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Data for equity in clean energy planning



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About the research

Data for equity in clean energy planning is a report written by The Economist Intelligence Unit and sponsored by Microsoft. Through desk research, literature reviews and expert interviews, the report explores how planning departments and official entities can use data to improve equity—but also how communities themselves can be more active participants through the use of detailed energy data and information.

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Executive summary

The US stands at a pivotal moment to develop an equitable clean energy economy. The recent momentum towards achieving net zero emissions to combat climate change, combined with a growing availability of data and technology, can set it on a path to make right generations of racial and class discrimination in communities across the nation.

This discrimination has led to a state of energy injustice, where low-income people and people of colour in frontline communities suffer from higher energy burdens, power shutoffs and service breakdowns. Often sited close to natural hazards and lacking adequate infrastructure, research shows these communities suffer the first and worst impacts of climate change, with residents having insufficient resources to adapt or mitigate, contribute to decisions

made, or make the most of available clean energy solutions (i.e. renewables).

A changing climate threatens to worsen their situation, affecting housing stock, security, and financial wellbeing and health. Without the right policies and programmes, these communities could suffer further inequity as the US economy decarbonises over the coming decades.

Addressing climate change and energy equity are irreversibly intertwined in an increasingly unpredictable world of extreme weather events. Frontline decision-makers will need to work across sectors and industries, and with different practitioners from government and non-government organisations (NGOs), to tailor interventions to ensure historically disadvantaged communities thrive in the new clean energy economy.

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This report explores the role of data and technology in developing a more equitable approach to clean energy planning in frontline communities across the US. Key findings include:

- **Historical energy injustice needs to be eradicated so the benefits of the new clean energy economy are shared to all.** This requires agreement on what equitable clean energy means, what standards should be set to achieve it and how it can be measured. Any action taken will need to centre on the needs of frontline communities.
- **The power to do this relies on being able to access and analyse data** that will identify communities most at need, show how residents are sharing the benefits and burdens of clean energy investments, and highlight what structural and procedural challenges need to be addressed on the ground. Informed local decision-making is critical for making investments and generating outcomes that align with local needs.
- **Accessing existing data is a work in progress,** with most data from utilities and government agencies focusing on how benefits and burdens are distributed across the population. Data will need to shed light on broader equity issues, like how involved communities are at identifying problems, coming up with solutions and monitoring progress to improve accountability. And communities need to have the capacity, staff and resources to use the data to inform local planning.
- **Ongoing initiatives are already making a difference.** Official entities and NGOs are developing detailed online energy equity databases and maps. Users can map areas of need, and layer data to see how energy fits in with housing, health, workplace and infrastructural programmes, and in the future will be able to use scenario planners to make decisions.
- **Technology has a role to play, too**—as a mix of renewables enter the grid, smart meters and energy efficient devices can generate reliable and precise data that communities can use to make decisions and address equity issues.

Introduction: A state of energy injustice

In July 2021 the western US and Canada was hit by drought and heatwaves, killing hundreds of people and triggering fires.¹ Cities from New York to Phoenix are rushing to implement cooling programmes to aid communities left especially vulnerable to extreme heat due to a lack of green spaces and decades of disinvestment.² Such extreme weather events are becoming the new normal as humans continue to emit greenhouse gases into the atmosphere, hastening climate change and the dire risks that it poses.

Energy planning is a key tenet in combatting climate change; burning fossil fuels for electricity and transport makes up more than half of American carbon emissions (54%, as of 2019).³ But in the US, planning has often ignored or misunderstood racial and historical contexts and how these impact access to affordable energy. Decision-making often excluded frontline communities, resulting in an inequitable distribution of the burdens and benefits of investments in American energy infrastructure.⁴

The existential threat of climate change is propelling a transition from carbon-emitting fossil fuels towards clean energy, where the focus is on zero-emission renewables and energy efficiency. But disparities in access are rife. Many local programmes to boost solar energy on homes, for example, used tax breaks or similar incentives, which often disproportionately benefit white and/or more affluent homeowners with better access to credit and financing.⁵

Research shows that frontline communities—often including people of colour, indigenous people, and those living on a low income—feel the impact of climate change “first and worst”.⁶ These neighbourhoods are more exposed to natural hazards⁷ and typically lack infrastructure to counter climate change’s worst outcomes. They have a higher chance of dying from heat and suffer greater damage from extreme storms and flooding.^{8,9} They are also more likely to breathe polluted air and live near coal plants and toxic sites, including those storing waste from fossil-fuel infrastructure.¹⁰

