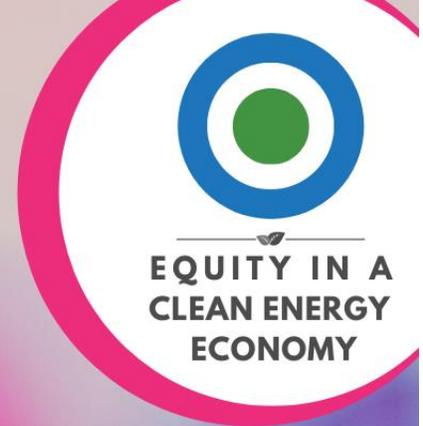


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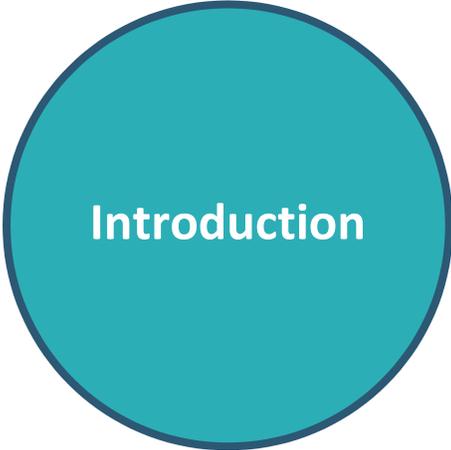


**EQUITY IN A
CLEAN ENERGY
ECONOMY**

RESOURCE GUIDE

UNDERSTANDING THE ISSUE
OF EQUITY, THE CLEAN
ECONOMY AND THE
EFFECTS OF CLIMATE
CHANGE

DATE
FEBRUARY 2021



Introduction

This resource guide provides news articles, studies, academic journal articles, and online tools that can be leveraged to understand the issue of equity, the clean economy, and the effects of climate change.

We created this document because we recognize the next few years as an important, transitional period for the United States. In the wake, of the COVID-19 pandemic and a contentious presidential election, the United States is now positioning itself to aggressively pursue clean technologies and renewable energy to rapidly decarbonize the economy and limit the effects of climate change.

Millions of Americans are simultaneously facing a debt crisis, a public health crisis, and an unemployment crisis. The hope is that this document can help those that review it to better understand some of the challenges and solutions facing so many Americans.

Definitions

Clean Economy: A low-carbon or neutral-carbon pollution economy. Any goods or services actively reduce their sector's carbon footprint ([Brookings Institution](#)).

Electrification: A movement to upgrade anything and everything that runs directly from fossil fuels (such as a car's combustion engine) and to have it run on electricity, ideally from renewable energies ([Resources for the Future](#)).

Environmental Equity: Protection from environmental hazards as well as access to environmental benefits, regardless of income, race, and other characteristics ([EPA](#)).

Environmental Justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies ([EPA](#)).

Grid Modernization: This is an effort to increase the reliability of the energy grid system through the adoption of new and emerging technologies ([Department of Energy](#)).

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Affordability of Clean Energy

ACEEE (2020). [Energy Burden Research](#). Washington, D.C.: ACEEE.

The American Council for an Energy-Efficient Economy (ACEEE) drafted this report focused on household energy burdens, particularly focused on how it differs among households of different ethnicities. Generally speaking, they found that Black, Hispanic, and Native American households had anywhere from a 20% to 45% higher energy burden than white, non-Hispanic households.

Calma, J. (October 2020). [Solar energy reaches historically low costs](#). New York, NY: The Verge.

This article examines a report from the International Energy Agency (IEA) that found that the cost of solar energy hit an all time low. While this report is on a global scale, rather than a national, it still highlights an overarching trend on solar energy becoming cheaper and cheaper.

Cappers et al (September 2021). [Disaggregating Future Retail Electricity Rate Growth](#). Berkeley, CA: Lawrence Berkeley National Laboratory.

Research produced by this Department of Energy lab examined the drivers behind retail electricity rate growth increases over the past ten years. They mostly found that the main driver was large increases in capital expenditures that were offset by “substantial wholesale price reduction.”

Fares, R. (August 2017). [Wind Energy Is One of the Cheapest Sources of Electricity, and It's Getting Cheaper](#). New York, NY: Scientific American.

Although this article is a few years out of date, it still highlights the trend of clean energy becoming more and more cheaper. This offers a breakdown of the Department of Energy's study on wind energy price. The price of electricity generated by wind power is approximately two cents per kilowatt-hour. As Fares notes, that's about the same price needing to be competitive with other electric sources.

Ip, G. (January 2021). [Green Euphoria May Cost Investors, but Planet Says Thank You](#). New York, NY: The Wall Street Journal.

A huge influx of stock buys into Tesla and the Clean Edge Green Energy Index Fund shows that people are willing to buy into the clean energy economy in all facets. This amount of money indicates a certain level of confidence in renewable energies and the technologies that are built around them.

Marcacci, S. (January 2020). [Renewable Energy Prices Hit Record Lows: How Can Utilities Benefit From Unstoppable Solar and Wind?](#) New York, NY: Forbes.

At the beginning of 2020, the Energy Information Administration predicted that solar and wind energy will make up 76% of new energy generation. Coal and natural gas plants were also predicted to be the overwhelming majority of closures. The article also examines data from Lazard and their Levelized Cost of Energy analysis which found that the cost of renewable energies hit a new low in 2019, falling below the cost of coal.

Seltzer, M. (December 2020). [Big but affordable effort needed for America to reach net-zero emissions by 2050, Princeton study shows](#). Princeton, NJ: Princeton University.

This article is a write-up of a research report by the Andlinger Center for Energy and the Environment. The article gives a summary of the nearly 350 page report detailing what it would take to get the United States to net-zero carbon emissions. The article details the efforts that must be taken, such as the rapid electrification of buildings and cars. Specifically, it says that the US needs to expand its electricity transmission systems by 60% by 2030.

Building Resilient Communities

California Energy Commission (2019). [Energy Efficiency in Existing Buildings](#). Sacramento, CA: California Energy Commission.

