Leveraging the IRA

Transforming the Market for Equitable Building Decarbonization

BUILDING DECARBONIZATION COALITION

Green & Healthy Homes Initiative®

AUTHORS AND ACKNOWLEDGEMENTS

The co-authors of this whitepaper are the Building Decarbonization Coalition (BDC) and Green & Healthy Homes Initiative (GHHI).

The **Building Decarbonization Coalition (BDC)** unites critical stakeholders on a path to transform the nation's buildings through clean energy, using policy, research, market development and public engagement. The BDC and its members are charting the course to eliminate fossil fuels in buildings to improve people's health, cut climate and air pollution, prioritize high-road jobs, and ensure that our communities are more resilient to the impacts of climate change.

The **Green & Healthy Homes Initiative (GHHI)** is dedicated to addressing the social determinants of health, opportunity and equity through the creation of healthy, safe and energy efficient homes. By delivering a standard of excellence in its work, GHHI aims to eradicate the negative health impacts of unhealthy housing and unjust policies for children, seniors and families to ensure better health, economic and social outcomes in historically disinvested communities – with an emphasis on communities of color.

Key Reviewers

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Purpose & Intended Audience

This paper provides 14 recommendations to maximize the effectiveness of the Inflation Reduction Act (IRA) in catalyzing full building decarbonization, augmenting housing and health benefits from building decarbonization efforts, and promoting equity in the nation's efforts to mitigate climate change. The recommendations are directed primarily to three groups that can have an outsized impact on successful implementation of the IRA:

Federal agencies, particularly the Department of Energy (DOE) and the Environmental Protection Agency (EPA)

State energy offices (SEOs)

Philanthropic organizations[1]

1 Nonprofit organizations and nongovernmental organizations will also be important partners for some of these recommendations, even if they are not explicitly identified as implementers.

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Introduction

The IRA is the most substantial climate legislation in the history of the United States and a major step towards reducing the country's contribution to global climate change. If implemented effectively, it could catalyze equitable policies and market-based mechanisms that will transition the entire United States to a clean energy economy. However, the IRA statute provides no guarantee that numerous provisions will act as anything more than a one-time infusion of funding. Therefore, funding must be allocated, and programs must be implemented in ways that create lasting market change and ensure equity and justice for communities that have been disproportionately harmed by the fossil fuel economy and left behind in the clean energy transition to date.

Part 1: Getting to Where We Want to Go: Top 14 Recommendations presents several specific recommendations for the three key stakeholders to consider while designing and implementing the programs outlined in the IRA.

Part 2: Guiding Principles for Equitable and Effective Implementation establishes five high-level principles for all relevant stakeholders to utilize while designing and implementing the programs outlined in the IRA.

The recommendations in this paper stem from several analyses that are summarized below and detailed in the appendices.

GAP ANALYSIS OF CURRENT ACTIONS

The clean energy funding within the IRA is a necessary impetus for building electrification market transformation, yet contains significant gaps — from an equity, emissions, and financial perspective — that needs to be addressed. Appendix 1: Gap Analysis of Current Actions identifies national goals and classifies how the IRA as written makes progress towards, but falls short of, meeting these goals.

EQUITY APPROACH

Certain communities have been, and continue to be, disproportionately impacted by environmental and energy injustice, including impacts from environmental racism, fossil fuel infrastructure investments, energy burden, and disinvestment (ACEEE (a) 2020; American Lung Association (a) 2022).[2,3] In order to address this historical and ongoing environmental injustice, we must consider the process by which the benefits and burdens of the IRA are realized by communities, and how the impacts are distributed (detailed in Appendix 2: Equity). While the IRA makes great strides at addressing procedural and distributional environmental injustices, it does not do enough to ensure equity is holistically and intentionally integrated.

To ensure the IRA can facilitate a long-term, durable, equitable transition, federal and state agencies must proactively address the bill's remaining equity gaps. These gaps are discussed further in Appendix 1: Gap Analysis of Current Actions.

To move towards rectifying the unjust legacies of the past and addressing extant disparities — particularly within BIPOC communities — disproportionately impacted populations (hereafter referred to as "ESJ communities") must be included early and meaningfully in the decision-making process of the IRA's implementation.[4,5] This will serve as a critical step in supporting energy equity; ensuring an equitable distribution of benefits from transitioning buildings off of fossil fuels, and reducing unintended, harmful consequences of increased energy burdens, displacement, gentrification, and more due to environmental and energy injustice.

2 The EPA defines environmental justice as "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 (a), 2022). The DOE uses the Initiative for Energy Justice's definition of energy justice as "the goal of achieving equity in both the social and economic participation in the energy system, while also remediating social, economic, and health burdens on those disproportionately harmed by the energy system" (Initiative for Energy Justice, n.d.).

3 Dr. Robert Bullard, a leader in the environmental justice movement, defines environmental racism as "any policy, practice or directive that differentially affects or disadvantages (where intended or unintended) individuals, groups or communities based on race or color. It also includes exclusionary and restrictive practices that limit participation by people of color in decision-making boards, commissions, and regulatory bodies. Environmental racism exists within local zoning boards as well as the U.S. Environmental Protection Agency" (Bullard, 1993).

4 For more information about the use of the term BIPOC (Black, Indigenous and People of Color), please see https://www.thebipocproject.org/.

5 Details on the considerations for preferred, inclusive terminology and intersectional, comprehensive definitions for ESJ communities can be found in the Equity Appendix under ESJ Communities Terminology and Definition.

LESSONS LEARNED FROM ARRA

The implementation of previous federal funding packages, specifically the American Reinvestment and Recovery Act of 2009 (ARRA), can provide lessons learned while considering how to implement the IRA most effectively. ARRA was an $831 billion stimulus package signed into law by the Obama Administration in response to the Great Recession of 2007. ARRA directed federal funds for the creation of temporary programming to financially support Americans most affected by the recession, and to make significant investments in infrastructure, education, health, and renewable energy. ARRA was successful in creating jobs and lowering unemployment, however, there are several opportunities to improve upon ARRA's implementation, and agencies are urged to consider the following suggestions when implementing the IRA:

1. **Provide Clear, Yet Adaptable Compliance Standards.** While program designs should be able to change over the term of the funding in order to respond to lessons learned, agencies must provide timely guidance around project eligibility and program compliance and must adequately communicate any changes to the market.

2. **Ensure Equitable Distribution of Funding to ESJ Communities.** Agencies that are responsible for awarding funding to ESJ impacted populations need to issue additional guidance that creates more specificity surrounding which communities are applicable.

3. **Design For Oversight and Awardee/ Applicant Accountability.** Agencies entrusted with distributing IRA funding must ensure that funding will be allocated to the intended recipients and complete the stated objectives of the IRA statute.

4. **Create a Balanced Media Strategy.** Implementers of the IRA should create a public relations/media strategy to highlight the benefits of IRA programs and tangible project/programming successes over the long-term.

5. **Allow for Reasonable Project Timelines.** While timeliness is a priority, timelines for implementation should have room for flexibility and not be so aggressive that applicants cannot adhere to them.

6. **Secure Sufficient Staffing.** In preparation for staffing limitations, federal, state, and local agencies likely to be managing IRA funds should develop resourcing strategies to ensure they have enough staff on hand to fully administer and disperse IRA funding.

A full analysis of these suggestions for implementing IRA programs can be found in Appendix 3: ARRA Lessons Learned.

Table 1: Potential Implementation Barriers and Table 2: Barriers for Technology Adoption build from the ARRA lessons learned, and outline specific barriers that should be considered when implementing IRA programs. These barriers are referenced and addressed by recommendations found in Part 1: Getting to Where We Want to Go: Top 14 Recommendations.

POTENTIAL IMPLEMENTATION BARRIERS FOR THE IRA

Table 1: Potential Implementation Barriers

Barrier	Description	Barrier Group
Excessive administrative complexity	Too many, misaligned, or differing requirements or guidance narrows the scope and number of potential projects and increases transaction costs and confusion.	Process
Too much flexibility	Too few requirements lead to ineffective implementation relative to goals and results in too much administrative time spent recreating structural program elements. For example, lack of definitional clarity and too little guidance on income eligibility definitions makes assessing eligibility and administering programs more complex, especially across several jurisdictions.	Process
Timelines are not reasonable	Ensuring equitable investment requires more time and resources, and slow payment schedules can limit market actor participation.	Process
Staffing limitations and bottlenecks	Many SEOs and community organizations do not have the resources or staffing in place to procure, manage, and disperse funds. This results in delays and ineffective implementation.	Resources
State-level interest	Different states have demonstrated varying levels of interest in implementing IRA programs due to political or other reasons. This inconsistent engagement could prevent funding from going to areas of highest impact from an emissions and ESJ perspective.	Motivation/ Politics
Change of political leadership	Leadership changes over time can shift priorities away from IRA programs and reduce success of programs already in place.	Motivation/ Politics

Table 2: Barriers for Technology Adoption

Barrier[6]	Description/Additional Equity Considerations	Barrier Group
Limited access to financing	Current funding is insufficient to reach and benefit all those in ESJ communities, and traditional financing such as tax credit-based mechanisms favor affluent consumers.	Affordability
Split incentives	Renters who benefit from improvements do not typically own the appliances in their household, even though they pay the energy bills, and landlords are not typically motivated to purchase high-efficiency equipment unless given a financial incentive. Additionally, there is a risk of landlords "gaming" the system of incentive programs, leveraging the IRA provisions to displace lower-income renters and resulting in gentrification (Kirk, 2021).	Affordability
Transaction costs	Higher transaction costs of new technology, such as those resulting from supply chain challenges and installation delays, are exacerbated when making updates to older/aging building stock, particularly in historically disproportionately impacted ESJ communities.[7]	Affordability
Mispricing of energy	As those able to electrify do so, gas infrastructure costs may increasingly fall on already disproportionately impacted ESJ communities. Other products in the market may also be mispriced due to regulation and/or failure to include externalities.	Affordability
Equipment installation challenges	There may be a lack of contractors with advanced technology experience in ESJ communities, which prevents even motivated customers from installing decarbonization measures.	Industry
Technology acceptance	Technology adoption can be stymied for social, cultural, and political reasons. Outreach efforts, marketing materials, and real-time communications with installers needs to be accessible to ESJ communities with an explanation of why the advanced technology option provides the benefits that the customers value. This content also needs to address an often present (and justifiable, based on historical interaction) distrust of institutions. Where possible, outreach materials should be designed with input from community-based organizations (CBOs)[8] and ESJ communities.	Industry
Access to information	Limited access to information about technologies and their impacts is exacerbated by data sharing constraints, and further heightened by language barriers, particularly in immigrant communities and amongst populations where English is a second language. Information about ESJ communities should be gathered (with consent), and input from ESJ community members should guide outreach efforts to ensure messaging clearly communicates the beneficial outcomes of upgraded technology.	Industry
Performance uncertainties and risks/ problems with product or service features *(not addressed by recommendations)*	Low-income populations are less financially able to tolerate risks or equipment breakdowns. Furthermore, the difficulty with resolving such problems could be a perceived barrier for those with English as a second language (accessibility), those concerned about paying for repairs (affordability), or those who are working multiple jobs and are time-constrained (capacity).	Technology

6 Based on ACEEE Report U1715 (York, Bastian, Relf, & Amann, 2017).

7 States that have robust energy efficiency programs will have an advantage in terms of being able to leverage IRA resources compared to states starting without robust programs. For example, Iowa has no required efficiency programs for utilities, whereas nearby states with similar climates (Minnesota and Illinois) will be able to layer federal money on top of existing utility programs and therefore achieve results faster. (Subramanian, et al., 2022)

8 CBOs refer to a "public or private nonprofit organization of demonstrated effectiveness that: (A) is representative of a community or significant segments of a community; and (B) provides educational or related services to individuals in the community (U.S. Census Bureau 2021; 20 U.S. Code § 7801 – Definitions). Note: CBOs could be environmental nonprofits but could also include institutions like churches, schools, and health clinics.

PART 1

Getting to Where We Want to Go: Top 14 Recommendations

RECOMMENDATIONS

Over 20 potential policy recommendations were identified and evaluated by examining the implementation barriers described in Table 1: Potential Implementation Barriers and the technology barriers identified in Table 2: Barriers for Technology Adoption, and analyzing the existing policy landscape and opportunities and documenting gaps as described in Appendix 1: Gap Analysis of Current Actions. After this analysis and review, the recommendations narrowed to a list of 14 using the set of key criteria identified in Table 3: Key Criteria.