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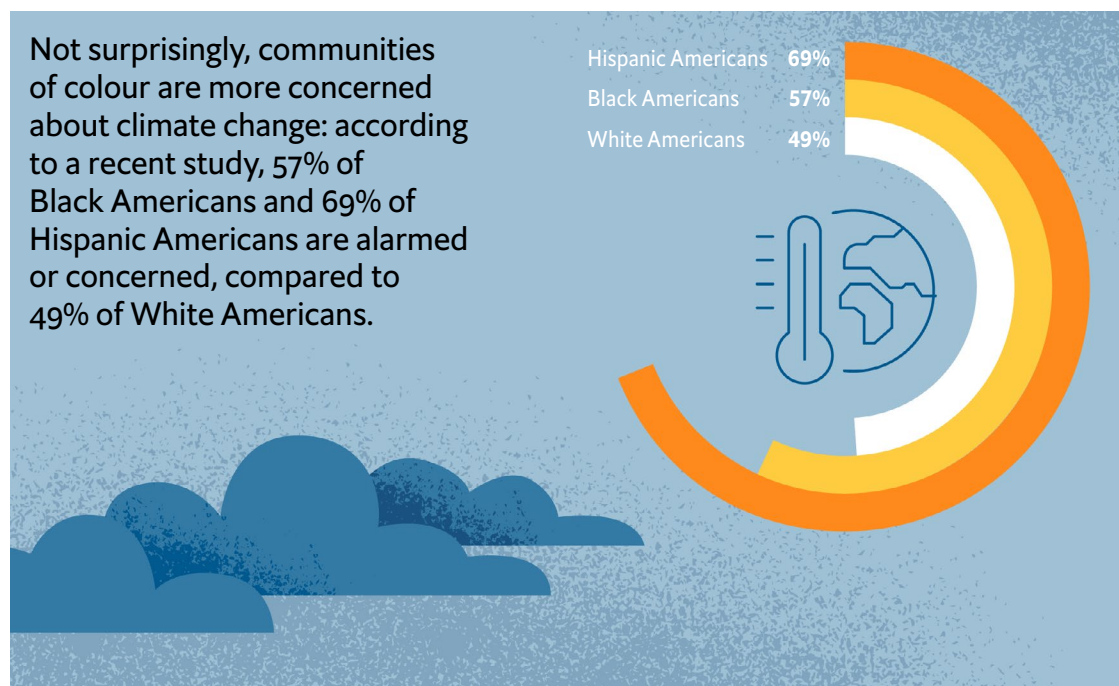


Not surprisingly, communities of colour are more concerned about climate change: according to a recent study, 57% of Black Americans and 69% of Hispanic Americans are alarmed or concerned, compared with 49% of White Americans.¹¹

Growing recognition of these disparities is fuelling a groundswell of support to empower frontline communities to find sustainable and resilient solutions to the climate crisis. This comes even as these communities grapple with the long-term effects of institutional discrimination and racism, which has left their views rarely translated into policy and programmes.^{12,13}

The Initiative for Energy Justice says that to boost equity stakeholders need to centre the concerns of marginalised communities, making energy more accessible, affordable, clean and democratically managed.¹⁴ Putting better data in the hands of frontline leaders is an essential part of identifying these needs and crafting solutions, but detailed data on local energy consumption, affordability and access can be difficult to obtain, making it challenging to robustly address energy inequity and insecurity.

This paper will explore the role of data in equitable clean energy planning and how better access to data and technology can equip frontline communities with the information necessary to plan for a more equitable clean energy future.



Source: Matthew Ballew et al., 2020.

Metrics for measuring inequity

As action to combat climate change accelerates a much-needed push toward clean energy, more importance is being placed on addressing equity, and how it is defined and measured. Equity “is a top priority and being discussed by virtually every state,” says David Terry, executive director at the National Association of State Energy Officials (NASEO).

In the past, policymakers focused on equality in ways that did not address the needs of underserved communities, but equity seeks input from underserved communities and targets resources to meet their needs, adds Mr Terry. It requires looking at affordability and access, but also historical inequities and the disproportionate burden faced by people of colour and low-income communities.

The American Council for Energy-Efficient Economy (ACEEE) and US government agencies use an approach that defines four dimensions of energy equity: structural dynamics; whether benefits or burdens are distributed fairly; whether processes are inclusive; and, lastly, whether solutions will benefit future generations.¹⁵

Defining equity

When looking at equity, it’s important to break it down into different areas of focus:

- **Procedural equity:** decision-makers create inclusive and accessible processes for developing and implementing clean energy programmes.
- **Distributional equity:** clean energy policies and programmes fairly distribute the benefits and burdens across all segments of communities.
- **Structural equity:** decision-makers recognise the historical, cultural and institutional dynamics that have led to clean energy inequities.
- **Transgenerational equity:** decision-makers consider the impact on future generations of the clean energy policies and programmes they develop.