Modernizing buildings to make them more energy efficient is an important step in transitioning to a clean energy economy, and the California Energy Commission has been focused on this topic following the release of the *2019 California Energy Efficiency Action Plan*. This plan was organized by three state goals: doubling energy efficiency savings by 2030, removing and reducing barriers to energy efficiency in low-income and disadvantaged communities, and reducing greenhouse gas emissions from the building sector.

California Energy Commission (2021). [Disadvantaged Communities Advisory Group](#). Sacramento, CA: California Energy Commission.

The creation of the Disadvantaged Communities Advisory Group (DACAG) was due to the Clean Energy and Pollution Reduction Act of 2015 (SB 350). The purpose of this group, with 11 members, is to review clean energy programs and policies that come from the California Energy Commission and California Public Utilities Commission. These reviews exist to ensure that disadvantaged communities receive the benefits of clean energy programs.

Jeffers et al. (October 2017). [A Grid Modernization Approach for Community Resilience: Application to New Orleans, LA](#). Washington, D.C.: Office of Scientific and Technical Information.

This report was done in collaboration with New Orleans, LA, to test different resiliency ideas for communities. The report notes that the United States has a huge reliance on the electric grid. The annual cost for outages average between \$18 billion and \$33 billion. This research was conducted with this understanding and aims to provide actionable recommendations to communities looking to limit the cost of natural disasters.

NIST (December 2016). [Helping to Build a Nation of Resilient Communities](#). Washington, D.C.: National Institute of Standards and Technology.

This is a broad-based guide for communities looking to build resilience to natural disasters. It offers guidance on best practices and approaches to planning. Included in the article is a six-step planning process. Those six steps are: form a collaborative planning team, understand the situation, determine goals and objectives, plan development, plan preparation, review, and approval, and finally plan implementation and maintenance.

O'Boyle, M. (November 2017). [What 'Resilience' Means in a Clean Energy Future](#). Boston, MA: Greentech Media.

This looks at the ambiguous and ill-defined term 'resilience' and breaks down what it means both as a definition and what it means from a practical perspective. The biggest issue, it identifies, with resilience is that there are no widely agreed metrics-of-success for it (compared to reliability where there are several metrics).

Schweitzer, S. V. (March 2016). [Can low-income housing be energy-efficient and affordable?](#) Washington, D.C.: Vox Media.

This article is on the older side, however it still offers a look, and some numbers, around upgrading buildings to becoming energy efficient. For example, the author cites a 2012 study by CNT Energy and the American Council for an Energy-Efficient Economy, which found that building owners and residents could save \$3.4 billion annually by upgrading multifamily housing units to become energy efficient. Overall, the article focuses on the why and how to upgrading millions of homes and buildings to becoming energy efficient.

U.S. Climate Resilience Toolkit (October 2019). [*Building Resilience in the Energy Sector*](#). Washington, D.C.: U.S. Climate Resilience Toolkit.

This is a short blurb looking at what resiliency in the energy sector looks like and some of the items that need to be done to achieve the goal. It looks at three different action areas: system and operation planning, existing or new equipment, and reducing energy demand. Along with these action areas and the accompanying items, the blurb also provides additional tools and resources related to the subject.

Climate Change

Flavelle, C. (January 2020). [U.S. Disaster Costs Doubled in 2020, Reflecting Costs of Climate Change](#). New York, NY: The New York Times.

Climate change has become increasingly expensive over the years. As natural disasters become more frequent and more damaging, we see it hit the bottom line. Disasters cost the United States about \$95 billion, more than double the 2019 toll and the third highest toll since 2010.

Kelly et al (September 2017). [A Framework for Local Action on Climate Change](#). Washington, D.C.: Center for American Progress.

While this report focuses its recommendations on mayors and local governments, there is valuable information to be learned from it. It gives nine recommendations for. Those nine items are: focus on equity, collaborate with community groups, expand economic opportunities, increase access to clean energy, access to clean transportation, invest in infrastructure, support emergency preparedness, support social cohesion, and invest in community resilience and livability.

NASA (2020). [Climate Change and Global Warming](#). Washington, D.C.: NASA.

This site by NASA goes over the science, evidence, and impact of climate change. It is comprehensive and informed in large part to their own research in climate change. Includes a look at quick facts such as global temperature, parts per million of carbon dioxide, and the arctic ice minimum.

Reidmiller et al. (2018). [Fourth National Climate Assessment](#). Washington, D.C.: U.S. Global Change Research Program.

This is a federally funded report that examines the effects of climate change on United States citizens. This is an ongoing series of reports examining the issue, updating every four or five years. This is volume two of the fourth iteration. The summary linked above covers 12 areas of climate affect. Communities, Economy, Interconnected Impacts, Actions to Reduce Risks, Water, Health, Indigenous Peoples, Ecosystems & Services, Agriculture, Infrastructure, Oceans & Coasts, and finally Tourism & Recreation.

Simon, M. (January 2021). [Climate Change Is Turning Cities Into Ovens](#). San Francisco, CA: Wired.

One consequence of climate change is that cities are getting hotter than other places. Currently, cities are projected to warm by 4.4 degrees Celsius (about 40 degrees Fahrenheit) by 2100. This is compared to the 1.5-2 degrees Celsius that the Paris Accord lays out as the hard limit to avoid for global temperatures. The 4.4 degrees Celsius is an increase from pre-industrial levels.

The Climate Reality Project (July 2018). [Three Big Ways Cities Can Protect Low-Income Residents from Climate Change](#). Washington, D.C.: The Climate Reality Project.

As the title of the article suggests, it offers three actionable items that local communities can work towards that are able to lessen the impact of climate change on vulnerable populations. The first is to increase economic opportunities and shrink the income gap. The second is to make clean energy more accessible. And the third and final item is to make disaster-preparedness a priority.

Climate and Environmental Justice

Biden, J. (2020). [*The Biden Plan to Secure Environmental Justice and Equitable Economic Opportunity*](#). Washington, D.C.: Biden Presidential Campaign.

A more focused look at an element of Biden's climate plan, this one focusing on environmental justice in frontline communities. Among the issues and solutions he's looking to push is an "all-of-government" approach to update and modernize existing government groups that offer protections around the issue of the environment.