Given the rapid timeline for implementation, some of these recommendations may already be in progress or in development. The complete matrix scoring for all recommendations is found in Appendix 4: Recommendation Evaluation Matrix.

Table 3: Key Criteria

Criterion	Description
Maximize pollution mitigation potential	How much pollution reduction could be achieved through this action?
Maximize procedural equity	To what extent are decision-making processes accessible to communities that have been historically excluded from these conversations?
Maximize distributional equity	To what extent are the benefits and costs of these policies distributed equitably?
Minimize political barriers to adoption	To what extent would this action be difficult to implement because of stakeholders that are opposed to it?
Minimize legal barriers to adoption	To what extent would this action be difficult to complete because there are legal issues that would need to be resolved?
Minimize implementation complexity	How difficult would it be to implement this action?

The four to six highest priority policy recommendations for each group — federal agencies, SEOs, and philanthropic organizations — are provided below. To make significant progress on decarbonizing the nation's building stock, these efforts should not be pursued in isolation, but should be adopted as part of a comprehensive approach that centers on equity in its implementation (reference Appendix 2: Equity). In addition, while this paper contains a prioritized list of the most urgent priorities, the authors recognize the interplay between this legislation and other efforts that may further support progress towards the nation's ambitious decarbonization goals over time.

FEDERAL AGENCIES: DOE/EPA

1 Provide Clarity Regarding Federal Incentives for Building Decarbonization

Background: The IRA includes many incentives to support building decarbonization. Without explicit and accessible guidance from the DOE on how federal incentives can (or cannot) be combined, stacked, and braided with other sources of federal and state funding — including utility system benefit charges, as well as information on timing and availability of incentives — there is a high risk of market confusion around applicability, eligible measures, and cost to the consumer.

Scope for DOE: All building-specific IRA funding, especially High Efficiency Electric Home Rebate Act (HEEHR), Home Owner Managing Energy Savings (HOMES) program, 25C tax credits.

Barriers Addressed: Excessive administrative complexity (Process); Access to information (Industry).

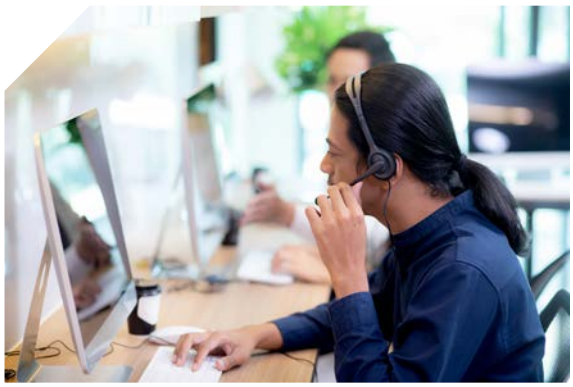
Solution: Provide explicit guidance and public facing tools for customers and installers on project eligibility for various funds and total claimable incentives (e.g., qualification of equipment by region, the relationship between HOMES and HEEHR, Weatherization Assistance Program (WAP), Low Income Home Energy Assistance Program (LIHEAP), while erring on the side of deployment speed and ease of use.

One example could be an open application programming interface (API) incentive lookup tool for customers and installers by product, zip code (possibly even address), and income (and/or anticipated tax liability, with a commitment of data privacy) to determine eligibility, including 25C tax credits (Consortium for Energy Efficiency [CEE] Tiers) and HEEHR (ENERGY STAR). This will reduce consumer and market confusion around eligible measures. Customers should easily understand the incentives they can take claim for a specific project.

Example: Rewiring America's Rebate Calculator

2 Implement Technical Assistance Hubs; Release Administrative Funds as Soon as Possible to Support the IRA Application Process

Background: Responding to funding opportunities requires sufficient planning, staffing, and expertise. Without technical assistance, federal funding opportunities often significantly favor groups, organizations, and states already equipped to respond, often with existing mechanisms in place, and programs and projects already in the pipeline due to existing funding streams. This disparity is exacerbated when federal funding has tight timelines for distribution.



Scope for both DOE and EPA: All building-specific IRA funding.

Barriers Addressed: Staffing limitations and bottlenecks (Resources); Timelines are not reasonable (Process).

Solution: Create expansive and far-reaching technical assistance hubs to support completion of funding applications of ESJ communities and under-resourced states and SEOs. This effort should include resourcing CBOs and other groups with trusted relationships within ESJ communities to help deliver this technical assistance. For formula funding programs to states, DOE should release "administrative costs" as soon as possible to allow states to hire, plan for, and administer the application process and implement the program. Support to states in the design and launch of programs will also allow, encourage, and facilitate groups of states to bundle implementation through third-party entities (e.g., regional energy efficiency organizations). These strategies to increase the capacity of implementing entities upfront will have long-term, lasting impacts — more equitable and effective distribution of funding, activity, and emissions reductions. Such support can especially benefit smaller states and states with fewer staff that need and lack the "startup" funds to support implementation of programs using federal funds and are currently "borrowing" from other programs to begin IRA program management.

Example: The Federal Transit Administration (FTA) created a Technical Assistance and Workforce Development Program, which funds technical assistance projects through national nonprofit organizations (NPOs) to improve public transportation (FTA, 2022). These NPOs work with public transit agencies to improve accessibility, accelerate innovative mobility practices and strategies, support rural communities, and leverage new transit technologies to support communities in need.

3 Provide a Model Program Design for Rebates

Background: HOMES and HEEHR programs will be designed and implemented by the states, the District of Columbia and U.S. territories, so there is the potential for over 50 different rebate programs, which increases complexity and confusion of building electrification efforts from a national perspective and can create undue burden on many stakeholders and market actors. While regional and state differences may exist, establishing design guidelines in advance of implementation can enable a streamlined process for all parties involved in the supply and distribution chain (often across multiple states), including administrators, customers, contractors, distributors, and manufacturers.

Scope for DOE: HOMES and HEEHR, and any other programs that are implemented using other funding mechanisms, including the Climate Pollution Reduction Grants.

Barriers Addressed: Too much flexibility (Process); Equipment installation challenges (Industry), Staffing limitations and bottlenecks (Resources); Transaction costs (Affordability).

Solution: For HEEHR and HOMES, to the extent possible, establish model guidelines in the application for program implementation that provides flexibility to programs while promoting optimization. Such streamlining will support better outcomes by leveraging existing knowledge and experience rather than "reinventing the wheel." Best practices include:

1. Ensuring the point-of-sale requirements for the HEEHR program are accessible to facilitate the participation of smaller and more resource-constrained market actors.
2. Facilitating a program design that enables rapid payment of incentives and potentially bridge funding for contractors, retailers, and other market actors, so they are "made whole" as quickly as possible after a qualifying sale.
3. Seeking alignment with legacy programs and workforce development efforts to minimize confusion, create efficiencies, and enhance market actor program participation.
4. Facilitating streamlined data access, collection, and reporting. Establishing and publishing guidelines for systems/agreements between state agencies, utilities, and third-party implementers for sharing and collecting data, by making such needs for IRA programs clear and defensible without being overly prescriptive in requirements on the specifics of execution such that states may face difficulty in complying. Consider encouraging meter data collection for a subset of projects, where available, to understand the cost impacts of implementation of equipment.[9] DOE should also consider establishing a national database of installed equipment, upfront and operational costs, and other metrics utilizing data collected on projects by the state. Public data is essential for learning over time and informing policy decisions, especially when it emphasizes key metrics, data quality, and ease of collection.[10] However, data collection and reporting efforts must also be structured so as not to create undue burden on program participants, market actors, or administrators and a data strategy should work with the end in mind — prioritize collecting key data that will result in insights.

5. Ensuring potential programs should conduct outreach/host workshops early to collect ideas and insights into how to leverage the program to catalyze freestanding market mechanisms that could help buy down the cost of building electrification equipment, such as the valuation of greenhouse gas (GHG) abatement or health and safety benefits from reducing gas combustion indoors.
6. Emphasizing disbursement of information to contractors, retailers, and other market actors serving ESJ communities to ensure equitable access, but by ensuring information/supporting materials speak to benefits specific to the community, making it easy for market actors to access this information through a variety of distribution channels, and pairing information with resources to help overcome other barriers that market actors serving ESJ communities face.
7. Focusing on best practices recommendations and facilitation rather than adding project conditionality for rebates (e.g., full weatherization of the home) that would prevent low- and moderate-income households from participation and/or concentrate the reach of the rebate programs.
8. Considering additional high-leverage considerations if funding is available, whether through the same or complementing funding mechanisms:
    a. Build market actor awareness and comfort/trust in the technology via technology giveaways to installers.
    b. Provide awards and additional bonus funds across the implementation chain, including manufacturers, distributors, and contractors — with equity-focused metrics.
    c. Co-market weatherization with equipment upgrade programs.

Examples: TECH Clean California

9 According to DOE's Advanced Grid Research division, installations of Advanced Meter Infrastructure exist in every state (DOE Advanced Grid Research, 2020).
10 See https://techcleanca.com/public-data/ for an example.

4 Encourage State Building Decarbonization Investment Roadmap and Model Policies

Background: States are in different stages of planning for, adopting, and implementing decarbonization polices. Model investment roadmaps and high-impact policies should be pursued through IRA funding.

Scope for EPA: Climate Pollution Reduction Grants

Barriers Addressed: Equipment installation challenges (Industry); Mispricing of energy (Affordability); Split incentives (Affordability); Change of political leadership (Motivation/Politics).

Solution: Prioritize funding to states to develop and implement decarbonization investment roadmaps that answer five key questions:

1. What is the impact and benefits of various decarbonization scenarios within the state?
2. What level of investment is required to achieve decarbonization scenarios?
3. Who will pay for this investment?
4. How does the state unlock the funding to make the investment possible?
5. How will the funds be used? More specifically:
    a. What policies will the state adopt to advance full decarbonization?
    b. What incentive and market transformation programs will the state implement to advance these policies leading up to or following adoption?

Some model policies the EPA should encourage in the application are:

1. Existing building performance standards (incentive programs can support buildings achieve the standards).
2. Air quality standards for appliances (incentive programs can drive and inform cost effectiveness and feasibility).
3. Reforming utility rates to support decarbonization.
4. Clean electricity expansion plan, renewable portfolio expansion, or otherwise (incentive programs can support achieving of the plan or goal).
5. Shifting electrification programs so they are not solely implemented by investor-owned utilities as part of their demand side management programs funded by system benefit charges.

The application should require entities to show progress towards these goals over time.

Example: The Massachusetts Decarbonization Roadmap Report provides analysis of various decarbonization scenarios and identifies several strategies to achieve emissions reductions (The Massachusetts Executive Office of Energy and Environmental Affairs, 2020).

STATE ENERGY OFFICES (SEOs)

1 Build on Existing Initiatives Where Possible

Background: To mitigate the worst impacts of climate change, heat pumps and other electric appliances must be adopted rapidly with the assistance of market transformation programs. However, program design, vendor selection, contracting, and program launch can take years and delay the large-scale benefits that full market transformation would bring. Additionally, while supplemental funding towards market transformation initiatives is always welcome, new programs with often differing eligibility requirements can add layers of complexity and cause market confusion that can delay deployments and frustrate customers and market actors.

Scope: HOMES and HEEHR

Barriers Addressed: Excessive administrative complexity (Process).

Solution: States should utilize existing program infrastructure and participation thresholds where possible to expedite getting funding to the market. Moreover, programs can also expedite low-income qualification by pre-qualifying residents that have already qualified as low-income through other programs (e.g., Weatherization Assistance Program (WAP), Low Income Home Energy Assistance Program (LIHEAP), Low Income Household Water Assistance Program (LIHWAP), or other pre-validated programs). Work with existing low-income housing action agencies and groups — the local organizations that are already delivering these programs and other housing improvement services are natural allies for helping to identify and serve low-income households.

Example: Rewiring America's Report "Frictionless Income Verification Methods for the Electrification Rebates" (Rewiring America, 2022).

2 Implement Program Best Practice for Rebate Deployment

Background: Utilize existing best practices and processes for rebate program implementation in states without established rebate programs or in states where there are opportunities to improve current programs.

Scope: HOMES and HEEHR, and any other programs that are implemented using other funding mechanisms, including the Climate Pollution Reduction Grants.

Barriers Addressed: Too much flexibility (Process); Equipment installation challenges (Industry), Staffing limitations and bottlenecks (Resources); Transaction costs (Affordability).