Source: ACEEE, “[Energy Equity](#)”, n.d

The most common metric of energy inequity has been energy burden, or the share of take-home income spent on energy costs. According to a recent study from the ACEEE, a quarter of US households face a high energy burden (paying more than 6% of income on energy bills), while 13% are severely affected (paying more than 10%).¹⁶

This burden is not equally distributed: studies show communities of colour face a 24-27% higher energy burden than White Americans,¹⁷ and that higher burden remains even when controlling across income levels.¹⁸ Meanwhile, low-income households experience an energy burden up to threefold that of high-income households.¹⁹

Other metrics reveal similarly concerning trends.²⁰ Even though in 2020 more than US\$125bn was invested in energy efficiency and renewables, around 120 million households faced energy insecurity, including threatened or actual shutoff of heat or power, forcing them to cut back on other basic needs to pay the bills.²¹ Low-income households and households of colour are also more likely to live in energy inefficient dwellings with inefficient appliances, resulting in more energy needed to heat or cool their dwellings, exacerbating energy insecurity.²²

Climate change is only making the problem worse: more frequent excessive heat days, for example, lead to increased energy consumption and higher energy bills, causing greater service disruption in frontline communities.



Getting everyone on the same page in understanding equity, especially racial equity, is key.

Chandra Farley, director, Just Energy, Partnership for Southern Equity

Getting everyone on the same page in understanding equity, especially racial equity, is key, says Chandra Farley, director of Just Energy at the Partnership for Southern Equity. There is a need to make sure “we’re all speaking the same language when it comes to equity.”

Because there is no standardised framework for measuring energy equity, utilities, regulators and advocates have judged equity on an ad-hoc basis. But efforts are under way to remedy this situation, with the Urban Energy Justice Lab, for one, developing the first standardised tool for driving equity in the clean energy industry.²³

Their equity measurement framework, set to launch in beta form in 2022, compiles a set of indicators so advocates, practitioners, agencies and utilities can drive more equitable investments and outcomes in energy efficiency, distributed generation and storage (solar and batteries), demand response, electrification, and electric vehicle (EV) infrastructure. The framework will assess metrics in the four dimensions of equity, aggregate existing metrics and indices, assess data gaps and barriers, and generate baseline equity ratings for all locations, among other aspects.²⁴

Targeting net zero: The case for equitable clean energy planning

In April 2021 the US president, Joseph Biden, announced new emission reduction targets for the country under the Paris Agreement, a global pact to limit the temperature rise to “well below” 2 degrees Celsius compared with preindustrial levels. Responding to the climate crisis, Mr Biden set a target to decarbonise America through a 50-52% reduction from 2005 levels in economy-wide greenhouse gas emissions by 2030.^{25,26}

As part of the larger goal for a net zero economy by 2050, Mr Biden is targeting a carbon-free power sector by 2035. To achieve this, he has called for renewable energy and infrastructure projects that are unprecedented in both scale and investment.²⁷

However, ensuring the benefits are felt by those who have historically borne the brunt of energy injustice requires overcoming structural barriers to accessing clean energy, such as:

- Exclusion of frontline communities from energy planning and decision-making.²⁸
- Inequitable distribution of benefits and burdens of energy investments.
- Low representation of people of colour in the clean energy industry.^{29,30}
- A lack of trust in government planning among marginalised communities.³¹

“In every city in America there’s decades of history, probably longer, of direct institutional racism—such as in how we developed highways and housing—that led to a lot of the problems,” said Dan Guilbeault, chief of the Sustainability and Equity Branch at the Department of Energy and Environment (DOEE), Washington, DC. “So, now when we show up for these projects, we’re representing the government that is the face of all of that. That’s a big challenge.”

Responding to historical and current injustices, Mr Biden’s Justice40 Initiative aims to direct clean energy solutions to those who need it the most. It pledges to deliver 40% of climate investment benefits, including weatherisation, retrofits and renewable energy, to historically disadvantaged communities. Progress will be measured with an environmental justice scorecard and a screening tool based on the Environmental Protection Agency’s justice mapping and screening tool, EJSCREEN.³²

Re-tooling the policy process with equity in mind

One area that stands out for its work on equity is the District of Columbia (DC). After its Sustainable DC plan in 2013 was criticised for lacking inclusivity,³³ planners decided to centre equity and frontline communities in developing Sustainable DC 2.0, their new sustainability and climate plan, said Dan Guilbeault, chief of the Sustainability and Equity Branch at the DC Department of Energy and Environment.

