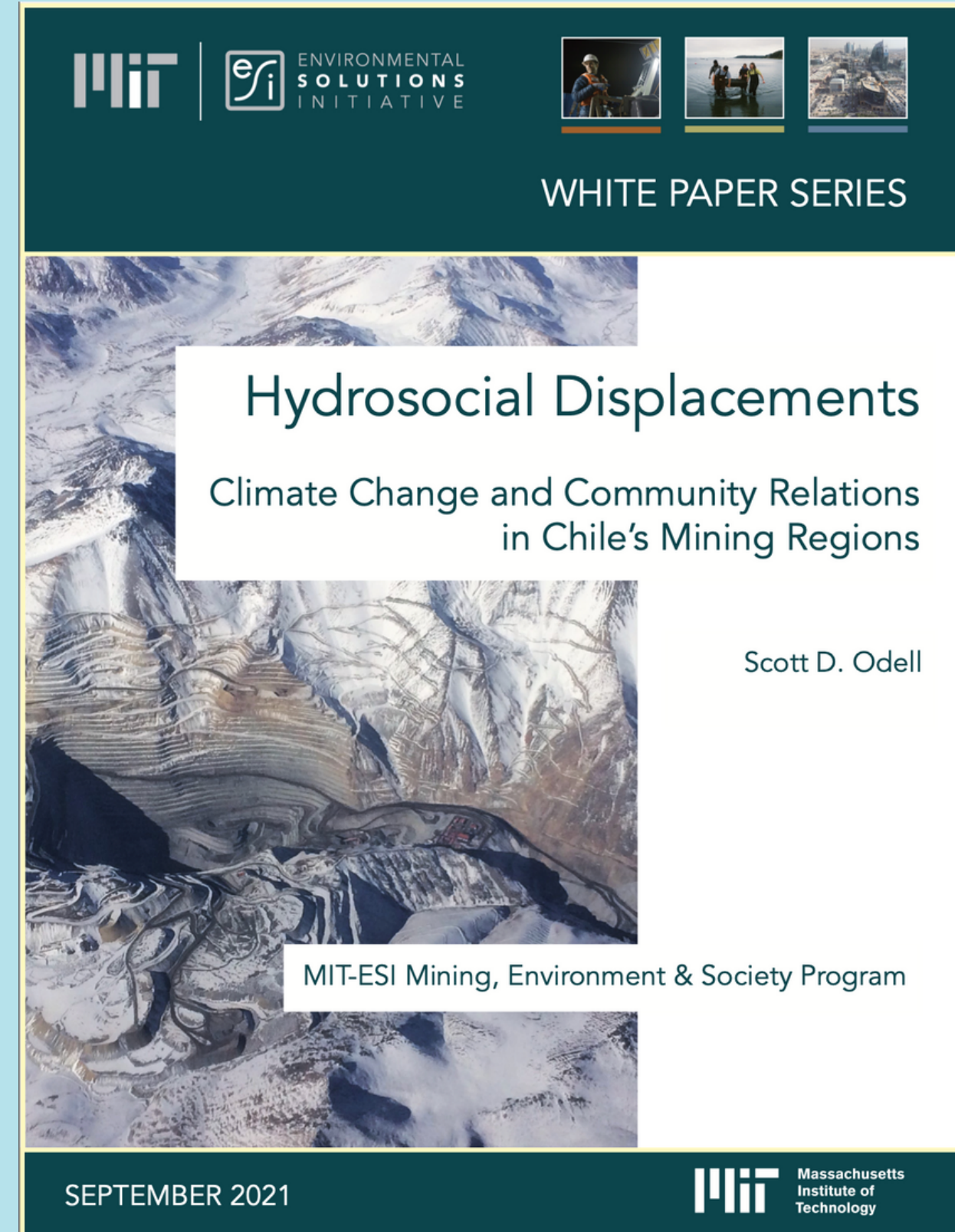


Activity #3:

Read & Discuss

[Hydrosocial Displacements: Climate Change and Community Relations in Chile's Mining Regions](#)

Before the reading: Define hydrosocial conflict. What are some examples?