Solution: For HEEHR and HOMES, to the extent possible, look to model guidelines for program implementation that provides flexibility to programs while promoting optimization. Such streamlining will support better outcomes by leveraging existing knowledge and experience rather than having to "reinventing the wheel." See Federal Agency recommendation #3, Provide a Model Program Design for Rebates for best practices.

3 Use IRA Funding to Align and Advance State Policies

Background: Model investment roadmaps and high-impact policies should be pursued through IRA funding.

Scope: Climate Pollution Reduction Grants.

Barriers Addressed: Equipment installation challenges (Industry); Mispricing of energy (Affordability); Split incentives (Affordability); Change of political leadership (Motivation/Politics).

Solution: See Federal Agency recommendation #4, Encourage State Building Decarbonization Investment Roadmap and Model Policies.

4 Ensure Deployment of a User-Friendly Tool for Customers and Installers to Lookup Incentives

Background: The IRA has many incentives to support building decarbonization, and for many states and regions this new influx of financial support adds to an existing landscape of incentives offered through utilities, state, or local programs, among others. Given the vast number and overlap, there continues to be market confusion around applicability, eligible measures, and cost to the consumer.

Scope: HEEHR, HOMES, 25C tax credits.

Barriers Addressed: Excessive administrative complexity (Process); Access to information (Industry).

Solution: SEOs should ensure that a comprehensive incentive lookup tool (by zip code, equipment, or census tract, if applicable) is deployed for customers and installers, which may require creating, funding, or facilitating one if it does not yet exist. This ideally leverages and builds upon the guidance for federal incentive relationships with state-specific information. See Federal Agency recommendation #1, Provide Clarity Regarding Federal Incentives for Building Decarbonization).

Example: Switch Is On.

5 Coordinate Sales Tax Exemption

Background: Tax credits are afforded to those with tax liability and are a delayed benefit. Sales tax exemptions are a progressive tax solution that can provide immediate benefit to low-income customers, particularly for retail products such as induction stoves and heat pump dryers. Contractors can also pass the benefits on to the customers for equipment they purchase and install.

Scope: All building-specific IRA funding (complementary).

Barriers Addressed: Limited access to financing (Affordability).

Solution: Coordinate with state departments of revenue, governors' offices, or equivalent entities to offer complementing sales tax exemptions for tax credit eligible products and deliver outreach campaigns year-round.

Examples: State of Florida Tax Exemption for ENERGY STAR equipment (FL Dept. of Revenue, 2022).

6 Establish Data Hubs to Enable Market Transformation

Background: With the potential for changes to the federal executive branch administration and respective political decisions, state agencies and other stakeholders should consider proactive approaches to support the continuation of programs beyond the life of the current administration. Losing institutional memory and data due to changing administrations might make systemic policy change more difficult.

Scope: All building-sector IRA funding.

Barriers Addressed: Change of political leadership (Motivation/Politics).

Solution: State agencies should establish resilient, state-level systems, processes, and data hubs for key information (including data and successes) from IRA funding projects that are structured in a way to outlive political leadership changes (e.g., key information shared directly with Federal agencies for reporting requirements should also be made public, proactively). As noted in Federal Agency recommendation #3 Provide a Model Program Design for Rebates, data is key for informing policy change and sustaining long-term market transformation.

Example: The Massachusetts Energy Efficiency Database.

PHILANTHROPHIC ORGANIZATIONS

1 Fund and Partner with Local Community-Based Organizations (CBOs)

Background: Both messengers and messages are key for shifting paradigms. Without community engagement, IRA-funding efforts run the risk of alienating the communities they are intended to serve. CBOs are particularly well-suited as partners in local and state building decarbonization efforts.

Scope: All building-specific IRA funding.

Barriers Addressed: Technology acceptance (Industry); Access to information (Process).

Solution: Help CBOs increase staff to handle the increased demand on their services and to become building decarbonization ambassadors. Work with CBOs to build support from key decision makers to bring IRA funding to their communities. Engage CBOs as trusted messengers to understand communities' priorities, where electrification fits, and actions that could facilitate greater acceptance within the community. Partnering with CBOs is a long-term, relational investment that takes both time and sustained effort. See Principle 2: Prioritize Equity and Engagement for more details.

Examples: WE ACT for Environmental Justice started in 1988 when a handful of community activists and environmental litigators joined together to fight for better air quality in Northern Manhattan. Today, WE ACT has grown to over 16 staff members and maintains a local presence in New York City while also pushing forward environmental justice initiatives in Washington, D.C. WE ACT is working with community members and allies to implement the Northern Manhattan Climate Action Plan which aims to create resilience in the face of disproportionate impacts of climate change on ESJ communities.

Strategic Actions for a Just Economy (SAJE) is an organization based in Los Angeles bolstering movements for tenant rights, healthy housing, and equitable development. They influence policy and engage with communities in a variety of ways, including policy innovation, leadership development, outreach, education, among others. SAJE analyzed the potential benefits and burdens decarbonization may place on tenants in their recently published report.

Photo by Li-An Lim on Unsplash

2 Create Supplemental Technical Assistance Hubs and Leverage IRA Application Process to Inform Funding Decisions

Background: As noted in Federal Agencies recommendation #2, Implement Technical Assistance Hubs; Release Administrative Funds as Soon as Possible to Support the IRA Application Process, state responses to funding opportunities require sufficient planning, staffing, and expertise. Without technical assistance — especially with quick timelines — these opportunities significantly favor groups, organizations, and states already equipped to respond, often with programs and projects already in the pipeline due to existing funding streams.

Scope: All building-specific IRA funding.

Barriers Addressed: Staffing limitations and bottlenecks (Resources); Timelines are not reasonable (Process).

Solution: Depending on how federal agencies implement and approach technical assistance hubs, complementary efforts may assist ESJ communities and under-resourced states to support planning, capacity building and education, project pre-development, application assistance, and implementation support.

Consider using the IRA application process and pool to inform philanthropic funding decisions. Many top applicants with strong projects, programs, and planning applications may still not receive federal funding given budget limitations or political decisions.

Examples: The DOE's Office of Energy Efficiency & Renewable Energy (EERE) State and Local Solutions Center provides resources for states, local governments, and school districts to help reach their respective energy efficiency and renewable energy goals. The center provides interested parties with technical assistance tools and resources, access to its Building Better Center, and offers partnership opportunities to develop programming, implement data management, and establish financing for programming (DOE EEERE, 2022). A peer learning opportunity and cohort example includes The Partners Advancing Climate Equity (PACE) Pilot Program offered by the California Strategic Growth Council (SGC) (PACE, 2022).

3 Support Implementation by Funding State Energy Office Staffing

Background: While the IRA dedicates funding to administrative expenses that support planning and provide technical assistance to SEOs, new demand may still exceed administrative capacity, resulting in continuing lack of funding for key staffing roles.

Scope: All building-specific IRA funding, particularly HOMES and HEEHR.

Barriers Addressed: Staffing limitations and bottlenecks (Resources).

Solution: Support in-state implementation by funding staffing, expanding pool of workforce through pro bono workforce (e.g., short-term project companies such as management consulting, accounting, and law firms), tax credits, student loan forgiveness expansion, or coordinating the lending of staff from energy labs and universities.

Example: AmeriCorps engages approximately 5 million people in services through a variety of stipend volunteer programs in several sectors. Its state and national programs participants are eligible for an Education Award or Pell Grant that can be used to pay for additional education or existing student

loans (Americorps, 2020). Governor Jay Inslee of Washington State has been vocal about establishing a Climate Conservation Corps (akin to the Civilian Conservation Corps created by President Franklin D. Roosevelt) that would allow young Americans to participate in creating sustainable solutions, work internationally with regional partners to assist in climate mitigation and resilience, and invest in creating jobs in the clean energy economy (Inslee, 2019).

4 Drive Demand for IRA Funding in States Less Likely to Participate

Background: Some states have chosen to decline federal program funding such as the Affordable Care Act and COVID-19 relief funding and may choose to do the same with some of IRA funding. There are cities and state governments that are very interested in decarbonization but may not have state programs or resources to support this pathway for a wide range of reasons (e.g., tax structure, political climate, legislative process, among others).

Scope: All building-specific IRA funding.

Barriers Addressed: State-level interest (Motivation/Politics); Change of political leadership (Motivation/Politics)

Solution: Implement multimedia marketing campaigns to state residents/key organizations and decision-makers in states with less motivation to decarbonize to ensure groundswell of interest in funding (e.g., focusing on considerations such as missing the major opportunity for job creation). Provide tandem funding for a marketing campaign to help consumers, contractors and other actors learn about home electrification and find rebates, and financing. Also include funding for compensated partnerships with CBOs.

Example: In August 2022, right after the IRA passed out of Congress, the Biden Administration released several statements describing how the IRA will impact individual Americans (The White House (a), 2022) and explained the basic tenets of this landmark legislation in easy-to-understand terms (The White House (b), 2022).

PART 2

Guiding Principles for Equitable and Effective Implementation

PRINCIPLES

To ensure equitable implementation of IRA building decarbonization programs, federal agencies, SEOs, philanthropic organizations, and program implementers should consider the following questions while designing programs:

1. **How can program administrators and implementers ensure that the benefits and burdens of a net-zero emissions economy are equitably distributed?**
2. **What are key tenets of equitable market transformation?**
3. **How can clean energy programs facilitate a just transition for ESJ communities?**

The following principles seek to address these questions, serving as guiding concepts to the implementation of the IRA and the aspiration of achieving an equitable end-state ecosystem for the benefit of all populations. It is important to note that guiding principles, values, and priorities may differ between and among various communities. Ultimately, the most equitable and effective implementation occurs at the most granular level, working directly with, and getting buy-in from, the most impacted populations (see Appendix 2: Equity for more details). These principles supplement the key program design principles learned from the implementation of ARRA, covered in depth in Appendix 3: ARRA Lessons Learned.

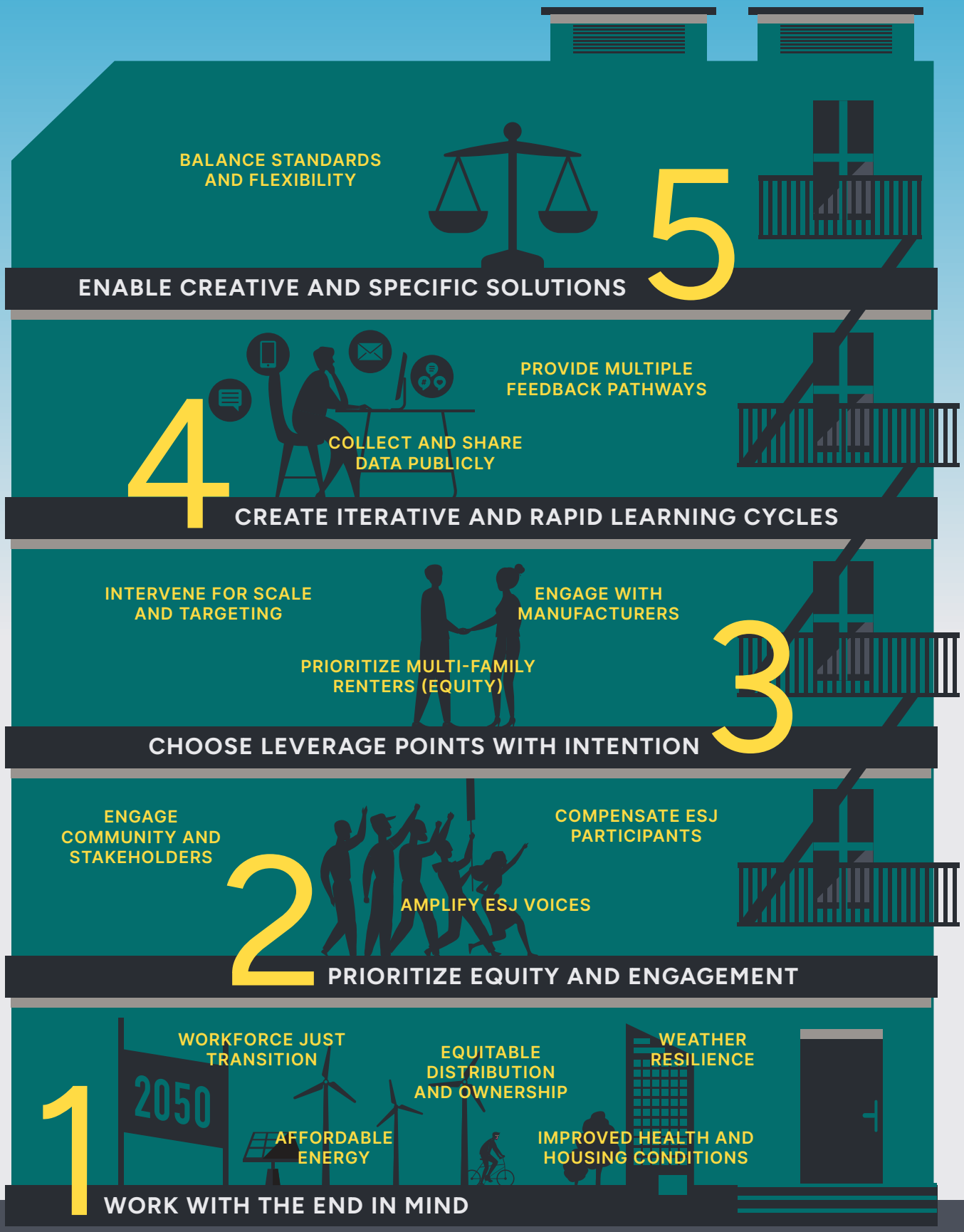


Figure 1: Guiding Principles for Equitable and Effective Implementation

1. WORK WITH THE END IN MIND

The United States has committed to reaching net-zero emissions economy-wide by 2050 and launched the Justice40 initiative to ensure that 40 percent of benefits from climate investments accrue to equity communities. In the residential and commercial building sector — which accounts for approximately 13 percent of overall emissions — the authors of this paper hold a parallel vision of an equitable sharing of benefits. The benefits of building decarbonization extend beyond mitigating climate change, and include:

- ✓ Consistently affordable energy costs
- ✓ Equitable distribution of new technology ownership
- ✓ A just transition for workers in a new clean energy economy
- ✓ Building stock that prioritizes human health
- ✓ Resiliency during extreme weather events

Our vision of building decarbonization and the equitable distribution of benefits serves as a guiding, ideal, end-state ecosystem to keep top of mind while developing strategy, key tasks, and outlining budget allocations. This vision also includes the scale of technology adoption that comes with high-compliance building codes and appliance standards, as well as zonal electrification of entire neighborhoods. The pathway to both these sets of strategies is greatly supported by data that can be used to justify the feasibility and benefits of building decarbonization. Collecting and making data public through program implementation can not only provide transparency to the market and drive down costs, but it can also help inform analyses that can justify high-leverage policies.

Several tactical market transformation benchmarks can support widespread adoption of building decarbonization technologies, and should be included in a building decarbonization roadmap, including:

- ✓ Robust, long-term capital — particularly third-party off-takers of risk — enabling far more projects to qualify for financing mechanisms.
- ✓ Pursuit of infrastructure investments based on long-term viability of a decarbonized economy as standard practice, with low operational costs due to coordination and advancement in other areas such as renewable energy supply and storage.
- ✓ Parity in the timeline and quality of all electrification installations (i.e., product and service supply).
- ✓ Systems and policies in place to ensure tenant protections during building decarbonization.

2. PRIORITIZE EQUITY AND ENGAGEMENT

Engaging the Community and Stakeholders. Successful community and stakeholder engagement requires identifying and prioritizing ESJ communities, building trust, and ensuring that ground-level community representation is included in program design, including data collection and design. Identifying ESJ communities, along with community leaders, their priorities, internal and external dynamics, coalitions or networks, and related organizations such as CBOs is a critical step to long-term and successful community and stakeholder engagement. Once communities and

Photo by Christina @ wocintechchat.com on Unsplash

organizations are identified, building a long-term, trusting relationship with these stakeholders must become a priority. ESJ communities and CBOs need to know that their lived experience, perspectives, and local knowledge are valued, that their priorities are understood, and that their ideas will influence decisions and outcomes. Such relationships "move at the speed of trust" and will take time to develop, but they are essential to achieving an equitable energy transition.[11]

Implementers seeking to partner with ESJ communities and CBOs need to be committed to a sustained, long-term relational investment, including an acknowledgement and remediation of past harms. It takes time to build organizational capacity and to cultivate confidence that opportunities will persist for the long term if ESJ communities and CBOs make the investment in staff, time, and energy. Moreover, electrification and the understood benefits for low-income homes, communities, and organizations are relatively new. These constitutive partnerships should ensure that ground-level community representation is included in data design and collection (e.g., the EJ Mapping initiative provisioned by the White House Council on Environmental Quality [CEQ] to collect data and track disproportionate pollution and climate change burdens to further equity for current and future generations) (U.S. Senate Committee EPW, 2022).

Amplify the Voices of Community Leaders Who are Doing Equity Work. Along with identifying ESJ communities, parties implementing the IRA need to identify key contributors to the equitable building decarbonization movement, review their work, and highlight or amplify their important contributions both publicly and privately to those who may not be familiar. Key contributors have identified a variety of ESJ recommendations which must be implemented alongside the IRA — and leverage the IRA — to

make use of the current political momentum. The Equity Resources and Frameworks in Appendix 2: Equity includes information from a selection of key contributors and provides links to some of their foundational reports.

Compensate Equity Stakeholders to Foster Non-Extractive Participation. For the IRA to be successful, a diversity of perspectives must be included in the conversation, especially those who have historically been excluded. These contributors need to be fairly resourced and compensated to ensure that participation is not extractive or overly burdensome, as CBOs may otherwise lack the capacity to participate in these conversations. Examples of compensation include but are not limited to: hiring CBOs or ambassadors of ESJ communities to share input and expertise, hosting focus groups and providing stipends, offering gift cards or other incentives that are meaningful to specific ESJ communities, paying for childcare or transportation during public engagement opportunities or workshops, among other forms of support. Compensation must also be appropriate for the level of expertise of the CBO contributor. For example, a CBO contributor with key insights and expertise on the impacted community should be compensated on par with a technical consultant who would be commissioned to provide similar services.

11 "Moving at the speed of trust" refers to the idea that "how fast you can move is determined by how much trust you have. And people won't trust you unless you're vulnerable with them" (Brown 2017; Forte 2022). "Moving at the speed of trust" captures and expands beyond the idea that building relationships require time, patience, and persistence. Oftentimes CBOs and ESJ communities are strapped for resources (time, money, or both). It might take multiple efforts to connect or reconnect. Federal and state agencies, philanthropists, and advocates must realize that ESJ community priorities may be different than those of implementers, and thus communication upfront should seek to understand, respect, and incorporate such priorities. For example, a community dealing with lead-contaminated water may not have capacity, time, or interest to provide input on nuanced and technical building electrification code changes with which they are not yet familiar.

3. CHOOSE LEVERAGE POINTS WITH INTENTION

There are a variety of barriers to building decarbonization market transformation, and different leverage points need to be determined and utilized intentionally to successfully implement the IRA and supplemental policies. Strategies designed to eliminate market-wide barriers should be highlighted, developed, and prioritized to create a market ready for building decarbonization. By intervening upstream (before customer purchase) for scale and downstream (at time of purchase) for targeting, implementers can choose the intervention point intentionally to prioritize different outcomes and effects. Interventions are most effective when made at key inflection points across the supply chain and distribution channels. For example:

- ✓ A vast majority of equipment replacements occur when that equipment fails (including 85 percent for HVAC equipment) meaning lower-emission technology needs to be top of mind and readily available for contractors to install (Pantano, Malinowski, Gard-Murray, & Adams, 2021).
- ✓ For equity considerations, prioritize clean energy technologies for multifamily dwellings, where the vast majority of low-income renters reside.[12]
- ✓ Increasing manufacturing and shipments of low-emissions equipment should lead to economies of scale that will help to bring equipment prices and installation costs down over time. Decision makers should engage with manufacturers to understand these market dynamics and set targets.

4. CREATE ITERATIVE AND RAPID LEARNING CYCLES (FEEDBACK PATHWAYS)

Collecting and making data public throughout the implementation process fosters rapid learning cycles through real-time feedback, rather than relying on a retrospective analysis. This unlocks potential for larger impacts while creating opportunity for future data-driven decisions, especially in the realm of codes and standards. For example, a program that collects data on project information, customer satisfaction, and pre- and post- install energy usage data can analyze data to discover project characteristics that are more likely to result in customer energy savings and refine targeting strategies.

When collecting program feedback, it is essential to use multiple channels when soliciting feedback from individuals and organizations. Providing multiple ways to provide feedback, such as via smartphone, increases accessibility and equity.[13]

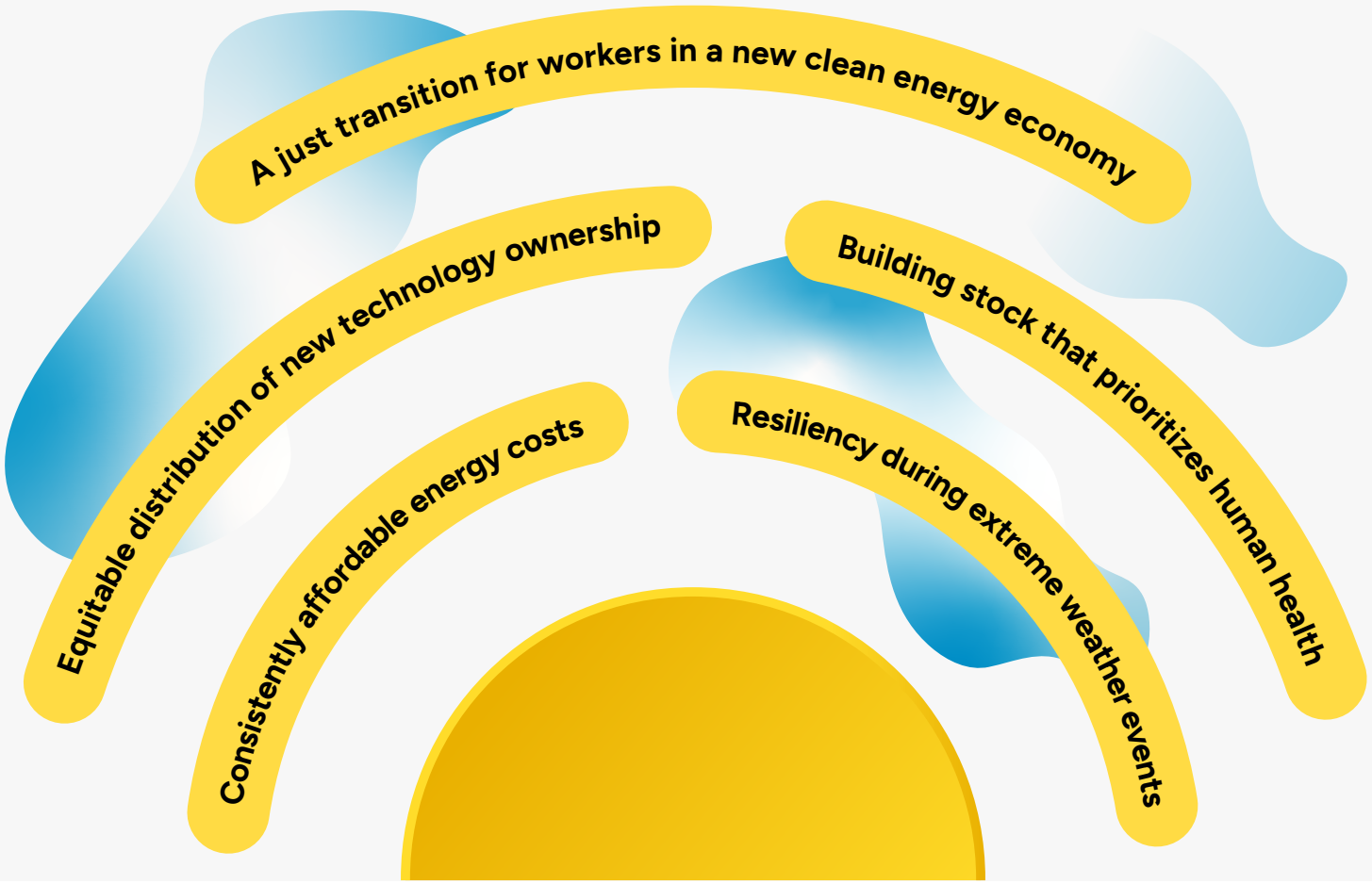
5. FOSTER AND ENABLE CREATIVE AND SPECIFIC SOLUTIONS

Striking a balance of both standardization and flexibility across states and markets is essential for solutions to be scaled and spread, while also fitting varied conditions and geographies — particularly when the solution focuses on climate-dependent equipment. While too few requirements or guidelines can lead to too much variability due to downstream decisions, administrative and implementation confusion, and mismatched solutions towards the goal, excessive requirements or guidelines can lead to too much administrative burden, resulting in a lack of participation.