Cho, R. (September 2020). [*Why Climate Change is an Environmental Justice Issue*](#). New York, NY: Columbia University.

This offers a very basic overview of the issue of the intersection of climate change and environmental justice. As it notes, communities of color and other frontline communities are disproportionately affected by climate change and the causes of climate change. These include extreme heat, extreme weather events, poor air quality, and pollution.

Environmental Protection Agency (2018). [*Learn About Environmental Justice | Environmental Justice*](#). Washington, D.C.: Environmental Protection Agency.

This is a very plain definition of environmental justice from the EPA. It includes links to other sources, such as their own Office of Environmental Justice, laws and statues, the Federal Interagency Working Group, executive orders, among others.

Green the Church (2021). [*Green the Church*](#). Berkeley, CA: Green the Church.

The transition to a clean energy economy must be a holistic one. Green the Church is at the intersection of sustainability and theology. Although the issue of religion can be a touchy one, it is undeniable that churches and other places of worship can be powerful community centers and advocates.

Klugman et al (October 2021). [*Illinois Enacts Comprehensive Climate and Clean Energy Legislation*](#). Sausalito, CA: JD Supra.

The state of Illinois passed a nearly 1000-page climate and energy bill called the Climate and Equitable Jobs Act (CEJA) in the fall of 2021. This article goes over some of the major impacts the bill brings. There's a particular focus on decarbonization, EVs, high voltage direct current transmissions, and net metering and energy storage are some of the bill's highlights.

Plumer, B., Popovich, N. (August 2020). [*How Decades of Racist Housing Policy Left Neighborhoods Sweltering*](#). New York, NY: The New York Times.

This article examines the correlation between redlined neighborhoods (a practice of marking neighborhoods as being risky investments due to a large population of Black residents) and the increase of urban heat as a result of climate change. Two big factors in this: formerly redlined communities tend to have less tree cover to offer shade and a larger amount of paved surfaces that absorb and radiate heat.

Searcey et al. (November 2021). [*A Power Struggle Over Cobalt Rattles the Clean Energy Revolution*](#). New York, NY: The New York Times.

Most talk about clean energy is largely focused on the end goals and benefits. However, as this New York Times article recognizes, as the transition occurs and more emphasis will be put on necessary materials, such as the Congo cobalt mine that's highlighted in this article. Equity issues go beyond where the benefits are going to and have to be considered for the entire supply chain.

Worland, J. (July 2020). [*Fight Against Environmental Racism Finally Gets Its Moment*](#). New York, NY: Time Magazine.

Although this article uses the phrase environmental racism rather than justice, they are largely the same. It summarizes the history of the movement against various practices and the attempt to make environmental impact lesser and equitable.

Electric Vehicles

Biden Administration (December 2021). [*The Biden-Harris Electric Vehicle Charging Action Plan*](#). Washington, D.C.: The White House.

As a part of Biden and Congress' infrastructure bill and emphasis on combating climate change and environmental justice issues, the Biden administration released an action plan around electric vehicle charging infrastructure. The focus is to build a national charging network to allow electric vehicles to travel across the country without being affected by range anxiety.

Burlston, D. (November 2018). [*Making EVs Possible for Low-Income Drivers*](#). Sustainable America.

This article gives an overview of what programs are available for a low-income person own an electric vehicle. It details resources to programs to assist financially as well as health reports about the benefits of electric vehicle for low-income people. It also gives resources on how electric vehicles are being incentivized through government programs and charging stations.

Clean Vehicle Assistance Program. (December 2020). [*Clean Vehicle Assistance Program*](#). Clean Vehicle Grants.

This website is used for low-income applicants to own an electric vehicle through a grant system. It lists the eligibility requirements, processes, and financing for low-income applicants in the state of California. This will give insight on how the leading state that pushes for electric vehicles is making EVs accessible for low-income communities.

Department of Energy (2020). [*Electric Vehicle Benefits and Considerations*](#). Washington, D.C.: Department of Energy.

This is a top-level view of the electric vehicle market and their benefits. Wide-spread adoption of electric vehicles can lead to an increase in energy security as it moves away from petroleum-based vehicles. Unfortunately, the purchase price of electric vehicles is still higher than their petroleum counterparts.

Dhanesha, N. (December 2021). [*The downside to Biden's electric vehicle charging plan*](#). Washington, D.C.: Vox.

This article is a critical examination of the Biden administration's plan to build 500,000 electric vehicle charging stations. The main critique is that the kind of chargers that the administration will have to opt for given the budget constraints will be slower chargers. Faster chargers are, simply put, more expensive to install than slower ones. Electric vehicles are a hard enough sell for cross-country travel and installing half-a-million slow chargers that can take hours to give a charge isn't going to make it more appealing.

Greenlining Institute. (2020). [*California's Equity EV Incentive Programs*](#). Greenlining Institute.

This gives brief descriptions of various ways California is trying to gain electric vehicle equity. It has multiple programs such as replace your ride and bay area clean cars. It also has some facts such as 336 million has been allocated to investments in electric vehicles infrastructure.

Hamilton, J. (June 2017). [Careers in Electric Vehicles: U.S. Bureau of Labor Statistics](#). U.S Bureau of Labor Statistics.

This website gives an overview of the jobs in the electric vehicle sector. It lists the types of jobs, education, requirements, and wages. It also gives a comparison of electric vehicles vs gas powered and the types of EVs in the world right now. For example, there are lots of job opportunities for low-income workers in this field by being assemblers or operators in the plants. Back in 2010, the median annual wage of an equipment assembler was \$29,470 which was the lowest one without any training. All the other classes in this chart could be obtained without any higher education and with training on the job and experience except production managers.

IEA (June 2020). [Electric Vehicles – Analysis](#). Paris, France: International Energy Agency.

This is a report on the global electric vehicle market. Overall, the analysis finds that the market presence of electric vehicles has grown. In 2019, their car stock increased by 40% over the previous year. Over 2.1 million electric vehicles were sold in 2019. Their market share is about 2.6%. Along with these statistics, the analysis also offers future projections of electric vehicle growth and adoption.

MacInnis, B., Krosnick, J. (October 2020). [Climate Insights 2020: Electric Vehicles](#). Resources for the Future.

