UNIVERSITY OF CALIFORNIA ALIANZA MX

ENERGY

UNIVERSITY OF CALIFORNIA ALIANZA MX BINATIONAL WORKING GROUP

The University of California Alianza MX Binational Working Group on Energy supports a binational transition to cleaner, more efficient, and more secure energy systems. It promotes greater understanding of existing energy systems on both sides of the US-Mexico border. And it fosters long-lasting collaborative relationships among energy stakeholders that share a common commitment to advancing clean energy.

The working group provides a space to discuss emerging policy challenges and design research programs that can offer innovative solutions. By convening UC and Mexican experts on issues such as critical minerals, extreme heat, and renewable energies, the working group allows participants to showcase projects and identify knowledge gaps through direct engagement among academic researchers and non-academic stakeholders.

These efforts build on a long history of research and policy collaboration on energy issues between the UC system and Mexico, including the UC-Mexico Initiative Energy Working Group (created in 2015) and the Lawrence Berkeley National Lab Mexico Energy Initiative (created in 2016).

Topics for Discussion

- Critical Minerals
- Extreme Heat
- Renewable Energy

This concept note was prepared by Alianza MX staff with contributions from members of the Climate Ambassadors strategic initiative, including Caren Aguirre (UC San Diego).

Critical Minerals

In recent years, a surge in global demand for critical minerals—including lithium, cobalt, graphite, and rare earths—has led numerous governments to seek more secure access to these resources by increasing domestic production and/or recycling or recovering materials from end-of-life products. Close economic, political, and technological relationships between the United States and Mexico present significant opportunities for increased cooperation that could help increase access to these resources and sustain economic development. Research on these topics can contribute to the sustainable development of critical mineral resources as well as policies and practices that improve economic opportunity.

Binational Issues

- **Existence of reserves:** Both the US and Mexico possess significant reserves of critical minerals and are exploring incentives for investment in related industries, from extraction to processing to downstream technology development.
- **Supply chains:** The automotive, clean energy, and information technology industries are major consumers of critical minerals in a range of different forms.
- **Trade integration:** The US and Mexico have one of the world's closest trade relationships (along with Canada) through the United States-Mexico-Canada Agreement (USMCA) and its predecessor, the North American Free Trade Agreement (NAFTA).
- **Environmental and social issues:** Growing demand for critical minerals have generated concerns in the US and Mexico about sustainable practices, particularly mining, and their impact on local communities.

Potential Research

- **Resource assessment:** Conducting comprehensive geological studies to identify and quantify potential reserves is essential for efficient and sustainable extraction.
- **Recycling and circular economy:** Exploring reuse of materials from end-of-life products can help reduce dependence on primary resources.
- **Supply chains:** Projecting future demand, analyzing vulnerabilities, and developing responses can enhance supply chain resilience and security.
- **Policy and regulatory frameworks:** Assessing existing incentives and regulations can improve responses to environmental, social, and technical challenges.
- **Social and community Impact:** Investigating effects of extraction and processing can improve understanding of community perspectives and help address their concerns.
- **International cooperation:** Promoting international collaboration can help share knowledge, expertise, and best practices for sustainable development.

Extreme Heat

Both Mexico and California regularly register record temperatures, particularly in the summer months. Many major cities on both sides of the border have also experienced much higher temperatures than rural areas, creating "urban heat islands," with the trend attributed to a combination of environmental climate change, building practices that use heat-absorbing materials, and planning practices that have eliminated trees and green spaces. As potential consequences of extreme heat, health risks and spikes in energy use pose significant challenges to sustainable development. Binational research can inform local decisions that expand options for cooling urban spaces and reduce the vulnerability of residents to these negative effects.

Binational Issues

- Building practices: Limited use of climate-conscious building materials can increase heat absorption (and even generate additional heat) in urban areas, thereby causing temperatures to spiral and worsening the phenomenon of heat islands.
- Urban planning: Limited prevalence of and/or access to vegetation in urban areas removes important sources of shade and limits the ability of green spaces to serve as carbon sinks.
- Health effects: Changes in temperature interact with air pollution to create significant challenges to mortality (including cardiovascular and respiratory diseases).
- Preparedness: In addition to extreme heat in areas that have traditionally had higher summer temperatures, regions that unprepared for high temperatures are experiencing similar trends, generating significant problems for communities that have limited access to mitigation technologies (such as air conditioning).

Potential Research

- Heat resilience: Developing a suite of public policy and governance strategies that allow cities and metropolitan areas to meet their specific needs in limiting the negative effects of extreme heat on residents.
- Climate data: Modeling the specific extreme temperature effects of climate change, particularly in large cities but also in smaller towns and arid rural areas of interior California and northern Mexico.
- Energy efficiency: Limiting the likelihood of blackouts caused by spikes in energy consumption that respond to higher-than-average temperatures, particularly in regions without steady access to reliable power generation.
- Smart grids: Integrating renewable and clean sources of energy generation into the power sector, thereby making electricity systems more competitive, efficient, and responsive to changes in technology and demand.

Renewable Energy

Renewable electricity generation experienced high levels of growth over the past decade, and is now responsible for around half of California's electricity generation (49 percent in 2022), though it holds a much smaller share of Mexico's electricity generation (19 percent in 2022). Both California and Mexico are widely considered to have significant resource potential for further development of energy from renewable sources such as solar, wind, and geothermal, but confront very different policy and regulatory scenarios for investment and access. Collaborative research on renewable energy provides an opportunity to reflect on how these similarities and differences can shape North America's regional energy outlook for the foreseeable future.

Binational Issues

- **Prices:** Innovation and optimization of global supply chains have driven down the price of electricity generation using renewable technologies in recent years, but certain regions have experienced significantly greater increases in the level of renewable deployment.
- **Infrastructure:** Renewable technologies face a range of both opportunities and challenges when integrated into existing electrical grids.

Potential Research

- **Cross-border connectivity:** Detailing infrastructure strategies to expand electrical grid connections between Mexico and the United States (including California, New Mexico, and Texas) and manage energy flows, including from renewable sources.
- **Public-private partnerships:** Outlining specific roles for private sector firms and government agencies in the deployment of renewable energy technologies and sustainable energy planning.
- **Technology outlook:** Exploring options for storage and transmission of electricity generated by renewable sources during periods of limited availability.