12 According to the 2021 American Housing Survey, 69 percent of renter households below 100 percent of their "poverty threshold" live in multifamily buildings (U.S. Census Bureau (b), 2021).

13 According to a Pew Research survey, lower-income households rely more on smartphones for accessing the internet than other income groups. 27% of adults living in households earning $30,000 or less per year only use their smartphone as a way to access internet (Vogels, 2021).

Figure 2: End-state Ecosystem



Conclusion

For federal agencies, state energy offices (SEOs), and philanthropic organizations, the administrative and implementation work associated with the IRA will be substantial over the coming months and years. The authors of this paper recognize that there are many challenges to overcome to equitably distribute IRA-related funds to yield the most benefit and reach the nation's energy use and emissions reduction goals. However, in order to effectively catalyze a just transition to a clean energy economy, we must collectively apply lessons from past federal funding outlays and design equitable programs and policies that address key barriers to success and enable long-term market transformation.

Appendix 1: Gap Analysis of Current Actions

The clean energy funding within the IRA is a necessary catalyst for building electrification market transformation, but contains significant gaps from equity, emissions, and financial perspectives that should be addressed by federal agencies, state energy offices (SEOs), philanthropic organizations, and other stakeholders via state-level program design or complementary building electrification initiatives.

EQUITY GAP

Ensuring that the processes and outcomes of decarbonizing the building sector are applied equitably is an opportunity to address historical environmental inequity and environmental racism. While the IRA does attempt to address this inequity via Justice40 commitments and substantial set-asides reserved for communities identified as "disadvantaged," if program implementation lacks intentional screening and controls for prioritizing ESJ communities, or fails to incorporate input from ESJ communities, there is significant risk of perpetuating systemic disparities in access to clean energy technologies and the associated benefits, leading to further injustice (IEN, 2022).

DEPLOYMENT BARRIERS TO MARKET ADOPTION

To date, the market adoption of beneficial clean energy technologies in ESJ communities has been inequitable due to barriers such as the high up-front cost of clean energy equipment and the limited availability of these technologies in ESJ communities. These barriers are compounded by a history of environmental racism, redlining, program design and cost-effectiveness metrics that favor more affluent homeowners, and other instances of systemic oppression that disproportionately impact ESJ communities. For example, EVs and solar photovoltaic (PV) systems are purchased largely by the affluent who can use federal tax credits to offset the high cost of these clean technologies. Meanwhile, communities most impacted by environmental harms cannot realize the full benefit of these credits and suffer from an inability to pay for high-cost upgrades upfront.[14] In 2019, almost half of the communities with a majority of Black residents lacked a single installed solar PV system.[15]

14 While the solar investment tax credit (ITC) aims to expand the adoption of rooftop solar, 40 percent of tax filers in the United States cannot receive any of the solar ITC benefit since they do not have any federal income tax liability. A majority of American tax filers in the United States (70 percent) cannot even receive the full solar ITC benefit as they do not have enough annual tax liability, according to 2018 data from the IRS (Shea & Mendell, 2021). Internal Revenue Code Section 30D (IRC 30D) provides a credit for qualified plug-in electric vehicles (PEVs). However, 89 percent of that benefit will go to those in the top 20 percent of household incomes in the United States ($75,000 and over), with only one percent of those credits benefitting the people with a household income less than $40,000 (Just Solutions Collective, 2022 page 40). Utilizing a tax credit as the main incentive for EV purchase furthers inequity as the benefit is received after the point of sale, forcing low-income Americans to fund the full price of the PEV upfront through cash or financing (Hardman, Fleming, Khare, & Ramadan, 2021).

15 "For the same median household income, Black- and Hispanic-majority census tracts have installed less rooftop PV compared with no majority tracts by 69 and 30%, respectively, while White-majority census tracts have installed 21% more. When correcting for home ownership, Black- and Hispanic-majority census tracts have installed less rooftop PV compared with no majority tracts by 61 and 45%, respectively, while white-majority census tracts have installed 37% more" (Sunter, Castellanos, & Kammen, 2019).

PROCEDURAL INEQUITY

It is important to acknowledge the procedural inequity of the IRA's composition and passage, in which ESJ communities were largely excluded. From the initial "Build Back Better" version to the reconciliation bill's final iteration as the IRA, many benefits and protections for ESJ communities were cut. As the Just Solutions Collective notes, significant funding to address air pollution was removed and "other changes include stripping out language prioritizing benefits to low-income, disadvantaged, or underserved communities."[16] In addition, there are many provisions that will lead to the continuation of inequitable, extractive processes, enabling and even encouraging continued fossil fuel extraction, and negatively affecting many already disproportionately impacted ESJ communities (IEN, 2022).

VARIED DEFINITIONS OF EQUITY

Furthermore, equity definitions in the IRA are varied.[17] Programming like Neighborhood Access and Equity Grant Program (Section 60501) and the Tribal Electrification Program (Section 80003) utilize specific definitions for where funding can be distributed and to whom. Section 60501 dictates that funds go towards improving transportation equity and lists three categories under which funding can be used. Section 80003 allocates support for developing zero-emissions energy, electrification, and repairs/retrofits to homes in tribal communities. However, other definitions of equity communities within the IRA, such as the "Energy Community" definition used for the IRA's renewable production tax credit (Section 13101) and the investment tax credit (Section 13102), may be so broad as to dilute the intended effects of concentrating investment in disproportionately impacted communities. Based on an analysis by Daniel Raimi and Sophie Pesek at Resources.org, up to 50 percent of the nation could be designated as an Energy Community, which includes categorizations such as: brownfield sites, census tracts which include a retired coal plant or mine in the past 20 years, or metropolitan/nonmetropolitan statistical areas in which ≥0.17 percent of employment or ≥25 percent local tax revenues are related to fossil fuel activities (RFF, 2022). The Energy Community language may be purposely general so that the greatest number of entities can secure funding for GHG mitigation-related projects/programming, however, there are concerns about whether this language will help or hinder the communities most likely to be disproportionately impacted by this transition.

DECLARATION OF A CLIMATE EMERGENCY

Finally, the IRA does not do what has been called for by many cities across the country and many frontline community organizations: declare a climate emergency.[18] Such a declaration would take the form of a formal statement from the White House affirming that climate change exists, that current measures used to mitigate GHG emissions are insufficient, and that significant government and administrative measures are necessary and can be deployed. For example, on November 28, 2019, the European Parliament declared a climate emergency on behalf of its 28 member states (European Parliament, 2019). Other nations, and even state/local governments, have taken initiative and declared a climate emergency, including Canada, Japan, South Korea, Hawaii, San Francisco, and New York City.

16 Please see page 15 of the Just Solutions Collective "IRA: Our analysis of the Inflation Reduction Act" report for information on removed language.

17 For considerations on ESJ community terminology and definitions, refer to Appendix 2: Equity section ESJ Communities Terminology and Definition.

18 The Climate Justice Alliance called upon the Biden Administration to declare a climate emergency and support economic recovery and workforce development by supporting local, community-controlled renewables in all communities, especially those expected to be most affected by climate change (Climate Justice Alliance, 2022).

EMISSIONS GAP

With IRA funding alone, there is the risk that funding may insufficiently allocated to where the need is most urgent across the country in terms of emissions reductions. Wyoming and North Dakota are the most emissions-intensive states in the nation, followed closely by West Virginia (Friedrich, Ge, & Tankou, 2017). These states are all home to energy-intensive industrial sectors and are fossil-fuel energy producers (Francis, 2021). Because of the economic baseline fossil fuels provide in these states, they are likely to be hesitant to begin transitioning to a zero-carbon economy. While these states might be inclined to receive IRA funding for some GHG reduction actions, due to fossil fuel industry pressure within the state, they are less likely to commit to ongoing market transformation activities to drastically reduce their respective GHG reductions.

Hesitancy to accept IRA funding for GHG reduction programming/projects could lead to skewed funding distribution and emissions reduction in these states. Also, the IRA funding mechanism is initially allotted to SEOs and is based on formula funding, which could lead to larger states (e.g., California and Texas) receiving significantly more revenue to steward this transition regardless of emissions profiles. Another factor leading to emissions gaps on a state-by-state basis is that the political landscapes in some states might not be conducive to facilitating this transition. Lastly, SEOs in certain states have already invested significant resources to implement clean energy programs and are more equipped to begin soliciting these funds, (e.g., California has already devoted extensive resources to prioritize this transition and the California Energy Commission [CEC] has 742 employees able to work on implementing these changes) while other states have not proactively invested and will therefore be hard pressed to build staffing capacity prior to even considering going after IRA-related funding.

FINANCIAL GAP

As noted in the Introduction, the IRA, while necessary, is insufficient to advance full decarbonization across all economic sectors, especially within the building sector. Decarbonizing all the residences in the United States would require a minimum $3 trillion to upgrade the over half a billion appliances alone to cover upfront gross costs (not including the substantial funds needed for weatherization, an additional component to decarbonizing) (U.S. Census Bureau, 2021).[19] Alternately, if all of $89 billion of the building-dedicated IRA funding was spent towards decarbonizing homes, including all $27 billion of the Greenhouse Gas Reduction Fund (which is not required in the statute), each household in the United States would receive approximately $325 if distributed across all households, leaving nothing for the commercial and industrial sectors. Additional policies and programs therefore must be implemented to address this funding gap.

19 Assuming $25,000 per home for electrifying space conditioning, water heating, stoves, and clothes drying in the over 142 million homes in the United States.

Appendix 2: Equity

Equity should be centered, prioritized, and integrated throughout each aspect of implementation of the IRA.[20] This appendix adds detail, depth, and resources to the equity discussion around IRA implementation, but is by no means comprehensive – several equity focused organizations will be releasing further guidance and comments on equity considerations regarding the IRA, for which we provide additional though not comprehensive information in the Equity Partners and Equity Resources and Frameworks Sections. As posited by the Equity Energy Project in the framework in their 2022 report, "equity is a journey, not a destination" (Energy Equity Project, 2022, p. 12). Therefore, even an imagined equitable "end state" for market transformation is still just a benchmark in an ongoing process.

The Energy Equity Project affirms that "the most durable form of energy equity is when agencies, organizations, and individual staff have embraced equity and can apply it to a variety of new situations" (Energy Equity Project, 2022, p. 12). Durable equity retains its structure even after the inciting incident (e.g., IRA funding to create new programs and opportunities) fades away. Therefore, administrators and implementers need to consider how IRA funding can be leveraged to make durable, equitable changes.

PROCEDURAL AND DISTRIBUTIONAL EQUITY

While the IRA makes great strides at addressing environmental injustice by directing billions of dollars to communities defined using environmental justice related criteria including income, proximity to pollution sources, and demographics, it also perpetuates environmental injustice by leasing public land for oil and gas extraction near ESJ communities, which can worsen localized air pollution and increase environmental harms for these communities (Spivak & O'Grady, 2022). Additionally, while the IRA aims to incorporate procedural equity by requiring some projects be done in partnership with local groups (U.S. Senate Committee EPW, 2022), it fails to provide a specific definition for disproportionately impacted communities and does not do enough to meaningfully address the legacy of cumulative environmental burdens or ensure that block grant activities are in fact consistent with community priorities. The building electrification and efficiency provisions are also heavily weighted to benefit the wealthy, with tax credits being fully funded for ten years as opposed to the set amount of funding for low-income rebates that is likely to expire well before ten years. Lastly, provisions largely fail to include and protect renters, a population that often has lower household incomes (Chi 2022; Holland 2022; NEEP 2022).

ESJ COMMUNITIES TERMINOLOGY AND DEFINITION

Definitions are powerful because they provide an opportunity for shared understanding. The IRA currently uses unspecified definitions such as "disadvantaged community" or "low-income community" throughout the law, risking the potential for overturned or redefined definitions in the future (Just Solutions Collective, 2022 page 40). Developing specific guidance on exactly who is and is not included in ESJ communities will aid implementers in ensuring funds and benefits

20 Information about centering equity can be found here https://ssir.org/articles/entry/centering_equity_in_collective_impact (Kania, et al., 2022).

reach the intended recipients. A deeper discussion of the current IRA program definitions, and the corresponding need for clarification or improvement can be found in the Equity Gap section. Below are some additional important considerations to include when developing the term and definition for ESJ community.