This article shows the public opinion of American consumers to electric vehicles. It gives statistics on why Americans could be resistant to electric vehicles and resistant to purchasing. For example, one graph shows that 58% of Americans believe that global warming will be a profoundly serious problem for the US but only 17% think that an all-electric vehicle will help the environment a lot.

King, P. (December 2021). [Why Equity Must Be Central to Transportation Electrification](#). Knoxville, TN: Southern Alliance for Clean Energy.

This article is a multi-pronged argument in favor of aggressive electrification of transportation from the Southern Alliance for Clean Energy (SACE). The article covers air pollution from current transportation, the economic burden and opportunity, climate exposure, the shrinking cost barriers to electrified transport access, fleet electrification that goes beyond personal EVs, as well as the opportunity to address social equity concerns.

National Research Council (2015). [Overcoming Barriers to Deployment of Plug-in Electric Vehicles](#). Amsterdam University Press.

This book details the barriers and incentives for the deployment of electric vehicles adaption. IT gives in-depth analysis on electric vehicles such as the types, consumer awareness, technology, charging infrastructure, and implications and incentives. For example, it has a graph showing the years needed for penetration of US households of everyday items such as a smartphone, dishwasher, air conditioning, etc. to show that adoption takes time.

Raustad, Ri. (September 2018). [Electric Vehicle Life Cycle Cost Analysis](#). Electric Vehicle Transport Center.

This research compares the 5-year financed electric vehicle ownership cost of different electric vehicles. This researched both battery electric vehicles and hybrid vehicles. This research showed that battery powered electric vehicles cost less overall than gas powered electric vehicles even with the large upfront cost. For example, a Hyundai Elantra costs \$7,076 per year over a 5-year period vs a Nissan Leaf which is \$5,360 including salvage value for both.

Seattle Office of Sustainability and Environment. (October 2014). [Removing Barriers to Electric Vehicle Adoption by Increasing Access to Charging Infrastructure](#). Seattle.Gov.

This was a study that the city of Seattle did on how to remove the barriers to electric vehicle adaption through charging infrastructure improvement. This study gives key research findings such as a failsafe charging business model does not exist therefore there is limited economic profit at this time due to the electricity cost. This study gives different types of neighborhoods and sees how charging at home, workplaces, and garage orphan models work for each type of neighborhood.

Electrification

Adler, M. D. & Meltzer, L. (2010). [*Equity Metrics: How to Choose?*](#) Paris, France: Organisation for Economic Co-operation and Development.

This was presented during the Organisation for Economic Co-operation and Development (OECD) Regulatory Policy Conference in 2010 and is focused entirely on the metrics of social equity. This covers some very basic formulas and definitions for measuring equity.

Bergam et al. (January 2020). [*Accelerating Building Electrification in New England The Harvard University Institute of Politics Environmental Policy Group*](#). Cambridge, MA: Harvard University.

This is an academic research report focused entirely on the effort to electrify New England. Within this paper, it examines fossil fuel usage, various barriers (financial, institutional, and cultural), and various policies (financial, institutional, and cultural). In general, they identify the financial cost of new electric technologies (such as heat pumps), out-of-date and unenforced building codes, and from a cultural standpoint there's a lack of consumer education and awareness.

Billimoria et al. (2018). [*The Economics of Electrifying Buildings*](#). Basalt, CO: Rocky Mountain Institute.

This is a summary of the RMI's report on the economics of electrification. This report examines the impact electrification not only on the economics of both cost and savings, but also on energy usage and carbon reduction.

California Energy Commission (2021). [*Building Decarbonization Assessment*](#). Sacramento, CA: California Energy Commission.

The California Energy Commission assessed greenhouse gas (GHG) emissions from buildings within the state in order to better understand the scope of the issue as well as next steps on how to modernize buildings. As they note, they're aiming to reduce GHG emissions in buildings by 40%, specifically calling out single-family, multifamily, and commercial buildings.

Casey, T. (December 2021). [*Home Battery Storage: The \(Solar\) Rich Get Richer*](#). United States: CleanTechnica.

This article examines the income-gap for people with home solar and those without. The author notes that for installing solar, the income-gap has been shrinking. However, when additional resources are added, such as at-home battery storage of solar or the virtual plant model, the gap not only reappears but widens significantly. The author argues that this is an issue, as the people that would most benefit from solar, storage, and the virtual plant are not the ones currently installing these amenities.

Gerdes, J. (June 2020). [*So, What Exactly Is Building Electrification?*](#) Boston, MA: Greentech Media.

This is another article that's meant to offer some basic definitions and information. In this case it focuses on electrification of buildings. As it notes, 40% of buildings in the United States account its energy usage and greenhouse gas emissions. It looks at potential disruptions in the grid as a result of such a shift, technologies that can help make that switch, as well as additional challenges.

German, B. (December 2021). [*Private equity's climate footprint gains focus*](#). Washington, D.C.: Axios.

A look at private equity's carbon footprint as well as their investment in Environmental, Social and Governance (ESG) criteria as a way to shift attention from the damage they do. Plenty of movement from various private equity firms, such as Blackrock, to require reporting on greenhouse gas emissions (GHG) from the companies in their portfolios and investing money into portfolios that are more environmentally conscious.

Mejia, A. (December 2020). [*What is the role of gas efficiency in the time of building electrification?*](#) New York, NY: National Resources Defense Council.

This article looks at natural gas and whether it should have a role as a transition fuel when it comes to energy efficiency, electrification, and constructing new buildings. Ultimately, we should build clean from the start. It notes that most buildings currently built in the US will be enough to house us in 2050. Avoiding new gas piping installations allows us to future proof buildings.

Palmer, B. (August 2021). [*An Advocate for Building Equity into Michigan's Climate Goals.*](#) Washington, D.C.: NRDC.

This is an interview with Derrell Slaughter, a clean energy advocate based in Michigan who works for NRDC. In this interview he lays out his case of climate change and civil rights being linked together and the importance of equity in the climate fight.

Pratt et al. (2017). [*An Electrifying Transition: Electrification Barriers and Opportunities Workshop.*](#) Washington, DC: Department of Energy.