To identify vulnerable communities in DC, they combined climate, location, planning, energy, environmental, economic and social data from across the city's agencies. These data showed that the most vulnerable area was Ward 7, around the flood-prone Watts Branch. To devise a climate adaptation plan that aligned with the priorities and needs of residents, they

engaged the community by convening a racially diverse planning team, prioritising people of colour, holding meetings in frontline neighbourhoods to draw in residents and setting up question stations after these, keeping the meetings informal, and connecting with residents online.

For the past three years they have worked with an advisory group, which they compensated with food, childcare and transport stipends, to support the plan's implementation. The group is now a resilience hub for their community.³⁴ "It's a really good example of putting our money where our mouth is on equity," said Mr Guilbeault. For frontline leaders to become architects of change, this kind of community engagement is key.³⁵

As communities across the country plan their transitions to 100% renewable energy, it is crucial to respect local contexts and ensure benefits do not raise costs or exacerbate existing inequities.^{36,37} This makes monitoring critical. "It's not just the number of renewable or energy efficiency jobs, but who's actually benefiting? Is it local residents? To have a targeted workforce approach you need data on those things," says Dr Lauren Ross, senior director for policy at American Council for an Energy-Efficient Economy.

Frontline communities need to be at the table defining their needs, because historical disparities need to be resolved as part of a holistic package around housing,

health, infrastructure and energy. Home ownership is a big issue in incentivising energy investments,³⁸ and gentrification and "greentrification" push out renters first.³⁹ Climate change could have a big impact on affordable housing stock,⁴⁰ housing security and broader financial wellbeing.⁴¹

"Our country has disinvested in affordable housing for decades, and now we're going to talk to them about saving energy? We think residents need to change their behaviour? No, we need to invest in infrastructure and address things like drafty windows, poor insulation, and bad appliances. We need to understand more about what's at play [and] the factors behind energy burdens," says Dr Ross.

According to a recent study, more than a third (35%) of the excess energy burden faced by low-income households would be eliminated if the efficiency of low-income housing stock was increased to the level of the average US home. This is even starker for communities of colour: 42% and 68% of the excess energy burden would be eliminated for Black and Hispanic households, respectively.⁴²



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Lauren Ross, senior director for policy, ACEEE

Cities at the forefront of the clean energy transition

Over 80% of the US population lives in urban areas, and research shows that, globally, cities produce around 70% of energy-related GHG emissions, putting them at the forefront of the clean energy transition.⁴³ Cities absorb more heat than rural areas in a warming world, putting people and infrastructure at risk. Progress toward energy goals has been limited, however, with less than 30% of major US cities having achieved UN Sustainable Development Goal 7: access to affordable and clean energy.⁴⁴

Still, cities are pursuing some of the most ambitious sustainability and equity goals. More than 180 US cities have committed to power their communities with 100% clean electricity by 2035, signing resolutions, climate action plans and other policies that take justice, equity, affordability and access into account. This is up from only 17 cities in 2016. In March 2021 Los Angeles

became the first city to release a plan to achieve 100% clean energy by 2035.^{45,46}

American cities are also looking at innovative ways to fund their transition, including sales, retail and fossil fuel taxes, and climate and resilience bonds.⁴⁷ Cities are also pooling funds from schemes like the Low Income Home Energy Assistance programme and other sources, enabling communities to build solar systems that all residents can use, lowering their bills at the same time.⁴⁸

However, there is still some way to go. “While cities are doing much more in terms of trying to think about equity, bringing the community into their decision-making, they’re still somewhat in the beginning stages of figuring out how to hold themselves accountable, especially because of the data issue,” says Dr Lauren Ross, senior director for policy at American Council for an Energy-Efficient Economy.

Rural communities are on the frontline too

Many rural communities are also on the frontline of climate change and face a unique set of challenges when it comes to equitable clean energy planning. Often, there is little to no coordination between urban areas setting ambitious renewable energy goals and rural areas where most of that renewable energy generation will be sited, according to Megan Day, senior energy planner at the National Renewable Energy Laboratory.

This leaves rural communities sourcing energy for cities, often bearing the brunt of large-scale changes in land use for renewables infrastructure, like solar projects and wind farms. Disagreement over land use can create bottlenecks, as restrictions in rural areas can sometimes drive up clean energy costs—for example, requiring shorter wind turbines and larger setbacks, says Ms Day. Low levels of broadband penetration, limited availability of skilled technicians and distances between houses compound the problem.