- When discussing equity, try to use verbs and phrases that highlight the ongoing mission to advance equity.
- Ensure that the chosen terminology is approved of or preferred by those the term seeks to describe. Although "disadvantaged communities" is a popular and approved term across a variety of state and federal agencies, grassroots organizations have shared that this term is stigmatizing and have communicated that they do not prefer using the word "disadvantaged" when describing ESJ communities (DC FPI, 2017). Other options for terminology include "ESJ communities" (CPUC, 2022), "disproportionately impacted communities" or "disproportionately impacted populations" (CO Dept. of Public Health & Environment, 2022), "priority populations," "frontline communities," "communities of concern" (The City of San Diego, 2022), and "environmental justice populations" (Commonwealth of Massachusetts, 2022), although this last term lacks reference to the social justice component.
- Intersectionality must be incorporated when defining ESJ communities, as "all forms of inequality are mutually reinforcing and must therefore be [analyzed] and addressed simultaneously to prevent one form of inequality from reinforcing another" (CIJ, 2017).

include intersectional identities such as race, income, tribal communities, renters, census tracts with a history of environmental injustice or environmental racism, English as a second language populations, certain disproportionately impacted rural communities, and people of different genders and sexualities, etc. (Goldsmith & Bell, 2022). For example, the current definition for Justice40-eligible communities is race-neutral, as the Climate and Economic Justice Screening Tool from the White House CEQ approaches factors of race-based discrimination by considering redlining data and adding tribal nations as criteria. It also displays the race and ethnicity data of the census tracts but does not use minority population or people of color, etc., as a criterion. While this approach provides resilience to future legal challenges, it also reduces targeted investments to communities of color, which will create an equity concern for many.

EQUITY PARTNERS

Federal agencies, SEOs, and philanthropic organizations should all be familiar with the work of national and regional energy equity organizations in addition to local CBOs and should seek to include their input in the design and implementation of IRA programs. For example:

- The Green & Healthy Homes Initiative (GHHI) is dedicated to addressing the social determinants of health, opportunity and equity through the creation of healthy, safe and energy efficient homes.
- The Greenlining Institute bridges research, policy, and community engagement to advance a future where communities of color can thrive amidst the impending challenges from climate change.
- Common Spark Consulting facilitates equitable conversations and provides energy policy expertise.
- Emerald Cities Collaborative implements policy and project development on clean energy, economic inclusion, etc., working with communities directly as well as a multitude of stakeholders to advance a sustainable future.
- Just Solutions Collective is a collective of frontline leaders and groups spearheading justice-centered policy and program efforts.
- **WE ACT for Environmental Justice** has been heavily involved in implementation discussions for the IRA building decarbonization provisions.
- Midwest Building Decarbonization Coalition works to create clean, healthy, and affordable buildings for all.

These example organizations serve as a starting point to who should be included in the conversation, but this section by no means provides a comprehensive list.

EQUITY RESOURCES AND FRAMEWORKS

Below are some examples of useful and foundational resources on the intersection of equity and building decarbonization. This list is not a complete set but rather a springboard for further research and education.

- Analysis of Electric and Gas Decarbonization Options for Homes and Apartments. Analyzes several thousand homes across the United States to understand the cheapest and best options for decarbonizing space and water heating (Nadel & Fadali, 2022).
- Building Decarbonization Solutions for the Affordable Housing Sector. Describes the benefits and barriers to decarbonizing affordable housing buildings (York, Cohn, Morales, & Tolentino, 2022).

- Community-Defined Decarbonization: Reflecting Rural and Tribal Desires for an Equitable Clean Energy Transition in Washington. Investigates barriers to decarbonizing buildings for Washington's rural and Tribal low-income homes, and determines the potential for decarbonization and clean energy developments to address energy inequities in these communities (Clean Energy Transition Institute, 2022).
- Decarbonizing Homes: Improving Health in Low-Income Communities through Beneficial Electrification. Outlines a comprehensive approach to electrifying housing in low-income communities (Tan & Jung, 2021).
- Energy Equity for Renters. Documents policy developments across the country that support affordability efforts for renters and highlights best practices (ACEEE (b), 2021).
- Energy Equity Project Report 2022. Determines a national framework for comprehensively measuring and advancing energy equity (Energy Equity Project, 2022).
- Energy Justice Scorecard. Provides a scorecard to be used for evaluating existing or proposed energy policy (Initiative for Energy Justice (b), 2019).
- Equitable Beneficial Electrification for Rural Electric Cooperatives: Electrifying Residential Space and Water Heating. Examines beneficial electrification as an option for rural electric cooperatives to equitably decarbonize their grids (Yanez, Veazey, Evans, & Shepherd, 2019).
- Equitable Building Electrification: A Framework for Powering Resilient Communities. Addresses the opportunities and challenges that electrification presents for low-income communities, 70 percent of whom are renters (Miller, Chen, Hu, & Sevier, 2019).
- Equitable Electrification: Solving the Affordability Catch-22 for LMI Households that Heat with Natural Gas. Applies an affordability lens and offers emerging strategies to help LMI households electrify their homes without increasing their energy burdens (Levin, Schaaf, & Nedwick, 2022).
- IRA: Our Analysis of the Inflation Reduction Act. Analyzes the IRA from an environmental justice perspective (Chi, 2022).
- Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities. Outlines the energy burdens faced by select groups in major metropolitan areas and provides strategies for alleviating high energy burdens (Dreholb & Ross, 2016).
- Los Angeles Building Decarbonization – Tenant Impact and Recommendations. Analyzes the negative impacts building decarbonization could have on the city of Los Angeles's renter population (Kirk, 2021).
- A People's History of Utilities. Highlights crucial moments of change in the energy system and role of utilities, prioritizing the work of organizers, particularly Black, Indigenous, and people of color (The Energy Democracy Project, 2021).
- The Spectrum of Community Engagement to Ownership. Charts a pathway to strengthen and transform local democracies by illustrating the pathway to community ownership (González, Rosa; Facilitating Power, 2019).
- Towards an Accessible Financing Solution: A Policy Roadmap. Provides strategies with program implementation considerations for tariffed on-bill programs in California to ensure equitable access to pollution free homes and workspaces (Building Decarbonization Coalition, 2020).
- Widespread Race and Class Disparities in Surface Urban Heat Extremes Across the United States. Examines the distribution of urban heating burden in the United States' and how that burden is distributed across income levels and racial makeup of neighborhoods (Benz & Burney, 2021).

Appendix 3: ARRA Lessons Learned

1. PROVIDE CLEAR, YET ADAPTABLE COMPLIANCE STANDARDS

The IRA must create a balance between providing flexibility and rigid adherence to program compliance standards. This should be accomplished by allowing for agencies to amend guidance documentation throughout the program's duration.

> **ARRA Lesson:** Federal agencies responsible for disbursing ARRA funding initially provided guidance documentation for several funding opportunities for applicants to adhere to and reference throughout the application process. However, some agencies did not manage to update guidance documents regularly or consistently. For example, the EPA faced multiple delays to publishing updated guidance documentation for Buy American certification requirements. A total of 40 out 54 of Buy American certifications (a requirement under the ARRA) for Clean Water State Revolving Fund projects that were awarded funding did not include sufficient information to verify that materials used were sourced within the United States (EPA OIG). These delays in publishing updated compliance standards in a timely fashion resulted in interruptions to crucial stakeholder engagement and last-minute scrambling for the agency to meet its own allocation deadlines. Funding recipients either assumed that the information they provided was applicable or did not provide sufficient evidence to justify awards if the EPA provided clear guidance.

2. ENSURE EQUITABLE DISTRIBUTION OF FUNDING TO ESJ COMMUNITIES.

Agencies that are responsible for awarding funding to ESJ impacted populations need to issue additional guidance that creates more specificity surrounding which communities are applicable to receive IRA funding. Definitions are determined by the secretary of each respective agency, and inconsistencies can lead to a lack of clarity. The IRA has carved out specific funding and instituted new language (i.e., "disadvantaged communities" and "Energy Communities") to expand the applicant pool for ESJ-specific funding, but the language needs to be further defined to specify applicable populations.

Some examples include the 10-20-30 approach (Clyburn, 2011), a variety of definitions for ESJ communities presented in the California Public Utilities Commission (CPUC) Environmental & Social Justice Action Plan (CPUC, 2022, pp. 73 - 93), and the Massachusetts definition for Environmental Justice Populations (Commonwealth of Massachusetts, 2022). Clarified definitions should consider guidance on inclusive language, ensuring that chosen terms are not stigmatizing to the populations they seek to describe. This includes replacing the term "disadvantaged" with "disproportionately impacted" (DC FPI, 2017). Definitions should also include elements of intersectionality, noting that "all forms of inequality are mutually reinforcing," meaning that language should address multiple socioeconomic factors at once rather than focusing solely on income, race, gender, or sexual identity (CIJ, 2017).

A more detailed discussion of definitions can be found in the ESJ Communities Terminology and Definition section of Appendix 2: Equity.

> **ARRA Lesson:** The ARRA made minimal references to equity, or ESJ-related projects or programming. The only ESJ topics the ARRA mentions are related to specific funding areas that should primarily focus on supporting low-income individuals and communities.
>
> Even then, after a thorough evaluation process of ARRA funds years after the fact, it was discovered that many funds were distributed to unintended recipients. For example, the Department of Energy's (DOE) Weatherization Assistance Program (WAP), was initially intended to provide weatherization upgrades for low-income households. The WAP defined eligible households at 150 percent of the federal poverty level (FPL). After conducting an external evaluation, the DOE realized that the formula used to distribute WAP funding unintentionally provided funds to higher-income households with fewer vulnerable individuals in residence. These homes were smaller and newer, discounting the original purpose of the WAP (Tonn, et al., 2015). These distributions unintentionally decreased the impact of the program to low-income households who were the intended recipients of much needed weatherization improvements.

3. DESIGN FOR OVERSIGHT AND AWARDEE/APPLICANT ACCOUNTABILITY

Federal agencies managing IRA funds must ensure that funded awardees and applicants are held accountable to the conditions set forth in the law, by tracking metrics and establishing regular check-ins with agency representatives to update and monitor progress. Where applicable, all contracts or granting agreements should include provisions for termination and/or opportunities to absorb funding at any instance of non-compliance by the applicant/awardee.

> **ARRA Lesson:** While the ARRA set up some accountability mechanisms related to project funding, its public-facing website provided only minimal project updates. On occasion, state and federal agencies awarded funding to projects that were only tangentially related to the initial funding opportunity, or funded projects that failed after receiving substantial funds without any reports of success. This led to significant criticisms from opponents of the ARRA and demands for enhanced accountability measures for future awardees/applicants of any federal funding program. For example, some states were using ARRA funding to carry out reforms related to standards and assessments in their respective academic institutions rather than using the funding to improve educator evaluation processes and support low-performing schools, as was initially intended by the ARRA (Roder & Elliott, 2013).

4. CREATE A BALANCED MEDIA STRATEGY

Implementers of the IRA should create a public relations/media strategy to highlight not only the benefits of such a large investment into both the nation's infrastructure and measures combatting climate change, but also tangible project/programming successes over the long-term as programs will potentially extend into several administrations. The most successful method to convey the importance of the IRA is to show the direct benefits that will change the lives of Americans for the better, both economically and environmentally (e.g., Joe Smith saved $X from installing a heat pump in their home using a rebate from the

HOMES program). Additionally, a retrospective analysis of how much money the IRA's programming saved Americans and GHG emission reductions over a multiyear arc will illustrate the long-term effectiveness of the IRA. Finally, implementers must be required to develop a process to ensure the results are publicly available without needing agency intervention (e.g., requesting submission to the agency and an additional separate, independent, public-facing website).

> **ARRA Lesson:** Most media stories related to the ARRA (during and after its implementation) were negative and hyper focused on project failures (e.g., Solyndra received $570 million in taxpayer funds only to declare bankruptcy after 2.5 years). Any press releases promoting the IRA should contain a mixture of positive messaging and critical examination. Primarily, narratives should center on the direct economic and environmental impacts to American households/families from IRA funding (e.g., lower utility bills from installing an electric heat pump or money saved from using tax credits to purchase an EV). The IRA is not the final piece of legislation to help combat climate change and funding is anticipated to outlast the current administration (Bernstein, 2014). It will take time to see all the results, both positive and negative, of this large scale.