This 93-slide presentation examines utility efforts to electrify in a few different cities, ports, and states. Topics include investments in electric vehicles, energy efficiency efforts, barriers, the need for this, and other additional factors.

Roberts, D. (August 2020). [*How to drive fossil fuels out of the US economy, quickly.*](#) Washington, D.C.: Vox Media.

This article breaks down a detailed roadmap for how to decarbonize by 2035. What needs to be built, how quickly, and where things need to be put. The roadmap itself is taken from a group called Otherlab which received a government grant to comprehensively track energy usage in the United States. Ultimately, it's a monumental effort to achieve this goal, and one that needs everyone working towards it.

Equity

Chandler, A. (June 2016). [Where the Poor Spend More Than 10 Percent of Their Income on Energy](#). Washington, D.C.: The Atlantic.

This is an older article; however, it still highlights the disparity of energy burden that low-income households face. While it offers some definitions and benchmarks to know when talking about energy burden, the real value in this article is the heat map of the United States, which offers the energy burden of every county.

Galluci, M. (April 2019). [Energy Equity: Bringing Solar Power to Low-Income Communities](#). New Haven, CT: Yale University.

Community solar, also called shared solar, is where a group of people buy or lease shares in a solar facility. This enables those shareholders to reap some of the benefits of solar energy without paying a steep, upfront price of panel installation. Enrollment in community solar can be cost prohibitive for low-income households, and states are experimenting with various incentives and mandates to help remedy it. When low-income households are involved they see the benefits in their electricity bills. Colorado, for example, has about 400 low-income households enrolled in community solar projects. Those households have saved between 15% to 50% on their bills as a result.

Kortenhorst, J. (December 2020). [An Equitable, Low-Carbon Way to End Global Energy Poverty](#). Boulder, CO: Rocky Mountain Institute.

This article looks at the intersection between COVID-19, global energy poverty, and renewable energy sources. The COVID recovery offers an opportunity for countries to invest in renewables as they have seen their cost to produce energy plummet over the past decade. This gives the potential to invest in a reliable energy source for the 1/3 of the world that lives without such a source.

Luskin Center for Innovation (2018). [Climate Equity](#). Los Angeles, CA: University of California, Los Angeles.

This article offers several examples of the kind of think-tank ideas that the Luskin Center has generated. Topics they've covered include Adaptation and Resiliency, Climate Mitigation, and Climate Investments. Each of these topics has at least one linked report or study that was conducted between 2014 and 2018, with the topics further explored in separate pages. Most of these studies were conducted with the focus on California, however many of the lessons learned can also be applied to other places.

Office of Energy Efficiency & Renewable Energy (2020). [Low-Income Community Energy Solutions](#). Washington, D.C.: U.S. Department of Energy.

This gives a general overview of low-income stakeholders and energy issues. This includes definitions of low-income and energy burden, links to additional resources, research entities, and other stakeholders.

Office of Energy Efficiency & Renewable Energy (2020). [Low-Income Energy Affordability Data \(LEAD\) Tool](#). Washington, D.C.: U.S. Department of Energy.

This is a tool from the Department of Energy that provides a data map of low and moderate-income households and various characteristics of their energy affordability. Data can be organized by three different low-income definitions: Area Median Income, Federal Poverty Level, and State Median Income. The map can be cast through several different filters such as energy burden, average annual energy cost, housing counts, building age, heating fuel type, building type, rent or owner occupied, among others.

Puzder, A. & Black, D. (2021). [Who Really Pays for ESG Investing?](#) New York, NY: The Wall Street Journal.

As the economy transitions to a clean economy, financial brokers and firms are putting an emphasis on new criteria focused on Environmental, Social and Corporate Governance (ESG). This article, however, pushes back against the assumption that ESG criteria for portfolios is more profitable than enacting environmental change.

U.S. Department of Housing and Urban Development (2015). [Climate Action for Resilient, Livable, and Equitable Communities](#). Washington, D.C.: U.S. Department of Housing and Urban Development.

Although from the Obama Administration, this was a brief overview of some announced investments at the time. With the incoming Biden administration, many of the issues will likely be reintroduced, reinforced, and added onto. The listed investments are the Resilience AmeriCorps which focuses on building local, community resilience plans. The National Disaster Resilience Competition technical assistance funding and a focus on climate change adaptation and planning for tribes.

Islam S.N., Winkel, J (October 2017). [Climate Change and Social Inequality](#). New York, NY: United Nations.

This paper, written for the Department of Economic & Social Affairs branch of the UN, focuses on the intersection of climate change and “social inequalities.” Generally, the paper found that the greater the initial inequality (such as unequal income or access to healthcare) lead to a greater exposure to the impact of climate change. The paper found three ways in which the disadvantaged group were affected by climate change. The first is a general increase in the exposure to climate change. The second is their susceptibility to damage caused by climate change. The third final channel is their difficulty to recover from the damage as a result of their inequalities.

NAACP (2020). [Environmental & Climate Justice](#). Baltimore, MD: National Association for the Advancement of Colored People.

The NAACP began an Environmental and Climate Justice Program which aims, in part, to tie a connection between pollution and race, as well as a lesser connection to class. As they say: “Race is the number one indicator for the placement of toxic facilities in this country.”

Wu et al (December 2020). [Who Gets to Breathe Clean Air in New Delhi?](#) New York, NY: The New York Times.

This is a very concrete look at how the differences class can make on exposure to pollution on a daily basis. It tracks two children of the same age in New Delhi, India and measures the micrograms of fine particles per cubic meter. Unsurprisingly, the person from a wealthier household was exposed to less pollution. Things like living in a house with an air filter, traveling to school in a car rather than by bike, or going to a school with an air filter made all the difference. New Delhi certainly does not make a perfect comparison to the United States, but it still highlights the kind of difficulties that disadvantaged and vulnerable populations face.

Grid Modernization

California Energy Commission (2020). [Load Management Rulemaking](#). Sacramento, CA: California Energy Commission.

Aiming to revise load management systems by the end of 2021, the California Energy Commission has been seeking public input on the process and end goals. The purpose of the revisions is to increase demand flexibility. Potential amendments to the rules might cover the topics of rates, end-use storage systems, automation, miscellaneous load management measures. This process will also include an economic impact assessment.