Aside from land-use issues, much of the focus in rural communities has been on economic development and job opportunities. The World Resources Institute, a Washington-based think-tank, says US\$15bn a year on climate spending could create nearly 260,000 jobs annually in rural US counties, where poverty is

rife.⁴⁹ Indeed, well-paying jobs can be hard to find in rural areas, particularly where local industries are dying.⁵⁰

In order to take advantage of those new opportunities, however, workers in these areas would need to be trained, as rural communities are often less equipped to address advanced energy needs, says Dr Ross. “As we move towards more high-efficiency technologies, the workforce isn’t often there for implementation in rural areas. Like heat pump installers, there’s a dearth of them in rural areas.”

Despite the challenges, there is promise. In rural areas, around 900 local electric co-operatives serve 42 million consumers with the potential to deliver the benefits of clean energy access to those communities.⁵¹ These non-profit co-ops generate two-thirds of their power from low or zero-carbon sources, keep rates affordable for consumer-members and offer programmes for those struggling to pay bills. Co-ops also lead the industry in smart meters, and are investing in energy storage for micro grids as well as carbon capture. In the future it is likely that artificial intelligence will play a key role in filtering data from countless sensors and smart devices to highlight areas of need and help consumers develop and implement their own solutions in a complex grid.⁵²

Closing the equity gap: Using data to foster equitable access

More data are being generated and used by more entities at a moment in time when climate action and clean energy programmes are expanding rapidly. Communities themselves can and should be more active participants in creating and using data and information, allowing them to amplify their voices and direct resources toward the energy insecure.

In the past, data were generated, regulated and funded mostly by government, but private companies and even citizen scientists are jumping into the fray, producing reams of data stored on cloud-based platforms. In Atlanta, for example, citizens are working with universities and local groups to test water and map urban island effects.

“We are working to better connect communities with data. Activities like these citizen science efforts help them better understand the role they play in data collection. But also understanding that when we’re talking about data, we’re talking about them,” says Ms Farley.

New technology is also expanding the range: space companies produce satellite data that communities can use in conjunction with equity indicators to map vulnerabilities. Real-time tracking of economic data—like goods scanned in supermarkets and the EV sales—enable communities to track local supply and demand for energy.

Specificity matters, too. Data down to the census tract level (or lower) can help identify high energy burdens, shutoffs (including their risk), ability to pay energy bills, and owed bills, allowing for more targeted interventions and investment.⁵³

This breadth and depth of data from the public and private sector, as well as individuals, can help inform how to close the energy equity gap in frontline communities by enabling better data analysis at the local level, as well as better monitoring.⁷ It can show the extent to which communities are taking part in energy programmes and planning, and how

Communities themselves can and should be more active participants in creating and using data and information, allowing them to amplify their voices and direct resources toward the energy insecure.



* For a list of available tools, datasets, reports, frameworks, and other resources for city governments engaging in inclusive clean-energy planning, see this [resources list](#) from WRI, greenlink and USDN.

they are consuming energy by race, ethnicity and income level. This community-level understanding can directly inform energy planning, putting power in the hands of communities rather than just central planners, and ensuring greater equity and responsiveness to community needs as they evolve.

Energy burden data from a study conducted by Georgia Tech and Greenlink Analytics helped identify that six out of 25 zip codes in the city had higher energy burdens, showing Ms Farley and Partnership for Southern Equity where to direct resources.⁵⁴ “It helped us be more hyper-focused on where we needed to be on the ground,” says Ms Farley.

And where data are not available—either because utilities or other agencies are not sharing data at levels that are useful, or because structural or process equity data do not yet exist—planning departments and official entities like the California Energy Commission, the US Department of Energy and the National Renewable Energy Laboratory are relying on surveys, census data and administrative records to build energy equity maps and tools.⁵⁵

The latter developed the online State and Local Planning for Energy (SLOPE) platform, giving access to consumption and burden data on energy efficiency, renewable energy and sustainable transport.⁵⁶ The aim is to make the platform a scenario-planner so communities themselves can use the data in an actionable way to decide which trade-offs to make. “Frontline, low-income, and disadvantaged communities often don’t have sufficient capacity to figure out all these tools, access the data, and then do something with it. So that’s what we’re trying to do with the [SLOPE] platform,” says Ms Day.



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Megan Day, senior energy planner,
National Renewable Energy Laboratory (NREL)

The data also allow for better monitoring and evaluation of energy investments, contributing to greater accountability through tracking progress against equity targets and goals. For example, by combining modelled consumption with renewable energy potential data, SLOPE can help communities decide if there are opportunities in clean energy, like hydropower or geothermal heat pumps, Ms Day adds. With the private and public sectors increasingly incentivised to invest in these projects, financial data will be crucial to see if they meet ESG and other carbon disclosures.

