

Study highlights opportunities to combine energy justice and innovation

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Almost 2,500 miles and numerous differences in size, culture, and climate separate Los Angeles, California, from Tehuantepec, Mexico. At the same time, these places share striking similarities when it comes to

ambitions for clean energy and the challenges of establishing strategies that engender buy-in from—and benefits for—the entire population.

A study led by researchers from the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) contrasts how these areas in California and Mexico have chosen to address inequities in plans for [clean energy](#) transitions and the very different outcomes of those approaches.

The suggested [framework](#) was recently published in *Nature Energy*. Co-authors at Emlyon Business School, Ohio State University, University of Birmingham, Utrecht University, University of Waterloo, University of Sheffield, University of Toronto, and Emory University also contributed to the research.

"The short version? Mexico didn't make the region's Indigenous people part of the process, creating insurmountable barriers to construction of a vital new wind power plant," said Patricia Romero-Lankao, the journal article's lead author and former NREL Behavioral Science Team lead.

"Los Angeles included members of underserved communities from the very outset of planning discussions. Their input has helped shape all the LA100 Equity Strategies and positioned the city for more widespread success in transitioning to renewable energy."

Romero-Lankao has also acted as NREL's LA100 Equity Strategies technical lead for [community engagement](#) and social science. A larger group of the laboratory's researchers has worked with the city of Los Angeles on the LA100 Study, which identifies ways for the city to shift to a 100% renewable energy power system.

After examining these projects' successes and failures, Romero-Lankao and her social and behavioral science research team have identified best

practices designed to cultivate win-win scenarios for clean energy and [diverse communities](#). The suggested framework to Center Justice in Energy Transition Innovations (CJI) can help [government agencies](#), developers, and others establish dialog with [community members](#) to pinpoint and address specific inequities.

Separate and unequal: Imbalances in energy burdens and benefits

Both the U.S. and Mexican locations studied by Romero-Lankao's international collaborators are home to large low-income populations that have been disenfranchised based on racial and sociocultural differences. This has translated into decades of energy injustices for certain communities. Compared to affluent counterparts, these groups historically have suffered more negative effects related to the generation and consumption of power from traditional petroleum-based resources, and more recently have reaped fewer benefits from clean energy innovations.

In Tehuantepec, one of the poorest states in Mexico, Indigenous peoples make up more than 34% of the population. The area is homeland to Jijot and Zapoteca communities, whose territories are mostly organized through communal land regimes and customary laws. Over the centuries, mining, textile, railway, and other industry interests have repeatedly been given precedence over regional values and traditions.

More than 16% of people live below the [poverty line](#) in Los Angeles, which has the second highest poverty rate of all major U.S. cities. Not only do more than 30% of extremely low-income households not have air conditioning needed to protect them from L.A.'s searing triple-digit summer temperatures, but many also spend over half their income on rent and utilities.

Any number of the city's underserved neighborhoods are located near oil wells or along busy freight transportation corridors with heavy concentrations of hazardous pollutants. And while California boasts a high overall rate of adoption for clean energy technologies such as solar panels and electric vehicles (EVs), low-income residents who cannot afford to buy houses or cars of any type are left far behind.

"It's not just lower-income Angelenos who feel the burden of energy costs. Community members urged us to also consider the needs of the 'missing middle.' These residents earn too much to qualify for low-income benefits, yet still struggle to pay their bills at the end of the month," said NREL Behavioral Science Researcher Nicole Rosner, who co-authored the *Nature Energy* journal article.

Now, LA100 has set ambitious goals to power the city with electricity generated completely from [renewable energy](#) by 2035. Paired with targets to eliminate the use of petroleum fuels in buildings and vehicles, the initiative plans to dramatically slash the emission of harmful greenhouse gas and criteria pollutants through widespread adoption of clean energy and energy-efficient technologies. Leaders quickly realized that everyone in the city needed to play an active role in LA100 Equity Strategies in order for this groundbreaking initiative to succeed.