Gahl et al. (April 2017). [Grid Modernization Whitepaper Series](#). Washington, D.C.: Solar Energy Industries Association.

This links to a series of white papers by SEIA with the focus being on grid modernization. All told, there is five papers. The papers look at how different states are building their grids, distribution planning, hosting capacity, how location and time can change distributed energy resources, and DER and the non-wires solutions opportunity.

Grid Modernization Initiative (2019). [Grid Modernization Initiative | Department of Energy](#). Washington, D.C.: Department of Energy.

This is a Department of Energy collaborative group that's solely focused on modernizing the grid. This group has only been around for a few years now. They highlight a few categories to that comprise a modern grid: resilience, reliability, security, affordability, flexibility, and sustainability.

Mathur, S. (July 2020). [Why Grid Modernization Promises a Stronger Electrical, Environmental and Economic Future](#). Boston, MA: Climate XChange.

This article gives an overview of grid modernization. This includes a history of the electric grid, benefits of modernization (both environmental and economic), barriers to adoption, as well as various technologies that come with it. Those technological examples are: electric vehicles, distributed energy resources, and advanced digital infrastructure.

Moore, J. (October 2017). [Transforming the Grid Is Essential for a Safe Climate Future](#). Washington, D.C.: National Resource Defense Council.

This NRDC article looks at what grid modernization means for the climate and a path forward to modernization. They note that the current electric grid was a centralized design meant to distribute energy from fossil fueled power plants. Their paths they lay out include expanding the grid through the addition of renewable energy markets, making the grid more local (i.e. rooftop solar), and utilizing smarter technologies to increase efficiencies.

Trabish, H. K. (January 2020). [Making the case for billion-dollar investments in grid modernization by answering 3 key questions](#). Washington, D.C.: Utility Dive.

This looks at more at the logistical side of modernizing the grid. The financial challenges, lessons learned from utilities such as Duke and Dominion, the role regulators play, a concept they call the "Why-What-How" framework which is a way to simplify the daunting task of modernization.

Impact of a Clean Economy on Low Income Segments

Bagley, K. (May 2019). [Why Low-Income Households Need to Be Part of the Clean Energy Revolution](#). New Haven, CT: Yale University.

This is an interview with a researcher, Tony Reames, who studies the intersection between low-income households and energy efficiency. In Michigan he found that for every dollar utilities spent on promoting energy efficiency efforts on low income customers \$4.34 was spent on middle and high income customers. Along with this, the interview goes over his findings of light bulb pricing in poor vs higher income communities.

Bovarnick, B.; Johnson, L. (August 2017). [Barriers and Solutions to Low and Moderate-Income Solar Adoption](#). New Haven, CT: Yale University.

As the title suggests, this examines the various barriers that low- and moderate-income households face when adopting solar energy. Financial, physical (i.e., living in a multi-family home), outreach from solar companies, state level legislation that fails to push solar. Along with these barriers, and others, solutions are offered. For example, offering remotely generated solar to low-income households, rather than direct panel installation, can be an affordable way for customers to reap the benefits of solar.

Brown Jr., E. G. (December 2016). [Low-Income Barriers Study, Part A](#). Sacramento, CA: California Energy Commission.

This lengthy study is focused primarily on barriers facing low-income households when it comes to access and affordability of energy efficiency, weatherization, and renewable energy investments. In addition to specific customer barriers, it also examined the barriers and opportunities that come with contracting with local, small businesses that are located in these communities.

Durkay, J. (February 2017). [Energy Efficiency and Renewables in Lower-Income Homes](#). Washington, D.C.: National Conference of State Legislatures.

This write-up achieves two main things: provide key facts and some actions that states can take. The key facts are around the barriers that low- and moderate-income households face when it comes to installing energy efficient infrastructure for their home. This includes their energy burden, lack of access to resources, and the fact that if low-income housing was as energy efficient as the average U.S. home their energy costs would decrease by about one-third.

Kane, J. W., Shivaram, R. (September 2020). [How clean energy jobs can power an equitable COVID-19 recovery](#). Washington, D.C.: Brookings Institution.

This is an examination of how the clean economy can be a more equitable economy. As it notes, many clean energy jobs have high wages and a lower education barrier to enter the workforce. It notes the lack of women and people of color (particularly Black workers) in the clean energy workforce. With projections of huge job growth within this industry over the next 10 or 15 years, this is an opportunity for the industry to address its weaknesses and make their workforce, and subsequently the larger economy, far more equitable.

Penrod, E. (December 2021). [Nevada moves to bring rooftop solar benefits to underserved customers in a step toward equity, advocates say](#). Washington, D.C.: Utility Dive.

The Public Utilities Commission of Nevada (PUCN) approved a final set of rules revolving around a newly expanded solar access program. The new rules require electric utilities to submit plans to the PUCN every three years. These plans must demonstrate how the benefits, both financial and economic, from rooftop solar reach customers that can't install solar panels on their own property.

Plautz, J. (November 2021). [How the Build Back Better bill could boost clean energy for low-income homeowners](#). Washington, D.C.: Utility Dive.

A focus on the federal government's priorities when the Democrats highlighted their Build Back Better bill in November. In this budget reconciliation bill, which was a nearly \$2 trillion bill, there was an emphasis on expanding access to renewable energy sources for low-income homeowners and renters. This was done primarily through adjusting tax credits. This bill as well as the infrastructure bill that passed in November had money and goals focused on renewable energy access.

Impact of Climate Change on Low Income Segments

Agency for Toxic Substances and Disease Registry (2018). [CDC's Social Vulnerability Index \(SVI\)](#). Washington, D.C.: Centers for Disease Control.

This is a data tool from the CDC that uses census data to help track vulnerable populations before, during, and after disasters. This tool is usually used to aid local communities in identifying these populations. The bulk of the data is updated every 4 years or when a new census is conducted. Their index comprises four primary data categories: socioeconomic, household composition/disability, minority/language, and housing/transportation.

Ali, W., Khoday, K. (December 2018). [Climate Change and the Rise of Poverty](#). New York, NY: United Nations Development Programme.