Similarly, there is growing interest from grassroots groups for higher-resolution information and better estimates. Greenlink Analytics, an energy research NGO, has developed an online equity map called GEM to help visualise how equity-related issues and burdens—along with health, demographics, housing, technology and income data—are spread across census tracts, enabling users to see how layers of indicators are linked at a community level.

This overlaying of data allows participants to think collaboratively in a multisector way around integrating clean energy solutions within housing, health and workplace policies, and to address persistent challenges around equity and inclusion in disadvantaged communities.

More than 50 cities use GEM, triggering a raft of report cards and equity indices for tracking performance, says Dr Matt Cox, CEO of Greenlink Analytics. Being able to go down to census tracts is key for grassroots groups like Ms Farley's. The tract data enabled her team to identify specific neighbourhoods and partners to work with in Atlanta, and to determine if weatherisation and energy efficiency programmes reach those most in need. Her team also became a feedback loop for utilities and the city on where programme priorities should be focused.

At a city-wide level, GEM enabled Atlanta to focus on residential energy equity—both in process and distribution—and not just commercial energy efficiency, according to Yeou-Rong Jih, former director of Urban Initiatives at Greenlink Analytics. After measuring the energy burden over time, the city created a clean energy taskforce, resulting in a low-income energy efficiency programme for the highest burdened communities. The GEM data not only identified needs in different parts

of the city, but enabled users to visualise their goals and be accountable for meeting them.

“Because of the maps coming out, the City of Atlanta ended up really focusing on energy equity, really educating people in the community about it, and it became a major part of their clean energy plan,” said Ms Jih. “Cities are taking these data and creating really tangible programmes and outcomes and metrics to measure, being accountable to not just city stakeholders but also to the community.”



Because of the maps coming out, the City of Atlanta ended up really focusing on energy equity, really educating people in the community about it, and it became a major part of their clean energy plan. Cities are taking these data and creating really tangible programmes and outcomes and metrics to measure, being accountable to not just city stakeholders but also to the community.”

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Urban Initiatives, Greenlink Analytics

Technology also has a role to play

A raft of new technologies in the clean energy space are changing the ways communities source and use energy, from renewables⁵⁷ to energy efficient appliances⁵⁸ and lighting⁵⁹ in homes and buildings, and driving shifts in mobility and automation. Meanwhile new game-changing technologies are seeking to capture carbon and store energy, enabling lower-emission power systems.

These tools will often be equipped with modern meter technologies—such as smart meters and Internet of Things devices—that can produce useful data for frontline and marginalised communities, allowing them to assess progress against targets and goals.

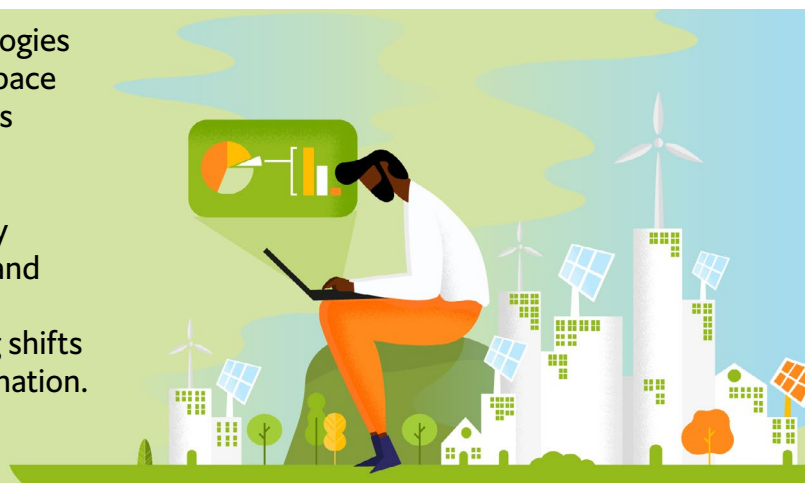
Smart grid and metering technologies will also enable communities to optimise energy use, allocation and production, shedding load during certain times of the day and automating decisions, helping to streamline processes, improve efficiency and conserve resources.

New and innovative technologies are also picking up speed, including low-temperature heat pumps and solid-state cooling. For the latter, there are emerging solid state refrigeration technologies using semiconductors to deliver precise temperature control and energy efficiency.⁶⁰ They are up to 30% more efficient than fridges used today and they use no high greenhouse warming potential refrigerants, according to Mr Terry.