5. ALLOW FOR REASONABLE PROJECT TIMELINES

While timeliness is a priority for any project receiving significant federal funding, timelines for projects/programs should have room for flexibility and not be so aggressive that applicants cannot adhere to them, particularly when considering a lack of sufficient resources at several eligible entities. It will take time for federal and state agencies to conduct the necessary stakeholder engagement to ensure who will receive the most direct and indirect benefits from a funding opportunity and assure that funds will be distributed in an equitable manner. There are funding areas under the IRA that will be available over several years. Federal agencies should encourage eligible applicants to apply for funding while also cautioning applicants in applying if a project/program does not meet the criteria of a "shovel-ready" project/program.

> **ARRA Lesson:** There were instances during the implementation of the ARRA where federal agencies expressed concern that state agencies handling much of the direct funding of project/programs would miss the ARRA's initial obligation and spending deadlines. Under the ARRA, agencies were allocated lump sums of funds to distribute to potential applicants then developed their own implementation plans to prioritize projects that could be completed within two years of ARRA passage.[21] In its own evaluation, the U.S. Government Accountability Office (U.S. GAO) specifically mentioned The United States Department of Housing and Urban Development (HUD) and the Treasury Department's need to strengthen accountability by developing plans to act if both deadlines passed without outlaying all ARRA funding allocations (U.S. GAO, 2010).

21 Statement of the Honorable Randolph Babbitt, Administrator, Federal Aviation Administration, (Implementation of the American Recovery and Reinvestment Act, 2009)

6. SECURE SUFFICIENT STAFFING

To prepare for staffing limitations, federal, state, and local agencies likely to be managing IRA funds should make certain that they have enough staff on hand (or hire to fill open and/or create new positions) before fully overlaying IRA funding.

> **ARRA Lesson:** The ARRA experienced staffing limitations in several key government agencies (federal, state, and local) which impacted appropriately managing allocated funds. Many federal agencies evaluating post-ARRA mentioned that a lack of staff to assist in implementation was a key barrier (U.S. GAO, 2010).

COMPARISON OF PROGRAMMING FUNDED BY THE ARRA AND IRA

Table 4: Funding Comparison between ARRA and IRA

Funding Title (IRA)	Funding Title (ARRA)	Funded Value in Billions (IRA)	Funded Value in Billions (ARRA)	Agency (IRA)	Agency (ARRA)	Purpose
Clean Energy Loan Guarantee	N/A	$43.6	N/A	DOE	N/A	Loans for projects
Greenhouse Gas Reduction Fund	N/A	$27.0	N/A	EPA	N/A	Project + Financing Green Banks (for Project), Planning + Program Development
Qualifying Advanced Energy Project Credit	Same as IRA	$10	$2.3	IRS / DOE	IRS / DOE	Tax credits for advanced energy projects
Climate Pollution Reduction Grants	N/A	$5.0	N/A	EPA	N/A	Planning + Program Development
Whole Home Efficiency Retrofit Rebates	Assisted Housing Stability and Energy and Green Retrofit Investments	$4.3	$2.25	DOE	HUD	Residential Projects Project-Based Rental Assistance + Grants and Loans for Energy Retrofits/Green Investments
Electrification Rebates	N/A	$4.5	N/A	DOE	N/A	Residential Projects
Environmental and Climate Justice Block Grants	Energy Efficiency and Conservation Block Grants	$3.0	$3.2	EPA	EPA	Planning + Program Development
Efficient Building Code Adoption Grants	N/A	$1.0	N/A	DOE	N/A	Building Code Adoption

Funding Title (IRA)	Funding Title (ARRA)	Funded Value in Billions (IRA)	Funded Value in Billions (ARRA)	Agency (IRA)	Agency (ARRA)	Purpose
Affordable Housing Resilience and Efficiency Investments	Assisted Housing Stability and Energy and Green Retrofit Investments	$1.0	$2.25	HUD	HUD	Loan-Cost Reductions Project-Based Rental Assistance + Grants and Loans for Energy Retrofits/Green Investments
Energy Efficiency in Government Buildings	Same as IRA	N/A	$5.5	N/A	GSA	Convert General Services Administration (GSA) Facilities to High-Performance Green Buildings
Weatherization Assistance Program (WAP)	Same as IRA	N/A	$5.0	DOE	DOE	Fund to Support the Most Cost-Effectiveness Efficiency Activities + Insulation for Low-Income Homes
Enhanced Use of the Defense Production Act of 1950 (DPA)	N/A	$.5	N/A	DOE	N/A	Accelerate Domestic Production of Key Technologies
Contractor Training	N/A	$0.2	N/A	DOE	N/A	Train contractors in advanced technologies
Total	–	**$99.6**	**$18.1**	–	–	–

Appendix 4: Recommendation Evaluation Matrix

The below matrix represents a variety of recommendations that the authors considered, the target entity for implementing the recommendation, and each recommendations' potential impact in achieving a variety of relevant goals. This evaluation matrix was utilized by the team in considering the final recommendations outlined in the main paper.

Table 5. Recommendation Evaluation Matrix

Recommendation	Target Entities	Maximize Distributional Equity	Minimize Implementation Complexity	Maximize Procedural Equity	Maximize Pollution Mitigation Potential	Minimize Legal Barriers to Adoption	Minimize Political Barriers to Adoption
Coordinate sales tax exemption	SEOs	**High**	**High**	**Medium**	**Low**	**High**	**High**
Provide clarity regarding the landscape of federal incentives	DOE	**Medium**	**High**	**High**	**Low**	**High**	**High**
Establish technical assistance hubs	DOE and Philanthropy	**High**	**Medium**	**High**	**Low**	**High**	**High**
Provide a model program design for rebates	DOE/EPA	**Medium**	**High**	**Medium**	**Low**	**High**	**High**
Partner with local community based organizations (CBOs)	Philanthropy	**Medium**	**Medium**	**High**	**Low**	**High**	**High**
Support administration of implementation by funding and coordinating staffing	Philanthropy	**High**	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**
Drive demand in states less likely to participate	Philanthropy	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**
Facilitate planning with model policies	DOE	**Medium**	**Medium**	**Medium**	**High**	**Medium**	**Medium**
Collect input on program ideas and share program design early	SEOs	**Medium**	**Medium**	**Medium**	**Low**	**High**	**High**
Build on existing initiatives where possible	DOE or SEOs	**High**	**Medium**	**Medium**	**Low**	**Medium**	**Medium**
Encourage market and state competition	DOE	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**	**High**
Establish data hubs to enable market transformation	SEOs	**Medium**	**Low**	**Medium**	**High**	**High**	**Medium**
Build market actor awareness via technology giveaways	SEOs	**Medium**	**Medium**	**Medium**	**Low**	**Medium**	**High**

References

ACEEE (a). (2020). Energy Burden Report: Low-Income, Black, Hispanic, and Native American Households Face High Energy Burdens. Retrieved 2022, from https://www.aceee.org/energy-burden

ACEEE (b). (2021, August 2). Energy Equity for Renters. Retrieved 2023, from https://www.google.com/search?q=Energy+Equity+for+Renters&rlz=1C1GCEA_enUS1014US1014&oq=Energy+Equity+-for+Renters&aqs=chrome..69i57j0i390l3j69i64j69i60.696j0j15&sourceid=chrome&ie=UTF-8

AECOM. (2022). Cities Advancing Climate Action: Leveraging Funds for Local Impact. Washington D.C.: The U.S. Conference of Mayors and the Center for Climate and Energy Solutions (C2ES). Retrieved December 2022, from https://www.c2es.org/wp-content/uploads/2022/01/cities-advancing-climate-cation-leveraging-federal-funds-for-impact.pdf

American Lung Association (a). (2022, November 17). Disparities in the Impact of Air Pollution. Retrieved December 2022, from American Lung Association: https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities

American Lung Association (b). (2022, April 21). New Report: Denver, Fort Collins Named Among the Most Polluted Cities. Retrieved from American Lung Association: https://www.lung.org/media/press-releases/sota-co-fy22

Americorps. (2020, January 13). Education Award FAQs. Retrieved December 2022, from https://www.americorps.gov/members-volunteers/education-award-faqs

Benz, S., & Burney, J. (2021, July). Widespread Race and Class Disparities in Surface Urban Heat Extremes Across the United States. Earth's Future, 9(7). doi:https://doi.org/10.1029/2021EF002016

Bernstein, J. (2014, February 14). Lessons From the Recovery Act. The New York Times. Retrieved December 2022, from https://archive.nytimes.com/economix.blogs.nytimes.com/2014/02/24/lessons-from-the-recovery-act/?searchResultPosition=1

Boddupalli, A., Airi, N., Gordon, T., & Greene, S. (2021). Lessons from the American Recovery and Reinvestment Act for an Inclusive Recovery from the Pandemic. Washington, D.C.: Urban Institute. Retrieved December 2022, from https://www.urban.org/sites/default/files/publication/105113/lessons-from-arra-for-an-inclusive-recovery-from-the-pandemic.pdf

Brooks, J., Davis, M. D., Hamann, J., Hess, K., & Lamptey, N.-L. (2022). The EPA Met 2018 Water Security Requirements but Needs to Improve Oversight to Support Water System Compliance. U.S. Environmental Protection Agency, Office of the Inspector General. Washington, D.C.: U.S. Environmental Protection Agency. Retrieved December 2022, from https://www.epa.gov/system/files/documents/2022-12/_epaoig_20221208-23-N-0003_REPORT.pdf

Brown, A. (2017). Emergent Strategy. Edinburgh, Scotland: AK Press.

Building Decarbonization Coalition. (2020). Towards an Accessible Financing Solution: A Policy Roadmap. Building Decarbonization Coalition. Retrieved from https://buildingdecarb.org/resource/towards-an-accessible-financing-solution-a-policy-roadmap

Bullard, R. D. (1993). The Threat of Environmental Racism. Natural Resources & Environment, 7(3), 23-56. Retrieved January 2023, from https://www.jstor.org/stable/40923229

Chi, S. (2022). IRA: Our Analysis of the Inflation Reduction Act . Just Solutions Collective. doi:https://assets-global.website-files.com/5fd7d64c5a8c62dc083d7a25/63232854dd4d104128f01b8c_JSC%20-%20Analysis%20of%20the%20Inflation%20Reduction%20Act%20-r3.pdf

CIJ. (2017, July 27). What is intersectionality. Retrieved December 2022, from Center for Intersectional Justice e.V: https://www.intersectionaljustice.org/what-is-intersectionality

Clean Energy Transition Institute. (2022, September 7). Community-Defined Decarbonization. Retrieved 2023, from https://www.cleanenergytransition.org/projects/rural-and-tribal-community-decarbonization/community-defined-decarbonization

Climate Justice Alliance. (2022, August 6). The Inflation Reduction Act is Not a Climate Justice Bill. Retrieved December 2022, from Climate Justice Alliance: https://climatejusticealliance.org/the-inflation-reduction-act-is-not-a-climate-justice-bill/

Clyburn, J. (2011, 15 June). 10|20|30 Persistent Poverty Formula. Retrieved December 2022, from https://clyburn.house.gov/10-20-30-amendment

CO Dept. of Public Health & Environment. (2022). What is Environmental Justice? Retrieved December 2022, from Colorado Department of Public Health & Environment: https://cdphe.colorado.gov/environmental-justice

Commonwealth of Massachusetts. (2022). Environmental Justice Populations in Massachusetts. Retrieved December 2022, from https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts

CPUC. (2022). Environmental and Social Justice Action Plan. San Francisco, CA: California Public Utilities Commission. Retrieved December 2022, from https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/news-and-outreach/documents/news-office/key-issues/esj/esj-action-plan-v2jw.pdf

DC FPI. (2017). DCFPI Style Guide for Inclusive Language. DC Fiscal Policy Institute. Washington, D.C.: DC Fiscal Policy Institute. Retrieved from https://www.dcfpi.org/wp-content/uploads/2017/12/Style-Guide-for-Inclusive-Language_Dec-2017.pdf

DeSilver, D. (2021, August 2). As national eviction ban expires, a look at who rents and who owns in the U.S. Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2021/08/02/as-national-eviction-ban-expires-a-look-at-who-rents-and-who-owns-in-the-u-s/

DOE Advanced Grid Research. (2020, July 13). AMI in Review: Informing the Conversation. Washington D.C.: U.S. Department of Energy: Office of Electricity. Retrieved December 2022, from AMI in Review: Informing the Conversation: https://www.smartgrid.gov/files/documents/AMI_Report_7_8_20_final_compressed.pdf