It's projected by 2030 that 100 million people could fall into extreme poverty as a result of climate change and over 200 million people could be displaced as a result of climate disasters. This adds onto the already existing 2 billion people that are poor or near poor. This article offers a handful of examples of some solutions such as cash transfers before and after climatic disasters or subsidies to enhance food and water security for affected communities. While this takes a global perspective on the issue the United States won't be immune to the displacement of vulnerable populations and could face a surge of disaster-stricken peoples.

Anderson, M., McMinn, S. (September 2019). [NPR Investigation: Low-Income Urban Areas Are Often Hotter Than Wealthy Ones](#). Washington, D.C.: National Public Radio.

NPR has conducted a series of reports examining the effects of climate change on lower income communities. In this specific article, NPR found that low-income communities experience higher temperatures than their wealthier counterparts. Looking at Baltimore, MD, they found that the neighborhood of Franklin Square was about 6 degrees hotter than the coolest neighborhood. Overall, NPR analyzed 97 of the most populous US cities. In more than ¾ of these cities, the poorer neighborhoods were hotter.

Hallegatte et al. (2016). [Shock Waves: Managing the Impacts of Climate Change on Poverty](#). Washington, D.C.: The World Bank.

This report examines two objectives: ending poverty and stabilizing climate change and ties them together. More specifically it looks at how climate policy can inform and reduce poverty as well as to increase resiliency of vulnerable populations.

Turrentine, J. (December 2019). [A Roadmap for Frontline Communities](#). Washington, D.C.: National Resource Defence Council.

This article by the NRDC focuses on frontline communities and what can be done to protect them from climate change. Frontline communities are ones that are ones disproportionately threatened by the effects of climate change. These groups tend to be poorer and communities of color.

State of Clean Energy Economy

Balaraman, K. (December 2021). [US storage market breaks records with 3.5 GWh of new deployments in Q3](#). Washington, D.C.: Utility Dive.

Energy storage is an important step in the clean energy transition, and this is a straightforward report on how much the storage in the US has grown quarter over quarter. In the third quarter the US installed 3,515 MWh of new storage, which is expected to be surpassed in the fourth quarter. By comparison, in the fourth quarter of 2020, 2,100 MWh was installed.

Behrsin et al (December 2020). [Renewable portfolio standards are propelling the US to a clean-energy future. But data practices are lagging](#). Washington, D.C.: Utility Dive.

This opinion piece examines renewable portfolio standards (RPSs) and how they've been helping the United States transition into a clean economy. However, the piece also notes that data practices around RPS's has been hamstringing them from being most effective and offers several solutions to what correct this. Solutions include making these datasets public for review and revision and including standard elements for RPS datasets.

Biden, et al. (2020). [The Biden Plan to Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future](#). Washington, D.C.: Biden-Harris Campaign.

This is Joe Biden's climate plan. In it, he commits to an investment of \$2 trillion in his first term to various research and projects. This is detailed further in nine categories: Infrastructure, the Auto Industry, Transit, the Power Sector, Buildings, Housing, Innovation, Agriculture and Conservation, and Environmental Justice. Interestingly, most of the language in the plan is focused on jobs and the economy rather than climate change itself.

Biden Administration (December 2021). [President Biden Signs Executive Order Catalyzing America's Clean Energy Economy Through Federal Sustainability](#). Washington, D.C.: The White House.

President Biden signed an executive order that requires the federal government, as an entity, to ultimately be net-zero emissions by 2050. Five goals are laid out in this executive order: 100% carbon pollution-free electricity by 2030, 100% zero-emission vehicle acquisitions by 2035, net-zero emissions from federal procurement by 2050, net-zero emissions building portfolio by 2045, and then the final goal of net-zero emissions from overall federal operations by 2050.

California Energy Commission (2021). [Integrated Energy Policy Report](#). Sacramento, CA: California Energy Commission.

Every two years the California Energy Commission has to conduct assessments and develop an integrated energy policy report (IEPR). By law, they use these assessments to "develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety." For 2021, the IEPR examines electricity resource plans, electricity and gas demand forecasts, energy reliability, natural gas outlook and assessments, building decarbonization and energy efficiency, and clean transportation benefits.

Chen et al. (2013). [CREATING THE CLEAN ENERGY ECONOMY Analysis of Three Clean Energy Industries](#). International Economic Development Council.

This is an older analysis of three clean energy industries: electric vehicles, off-shore wind, and net-zero homes. This analysis is largely a response to the loss of manufacturing in the fallout of the 2008 recession and how investments in clean technologies and energy can spur job creation in the manufacturing sector. As it notes, clean energy jobs grew four time fast than all other types of jobs combined between 2010 and 2011.

Cohen, M. (August 2021). [New Microsoft solar project shows climate, racial equity are connected](#). New York, NY: CNBC.

A look at how one of the largest companies of the world is approaching climate change and looking to reduce their carbon footprint. In August, Microsoft partnered with Volt Energy in order to reach its goal of 100% renewable energy by 2025. Additionally, both companies will reinvest profits made through this partnership to bring renewable energy sources to underserved communities.

DiChristopher, T. (January 2020). [Washington state proposes legislation to phase out natural gas utility service](#). New York, NY: S&P Global.

This is a write-up and summary of legislative proposal coming out of the Washington State governor's office. Its focus is to drastically reduce if not outright eliminate the role of natural gas utility's role in delivering energy over the next 30 years. It requires all Washington homes to be zero-carbon by 2030 and to eliminate fossil fuel consumption by 2050.

Dickler, J. (December 2020). [BlackRock makes climate change central to investment strategy for 2021](#). New York, NY: CNBC.

BlackRock, one of the largest investment firms in the world, announced a new investment strategy focuses on businesses that are planning for long-term sustainability. This is significant because BlackRock's nearly \$8 trillion of wealth and they have explicitly stated that directors will be held accountable and they will vote against their re-election if they aren't moving fast enough on this issue.

Kutscher et al (2020). [Accelerating the US Clean Energy Transformation](#). Boulder, CO: University of Colorado Boulder.