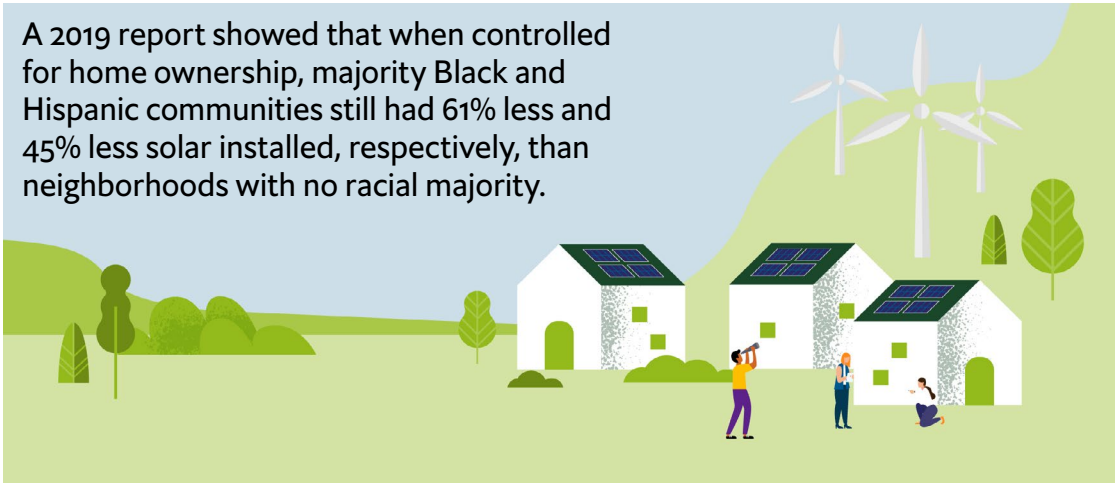
These technologies, combined with artificial intelligence (AI) and machine learning techniques, will help monitor, simulate, forecast and optimise efficiency amid a riskier climate.^{61,62,63} Utilities can, for example, assess customer energy usage, with AI suggesting retrofits or behaviour changes. AI can also help better predict weather and automate a complex electricity grid to meet changing demands.⁶⁴

Despite these tech advances, research has identified many cases where access to low-carbon and efficient technologies is not universal and, in most cases, exclusively seized by higher income households,⁶⁵ deepening the divide between the data-haves and the data-have-nots.

A raft of new technologies in the clean energy space are changing the ways communities source and use energy, from renewables to energy efficient appliances and lighting in homes and buildings, and driving shifts in mobility and automation.



A 2019 report showed that when controlled for home ownership, majority Black and Hispanic communities still had 61% less and 45% less solar installed, respectively, than neighborhoods with no racial majority.



This lack of access to both the technology (and the data derived from it) is typically attributed to high upfront costs, a lack of incentives, and a misalignment between installation and use of the technology with living conditions (for example, rental properties).⁶⁶ When it comes to smart home technology, for instance, a 2013 study highlighted the difficulty of installation for those living on low incomes, short-term rentals and in older dwellings.⁶⁷

The same goes for poorer households who do not have solar panels and/or energy efficient appliances. A 2019 report⁶⁸ showed that when controlled for home ownership, majority Black and Hispanic communities still had 61% less and 45% less solar installed, respectively, than

neighborhoods with no racial majority. And even when controlling for home ownership, nearly half of Black-majority communities did not have a single solar system installed.

By tracking and assessing inequity across all these factors (not just energy burden), programmes can be designed to remedy constraints and challenges on the ground. For example, while clean energy technologies are often seen as a solution to benefit everyone, these technologies may not be compatible with socioeconomic and institutional realities within communities and could further burden some groups while benefiting others, worsening injustice.

A pivotal moment: Time to improve data access

The US is at a critical moment where it can leverage policy momentum, along with the latest innovations in data and technology, to ensure equitable access to affordable, clean energy. To maximise this moment, identifying where improvements can be made to make better data available for those making decisions will be crucial.

One of the biggest gaps (and opportunities) for frontline communities is getting access to their own data: equitable energy planning requires neighbourhood-level data, which is not always available. Utilities are at the forefront of the US clean energy transition, with their focus on energy efficiency, EVs and distributed energy resources.⁶⁹ They have vast data on how customers in every home and business across America use energy. But many are not sharing data, either due to resistance, concern over physical security or insufficient data collection.