Similarly, more than 20 years ago, the Mexican government-initiated plans for the development of a large-scale wind plant on the Oaxacan Isthmus of Tehuantepec, an area with abundant wind resources. As it was envisioned, this installation would have the potential to produce up to 44,000 megawatts, more than 10 times the power generated by the Hoover Dam, enough electricity to support a population of 1.3 million.

A study in contrasts: Collaboration vs. imposed decisions

While the Mexico and California projects share admirable objectives for advancing clean energy, their approaches to engaging underserved communities provide a stark study in contrasts—in terms of process and ultimate outcomes.

For the LA100 initiative, NREL worked with city officials and the Los Angeles Department of Water and Power (LADWP), the nation's largest municipal utility, to examine the scientific challenges and trade-offs in achieving a 100% renewable power grid. The laboratory also partnered with UCLA, numerous city agencies, and community-based organizations focused on issues related to the environment, employment, housing, transportation, education, and more.

Rather than imposing outside ideas on underserved communities in misguided efforts to solve problems, Romero-Lankao, Rosner, UCLA partners, LADWP representatives, and a team of like-minded social science experts began collaborating with community members at the very outset of the LA100 initiative to take a fresh look at issues and possible answers.

"In the past, even well-intentioned city planners might have just made token gestures, sharing predetermined decisions with these community members, often in a very paternalistic way," Rosner said. "Instead, the community needs to drive the decision-making process. Let them define their problems and pain points, as well as work with us hand-in-hand to come up with the right solutions to meet their specific needs and priorities."

Through listening, analysis, and feedback sessions, the LA100 Equity Strategies steering committee and underserved community members identified five equity priority areas for the city's energy transition:

- Affordability and burdens

- Access to and use of energy technologies, programs, and infrastructure
- Health, safety, and community resilience
- Jobs and workforce development
- Inclusive community involvement.

Today, thanks to early open dialog, LA100 Equity Strategies is on track to address these priorities with measures designed to expand access to reliable clean energy sources, energy-efficient climate-controlled housing, and affordable electrified transportation options among members of underserved communities. These measures will also aim to cut utility bills, dramatically reduce exposure to harmful pollution, and prevent displacement or rent increases due to property improvements.

Community perceptions of the planning process for the utility-scale wind power project in Tehuantepec, Mexico, noted patterns of top-down decision-making, job insecurity, and violating Indigenous peoples' land rights. In Tehuantepec, the transnational companies' interests became the main force behind the proposed wind developments, and decisions were made predominantly based on techno-economic considerations.

It was reported that local Indigenous communities felt shut out, triggering resistance. Eventually, this led to threats and violence, causing numerous delays and portions of the project to be scrapped entirely.

Community participation: Early, active involvement

"The inequitable history of wind power in Oaxaca highlights the complex relationship between local and global energy development," Rosner said. "On one hand, it reveals the unequal distribution of wind power's economic benefits between the Global North and Global South. On the other hand, when Indigenous Oaxacans demanded a say, they effectively blocked wind farm construction, demonstrating the

importance of authentic collaboration with communities."

In the *Nature Energy* article, Romero-Lankao and her team present a framework that other organizations can use when embarking on efforts to uncover and effectively address energy inequities. The Center Justice in Energy Transition Innovations (CJI) methodology outlines questions for planning agencies, developers, and operators to ask themselves and the community at various stages of designing, funding, constructing, and deploying new large-scale clean energy initiatives.

The CJI guidance familiarizes decision makers with [social science](#) techniques that can help them understand and address past and current energy inequities, empower community leadership in the process, and formulate equitable distribution of both benefits and risks related to an energy transition. These lead to informed decisions about strategic technology and infrastructure investments, expanding existing programs, and establishing new policies.

"The foundation of energy justice is getting all of the right players to the table from the beginning and then making sure that all of their voices are heard and their priorities are acted upon," Romero-Lankao said. "This approach not only can make the shift to a clean energy economy possible, but it can reshape the moral calculus of this transition."

More information: Patricia Romero-Lankao et al, A framework to centre justice in energy transition innovations, *Nature Energy* (2023). [DOI: 10.1038/s41560-023-01351-3](https://doi.org/10.1038/s41560-023-01351-3)

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