Discussion Questions

- 1) What two new interventions have mining companies undertaken to address hydrosocial, political, & economic concerns?
- 2) What circumstances issued Antofagasta Minerals to eventually respond to repeatedly expressed hydrosocial conflicts? How is this different to the Andina mine?
- 3) How can the imbalance of the overuse of water by mining companies and an increased community demand for water be solved? Should "sacrifice zones" exist for the benefit of global energy?
(Optional Debate: Why or why not?)
- 4) How can mining companies ensure that communities are the agents of their own health?

03

Mining & Sustainability



Activity #4:

Read & Discuss

[Nature: Mining our green future/MIT](#)
[Engineers: Energy-storing Concrete/MIT](#)
[Mission 2016: Green Mining](#)

- 1) Overview of sustainability challenges
- 2) Discuss innovative technologies
- 3) Discuss the 5 proposed solutions of the MIT Mission project and how they could impact the field today

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Mining our green future

[Richard Herrington](#) ✉

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The green energy revolution is heavily reliant on raw materials, such as cobalt and lithium, which are currently mainly sourced by mining. We must carefully evaluate acceptable supplies for these metals to ensure that green technologies are beneficial for both people and planet.

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Technology

Energy-storing concrete could form foundations for solar-powered homes

A mixture of cement and fine charcoal can become a supercapacitor that could someday charge homes or electric vehicles

By [Jeremy Hsu](#)

31 July 2023

Mission 2016: The Future of Strategic Natural Resources

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The Solution >> [Improving Technology](#) >> [Green Mining](#)

The Solution

Mining

- Locations of Deposits
- Opening New Mines
- Mining Oceans
- Mining Asteroids

Improving Technology

- Green Mining
- Green Refining

Environmentally Sensitive "Green" Mining

Using Environmentally Conscious Mining Standards

Overview

New mining technologies and regulations have significantly improved mining efficiency and reduced environmental impact in recent years. In general, mining techniques become much more environmentally sensitive when efficiency is improved because less waste is produced. However, even greater improvements must be made as part of Mission 2016's plan. The current "green" mining techniques need to become more widespread and there will be a focus on researching new environmentally friendly techniques.

The plan for improving efficiency and decreasing the environmental impact of mining is broken up into the following categories:

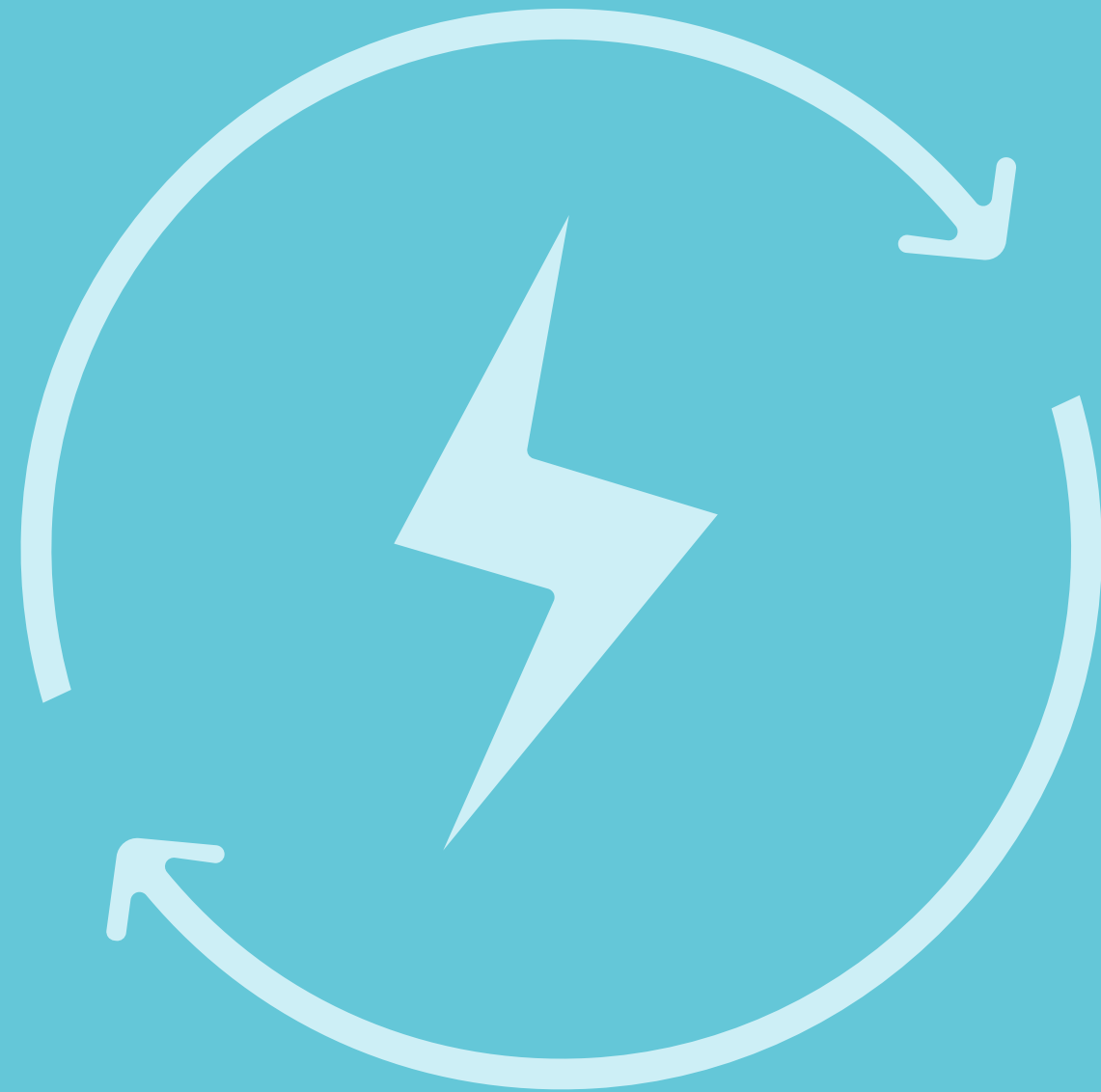
Discussion Questions

After an overview of green mining, innovative technologies to replace batteries, & solutions to mining issues:

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

04

Mining & Renewable Energy



Activity #5:

Read & Propose

[MIT Climate Portal: How does the environmental impact of mining for clean energy metals compare to mining for coal, oil, and gas?](#)



The screenshot shows the MIT Climate Portal website. At the top, the MIT logo and 'Climate Portal' are on the left, and navigation links for 'Climate 101', 'Explore', and 'MIT Action' are on the right. Below the navigation is a dark blue header with the text 'ASK MIT CLIMATE'. The main content area features the article title 'How does the environmental impact of mining for clean energy metals compare to mining for coal, oil and gas?' in a large, bold, black font. Below the title is a 'Listen with Speechify' audio player showing a progress bar from 0:00 to 4:35. Underneath the player is a short paragraph of text: '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.' To the right of this text are two circular profile pictures. The first is for Fernanda Ferreira, MIT Climate Portal Writing Team. The second is for Scott Odell, MIT Environmental Solutions Initiative Visiting Scientist.

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.



Beyond the Module



Additional Resources:

Project Option: Within a group or individually use the resources below and beyond to learn about a topic within the intersection of mining & climate justice to present in any format with the class.