Ms Farley's team in Atlanta provides a great example of this. She needed zip code- or census tract-level data on shutoffs to ask for a moratorium on electricity, water and broadband shutoffs during the covid-19 pandemic. Instead, Georgia Power, the local utility, gave only total customer numbers, leaving her team unable to pinpoint where in the area—say southwest Atlanta or rural Georgia—the shutoffs were happening. “You can't target programmes, and you can't target policy, without being down at a more granular level with that data,” said Ms Farley.



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Chandra Farley, director, Just Energy, Partnership for Southern Equity

Access to these data is especially important since utilities are generators of useful data. “If you know about electricity use, bill data, down to the day, the hour, you can see trends and what that means in the community,” says Mr Terry.

Even when data are available at the local level, communities need to have the capacity, staff or resources to make efficient use of it. Data illiteracy among decision-makers, local governments and residents can limit effectiveness, signalling a need to not only invest in training, but also to develop tools that gather and input the data and allow for easy analysis.

“Our dream dataset is to help local communities be more strategic—how do they make strategic investments in their town? In their infrastructure? But what we hear repeatedly from cities and communities is that they're overwhelmed. They get these tools, but they don't know which ones to spend the time to figure out,” says Ms Day. “With the scenario planner [in SLOPE] we're delivering the data and shortcutting the situation so they can make decisions.”

Likewise for lack of internet access—cities must prioritise communities with limited access and slow speed. “Those communities that are the most remote, the disadvantaged, are also those who have traditionally been underrepresented in data. Even when they are represented in data, the extent to which those data comes back to them so they can use it for accountability is very variable,” says Dr Claire Melamed, CEO of the Global Partnership for Sustainable Development Data.

While data can tell stakeholders how their programmes are operating and their interventions’ impacts, people worry what it will be used for and who it will be sold to, Dr Melamed says. The potential to use mobile data is huge, but hugely controversial. The key is to get data in a way that protects vulnerable communities and use it in a very transparent, understandable and institutionalised way, according to Dr Ross.

To put people at ease over privacy concerns, states have been working with utilities to place consumers at the centre of the process.⁷⁰ They have set up systems where consumers can access their own energy data from utilities and decide if they want to share that with third parties. Utilities have



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Lauren Ross, senior director for policy, ACEEE

doubled the number of smart meters they have installed since 2010, with nearly half of US electricity customers outfitted with one.⁷¹

California and Texas show how states can share data in a way that preserves privacy but allows that data to be used to plan and target the energy insecure. In Texas, which ordered utilities to provide consumers with access to their electricity data, customers access their data through a web portal called Smart Meter Texas.⁷²

Secure and transparent management of data encourages people to share data, and these models show how data access can be streamlined for stakeholders seeking information to design policies and programmes for communities at need.

The road ahead: Harnessing the power of data for equity

Inequities are ingrained in frontline communities across America. As these communities are impacted first and worst by climate change, their ability to mitigate and adapt to its dire consequences in the transition to a clean energy economy must be considered first too.

Data are a potent tool to enhance local clean energy planning, and with more data available at faster speeds from more providers, it can empower frontline communities to be more active participants. “We are on the brink of using data more effectively to identify those households that have been left out of the clean energy economy,” said Dr Ross. “There’s such a potential for better data to not only surface the major inequities within the energy space, but to lead to good solutions.”

While data are proliferating, it also needs to be accessible, analysed and shared with stakeholders in a better way. Much work is being done to include equity in national datasets and tools, as well as on the ground, but more investments need to be made in data infrastructure and human capital to support communities to track progress against clean energy goals over time.



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Climate change and equity conversations, once treated separately, are being considered together in the context of clean energy planning. “Both sides have recognised we’re not going to solve one without solving the other. Making those two things speak together to develop solutions collectively with a better-informed toolkit, that’s the part I’m most excited about,” says Dr Cox.

Key to that toolkit is the merger of a community focus with computing power, like machine learning or AI, allowing planners to project into the future, says Dr Cox. “That’s the part that is going to be critical, at least as far as addressing climate change in the US goes.”

Energy planning cannot be seen in a silo. Public and private entities, and especially utilities, will need to work together with communities to develop and share data,

not just on clean energy, but also on other equity-focused measures, such as affordable housing, jobs and adequate healthcare.

“We’re moving in the direction where you’ll be able to put data layers on top of each other and really shape policy and target interventions like we haven’t done before. And that’s something that we hope to explore in the next iteration of our clean energy planning,” says Jamie Donovan, program analyst at DOEE.

Energy planning cannot be seen in a silo. Public and private entities, and especially utilities, will need to work together with communities to develop and share data, not just on clean energy, but also on other equity-focused measures, such as affordable housing, jobs and adequate healthcare.



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