This is a huge report on the challenges facing the transition to a clean economy and an examination of solutions to challenges. It keys in on five topics: Electricity Sector, Buildings Sector, Transportation Sector, Industrial Sector, and Carbon Dioxide Removal Method

Levin, A. (November 2019). [Seventh Annual Energy Report - Clean Energy Opportunities and Dirty Energy Challenges](#). Washington, D.C.: National Resource Defense Council.

This annual report looks at the state of the clean economy from the previous year, offering a roundup of important facts and figures and other headlines. It also looks at news surrounding the fossil fuel industry. Ultimately, they find that clean energy and renewables tend to be growing in importance. Renewable energy has outcompeted coal and is closing the gap on natural gas, all this coming off the heels of various states and utilities investing more into clean energy.

Muro et al. (April 2019). [Advancing inclusion through Clean Energy Jobs](#). Washington, D.C.: The Brookings Institution.

This analysis examines the clean economy, specifically the workforce of it, and what a larger transition towards it will look like. Although it looks at elements such as race, age, and gender demographics of the current workforce, some of the more interesting findings were in educational level and what the transition will look like. First, they found that about 50% of workers have nothing beyond a high school diploma but they make significantly more money than counterparts in other industries. Looking towards the future, Brookings found that the clean energy economy will involve "320 unique occupations spread across three major industrial sectors." Those sectors are clean energy production, energy efficiency, and environmental management.

Office of Senator Kamala Harris (August 2020). [Harris, Ocasio-Cortez Introduce Landmark Legislation to Empower Frontline Communities](#). Washington, D.C.: Office of Senator Kamala Harris.

This press release is a look at the kind of priorities that the new administration will be focusing on, especially considering Kamala Harris will be featured prominently in the Biden administration. This gives a brief overview of the *Climate Equity Act* from Harris and Alexandria Ocasio-Cortez which aimed to address climate change and equity among frontline communities.

Penrod, E. (December 2021). [Green hydrogen could compete with traditional hydrogen by 2030, natural gas by 2050: report](#). Washington, D.C.: Utility Dive.

The transition to a clean energy economy means a lot of money and resources are going to be invested into all kinds of technologies and alternative fuels and energy sources. This article examines the growth that green hydrogen has seen in the past year. Hydrogen projects have grown seven-fold and green hydrogen is expected to become cheaper than natural gas in 16 countries by 2050.

Raimi, D. (October 2020). [Jobs, Equity, and Efficiency: Reconciling Priorities in a Transition to a Clean Energy Economy](#). Washington, D.C.: Resources Magazine.

This article examines some of the political realities facing any kind of shift to a clean economy, focusing specifically on jobs that currently exist in the fossil fuel industry versus green energy industry. It additionally looks at equity and efficiency, and transitional energy.

Rewiring America (July 2020). [Mobilizing for a Zero-Carbon America](#). United States: Rewiring America.

This is an executive summary for a longer report on the jobs creation that an aggressive switch to green energy can bring. Ultimately, Rewiring America found that “an aggressive national commitment to electrify all aspects of our economy” could create anywhere between 15-25 million jobs. Along with this, but their analysis has found that the average household could save \$2,000 annually and achieve the overarching goal of lower carbon emissions.

Salesforce (2021). [Environmental Sustainability](#). San Francisco: Salesforce.

Salesforce has a particular focus on being a carbon neutral company. Here they publish their various plans, such as reducing greenhouse gas emissions in supply chains and business travels. In addition to these plans, they also highlight their six focus areas of sustainability: carbon removal, trillion trees/ecosystem restoration, education & mobilization, innovation, regulation & policy, and emissions reduction.

Shahyd K., Urbanek, L. (November 2020). [Biden Plan Promises Better Buildings, for Climate and Equity](#). New York, NY: National Resources Defense Council.

A look at Biden’s Build Back Better transition plan. There are four focuses of this plan: the COVID-19 pandemic, economic recovery from the pandemic, racial injustices, and climate change. The climate aspect, as well as a piece of the racial injustice puzzle, is a focus on modernizing of home, particularly in low-income communities where people of color are disproportionately living and the building they are in are in worse condition than wealthier counterparts.

Texas Advanced Energy Business Alliance (2020). [Latest News of Texas Advanced Energy Business Alliance](#). Austin, TX: Texas Advanced Energy Business Alliance.

This is the latest news section of TAEBA, a section that is continuously updated with news focused on the energy economy in Texas. The various reports and press releases include news on electric vehicles, jobs in the energy sector as they compare to other industries, as well as an interactive map of the jobs in each county in the state.

Toplensky, R. (December 2020). [Gas Is Cleaner Than Oil, But Still Has a Transition Problem](#). New York, NY: The Wall Street Journal.

This is an analysis of the future of natural gas in an increasingly cleaner economy. The article recognizes that natural gas will have an important role as a transition fuel, as it replaces coal-fired power plants. However, the kind of return on investment that it will see will be diminished in comparison to other fossil fuels.

Urban Energy Justice Lab (2020). [The Energy Efficiency Equity Baseline \(E3B\) Map](#). Ann Arbor, MI: University of Michigan.

This is an interactive map from the Urban Energy Justice Lab which aims to provide a standard measurement of low-income investments by utilities. While the data does not reflect every state or utility, drawing only from the 24 states that use Energy Efficiency Resource Standards. It also gives a measurement of the investment performance of the 74 utilities they've gathered data about and compare it to equitable standards.

U.S. Energy Information Administration (2015). [RECS: One in three US households faced challenges in paying energy bills in 2015](#). Washington, D.C.: U.S. Energy Information Administration.

Although this report is many years out of date and will not be able to account for the effects of COVID-19, the survey conducted found certain segments of US citizens faced disproportionate energy security issues. People of color, people with low-income, and people that live in homes built prior to 1990 all face increased energy security risk.

Yarmosky, A. (April 2020). [Governor Northam Signs Clean Energy Legislation](#). Richmond, VA: Office of the Governor.

The State of Virginia passed legislation in the Spring of 2020 to prepare and advance their economy to becoming clean. The Virginia Clean Economy Act accomplishes broad goals: establishes renewable portfolio standards, establishes energy efficiency standards, advances offshore wind, and advances solar and distributed energy generation.



EQUITY IN A
CLEAN ENERGY
ECONOMY

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