Cobalt Mining

Cosmetic Mining

Metals & Climate Justice

E-Waste

Environmental Risks

Sacrifice Zones

Clean Energy Requirements

Mining for Clean Energy

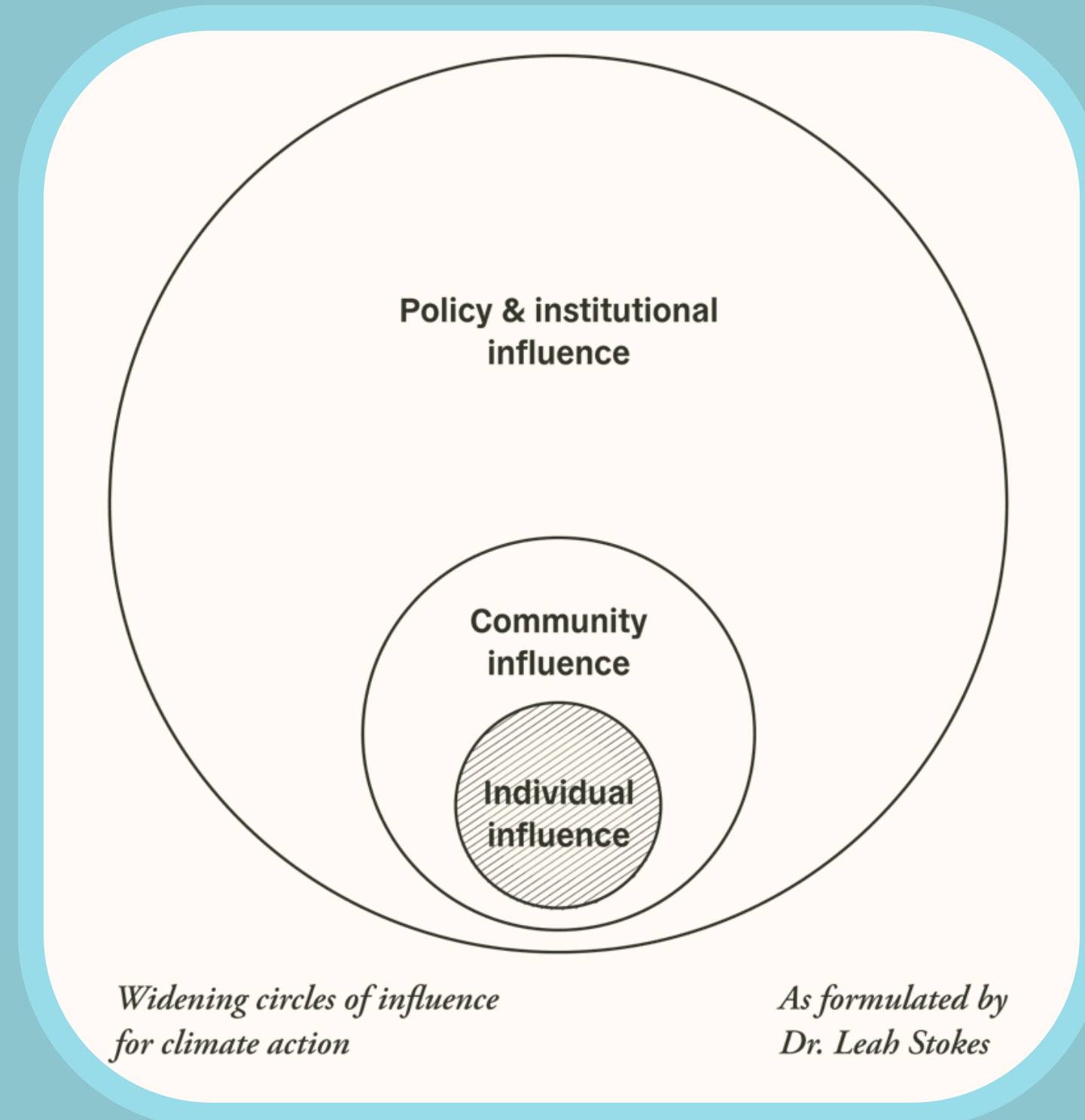
Public & Private Companies

Modern Computing

E-Waste & Solutions

All We Can Save

Use this graphic showcasing spheres of influence and source to scale how you "spark action" for the project options



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