DOE EEERE. (2022). State and Local Solution Center. Retrieved Deember 2022, from U.S. Department of Energy Energy Energy Efficiency & Renewable Energy: https://www.energy.gov/eere/slsc/state-and-local-solution-center

DOE: Office of Economic Impact and Diversity. (2022, June 4). Justice40 Initiative. Retrieved December 2022, from https://www.energy.gov/diversity/justice40-initiative

Dreholb, A., & Ross, L. (2016). Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities. Washington, D.C.: ACEEE. Retrieved from https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf

Energy Equity Project. (2022). Energy Equity Framework: Combining data and qualitative approaches to ensure equity in the energy transition. Ann Arbor, MI: University of Michigan - School for Environment and Sustainability (SEAS). Retrieved December 2022, from https://energyequityproject.com/wp-content/uploads/2022/08/220174_EEP_Report_8302022.pdf

EPA (a). (2022, September). Learn About Environmental Justice. Retrieved December 5, 2022, from https://www.epa.gov/environmentaljustice/learn-about-environmental-justice

EPA (b). (2022, August 5). Sources of Greenhouse Gas Emissions. Retrieved 2022, from Environmental Protection Agency: https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

European Parliament . (2019, November 29). The European Parliament declares climate emergency. Retrieved December 2022, from European Parliament Press Room: https://www.europarl.europa.eu/news/en/press-room/20191121IPR67110/the-european-parliament-declares-climate-emergency

FL Dept. of Revenue. (2022). Fla. Dept. of Revenue, 2022 ENERGY STAR Appliances Sales Tax Exemption Period FAQs. Retrieved December 2022, from https://floridarevenue.com/ENERGYSTAR/Documents/2022/Energy-Efficient%20Appliances%20Sales%20Tax%20Exemption%20Period%20-%20External%20FAQs%20-%20Consumers.pdf

Forte, T. (2022, January 20). Emergent Strategy: Organizing for Social Justice. Retrieved December 2022, from Forte Labs: https://fortelabs.com/blog/emergent-strategy-organizing-for-social-justice/

Francis, M. (2021, August 3). U.S. energy intensity has dropped by half since 1983, varying greatly by state. Retrieved December 2022, from U.S. Energy Information Administration (EIA): Today in Energy: https://www.eia.gov/todayinenergy/detail.php?id=48976

Friedrich, J., Ge, M., & Tankou, A. (2017, August 10). 8 Charts to Understand US State Greenhouse Gas Emissions. World Resources Institute. Retrieved January 2023, from https://www.wri.org/insights/8-charts-understand-us-state-greenhouse-gas-emissions

FTA. (2022, December 6). Federal Transit Administration-Sponsored Technical Assistance Centers. Retrieved December 2022, from https://www.transit.dot.gov/funding/grants/fta-sponsored-technical-assistance-centers

Goldsmith, L., & Bell, M. L. (2022, January 1). Queering Environmental Justice: Unequal Environmental Health Burden on the LGBTQ+ Community. 112(1), 79-87. doi:https://doi.org/10.2105/AJPH.2021.306406

González, Rosa; Facilitating Power. (2019). The Spectrum of Community Engagement to Ownership. Oakland, CA: Movement Strategy Center. Retrieved from https://movementstrategy.org/wp-content/uploads/2021/08/The-Spectrum-of-Community-Engagement-to-Ownership.pdf

Hardman, S., Fleming, K. L., Khare, E., & Ramadan, M. M. (2021, August 30). A perspective on equity in the transition to electric vehicles. Retrieved December 2022, from Science Policy Review: https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/

Holland, N. (2022, November 30). Will the Inflation Reduction Act Increase Equitable Access to Green Housing? Retrieved December 2022, from https://housingmatters.urban.org/articles/will-inflation-reduction-act-increase-equitable-access-green-housing

IEN. (2022, August 4). The Inflation Reduction Act of 2022 is Not a Climate bill. Retrieved January 2023, from Indigenous Environmental Network: https://www.ienearth.org/the-inflation-reduction-act-of-2022-is-not-a-climate-bill/

Implementation of the American Recovery and Reinvestment Act, Before the Committee on Transportation and Infrastructure, 111th Cong. (The Honorable Randolph Babbitt, Administrator, Federal Aviation Administration June 25, 2009). Retrieved December 2022, from https://www.transportation.gov/testimony/implementation-american-recovery-and-reinvestment-act-2009

Initiative for Energy Justice (b). (2019). Energy Justice Scorecard. Initiative for Energy Justice. Retrieved from https://iejusa.org/scorecard/

Initiative for Energy Justice. (n.d.). Initiative for Energy Justice Home Page. Retrieved December 5, 2022, from https://iejusa.org/

Inslee, J. (2019, May 9). A Call to Action for a Climate Conservation Corps. Retrieved December 2022, from https://www.jayinslee.com/issues/climate-corp#

Jenkins, Mayfield, Farbes, Jones, Patankar, Xu, & Schivley. (2022, August). Preliminary Report: The Climate and Energy Impacts of the Inflation Reduction Act of 2022 ," REPEAT Project, Princeton, NJ, DOI: 10.5281/zenodo.6992940". Retrieved 2022, from https://repeatproject.org/docs/REPEAT_IRA_Prelminary_Report_2022-08-12.pdf

Just Solutions Collective. (2022 page 40, November 21). States are in the Driver's Seat: How the IRA can Pave the Way to Greater Energy Equity. Retrieved December 2022, from https://pubs.naruc.org/pub/1620C742-1866-DAAC-99FB-F9C57BE494C0?_gl=1*12rhk8g*_ga*MTY2MDYxMzE0Ni4xNjY5OTM-wOTM5*_ga_QLH1N3Q1NF*MTY2OTkzMDkzOC4xLjAuMTY2OTkzMDk0MS4wLjAuMA

Kania, J., Williams, J., Schmitz, P., Brady, S., Kramer, M., & Splansky Juster, J. (2022, December 21). Centering Equity in Collective Impact. Stanford Social Innovation Review. doi:10.48558/rn5m-ca77

Kenney, M., Janusch, N., Neumann, I., & Jaske, M. (2021). California Building Decarbonization Assessment. CEC - Energy Efficiency Division. CEC. Retrieved January 2023, from https://www.energy.ca.gov/publications/2021/california-building-decarbonization-assessment

Kirk, C. (2021). Los Angeles Building Decarbonization: Tenant Impact and Recommendations. Strategic Actions for a Just Economy (SAJE). Los Angeles, CA: Strategic Actions for a Just Economy (SAJE). Retrieved December 2022, from https://www.saje.net/wp-content/uploads/2021/12/LA-Building-Decarb_Tenant-Impact-and-Recommendations_SAJE_December-2021-1.pdf

Levin, E., Schaaf, B., & Nedwick, T. (2022). Equitable Electrification: Solving the Affordability Catch-22 for LMI Households that Heat with Natural Gas. Winooski, VT: VEIC. Retrieved from https://www.veic.org/Media/Default/documents/resources/reports/Equitable%20Electrification%20-%20Solving%20the%20Affordability%20Catch-11%20for%20LMI%20Households%20that%20Heat%20with%20Natural%20Gas.pdf

Miller, C., Chen, S., Hu, L., & Sevier, I. (2019). Equitable Building Electrification: A Framework for Powering Resilient Communities. The Greenlining Institute. Oakland, CA: The Greenlining Institute . Retrieved from https://greenlining.org/wp-content/uploads/2019/10/Greenlining_EquitableElectrification_Report_2019_WEB.pdf

Nadel, S., & Fadali, L. (2022). Analysis of Electric and Gas Decarbonization Options for Homes and Apartments. Washington, DC: ACEEE. Retrieved from https://www.aceee.org/research-report/b2205

Northeast Energy Efficiency Partnerships. (2022). Ready, Set, Scale. A NEEP Series: Preparing for IRA Funding. Retrieved December 2022, from https://www.youtube.com/watch?v=hvzs_L8Yvjw

PACE. (2022). Partners Advancing Climate Equity. Retrieved December 2022, from Partners Advancing Climate Equity: https://partnersadvancingclimateequity.org/team/

Pantano, S., Malinowski, M., Gard-Murray, A., & Adams, N. (2021). 3H 'Hybrid Heat Homes' An Incentive Program to Electrify Space Heating and Reduce Energy Bills in American Homes. CLASP. Retrieved January 2023, from https://www.clasp.ngo/research/all/3h-hybrid-heat-homes-an-incentive-program-to-electrify-space-heating-and-reduce-energy-bills-in-american-homes/

Rewiring America. (2022). Frictionless Income Verification Methods for the Electrification Rebates. Retrieved January 2023, from https://assets.ctfassets.net/v4qx5q5o44nj/3cTqhWhFztiUWShtyztwe/10bfe13a145683d7a8f3e913b41ebd0e/Electrification_Rebates_Income_Verification_Memo.pdf

RFF. (2022, September 7). What Is an "Energy Community"? Retrieved from Resources for the Future: https://www.resources.org/common-resources/what-is-an-energy-community/

Roder, A., & Elliott, M. (2013). Stimulating Opportunity: An Evaluation of ARRA-Funding Subsidized Employment Programs. New York, NY: Economic Mobility Corporation. Retrieved from https://www.rockefellerfoundation.org/wp-content/uploads/stimulating-opportunity-full-report.pdf

Shea, R., & Mendell, R. (2021, October 14). Congress Cannot Ignore Residential Solar Tax Credit Inequities. Retrieved December 2022, from https://rmi.org/congress-cannot-ignore-residential-solar-tax-credit-inequities/

Spivak, R., & O'Grady, M. (2022, November 7). Biden Administration Flouts Climate Goals With Inflation Reduction Act's First Onshore Oil, Gas Lease Sales. Retrieved December 2022, from https://biologicaldiversity.org/w/news/press-releases/biden-administration-flouts-climate-goals-with-inflation-reduction-acts-first-onshore-oil-gas-lease-sales-2022-11-07/

State of California, E. D. (n.d.).

Subramanian, S., Berg, W., Cooper, E., Waite, M., Jennings, B., Hoffmeister, A., & Fadie, B. (2022). 2022 State Energy Efficiency Scorecard. Washington, D.C.: American Council for an Energy-Efficient Economy (ACEEE). Retrieved from https://www.aceee.org/research-report/u2206

Sunter, D. A., Castellanos, S., & Kammen, D. M. (2019, January 10). Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity. Nature Sustainability. doi:https://doi.org/10.1038/s41893-018-0204-z

Tan, Y., & Jung, B. (2021). Decarbonizing Homes: Improving Health in Low-Income Communities through Beneficial Electrification. Rocky Mountain Institute (RMI). Retrieved from https://rmi.org/insight/decarbonizing-homes/

The City of San Diego. (2022). Climate Equity and Jobs. Retrieved December 2022, from https://www.sandiego.gov/climateequity

The Energy Democracy Project. (2021). A People's History of Utilities. Washington, D.C.: Emerald Cities Collaborative. Retrieved from https://emeraldcities.org/wp-content/uploads/2021/11/FINAL-Peoples-History-of-Utilities-1.pdf

The Massachusetts Executive Office of Energy and Environmental Affairs. (2020). Massachusetts Decarbonization Roadmap. Retrieved January 2023, from https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download

The White House (a). (2022, August 15). By the Numbers: The Inflation Reduction Act. Retrieved December 2022, from Briefing Room: https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/15/by-the-numbers-the-inflation-reduction-act/

The White House (b). (2022, August 19). Fact Sheet: The Inflation Reduction Act Supports Workers and Families. Retrieved December 2022, from Briefing Room: https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/

Tonn, B., Carroll, D., Rose, E., Hawkins, B., Pigg, S., Bausch, D., . . . Conlon, B. (2015). Weatherization Works II - Summary of Findings From the ARRA Period Evaluation of the U.S. Department of Energy's Weatherization Program. Oak Ridge, TN: U.S. Department of Energy. Retrieved December 2022, from https://www.energy.gov/sites/prod/files/2015/09/f26/weatherization-works-II-ARRA-period-eval.pdf

U.S. Census Bureau (b). (2021). American Housing Survey (AHS). Retrieved January 2023, from https://www.census.gov/programs-surveys/ahs.html

U.S. Census Bureau. (2021). DP04: Selected Housing Characteristics. Retrieved December 2022, from https://data.census.gov/table?tid=ACSDP1Y2021.DP04

U.S. GAO. (2010). Recorvery Act - Opportunities to Improve Management and Strengthen Accountability over States' and Localities' Use of Funds. Washington, D.C.: U.S. Government Accountability Office (GAO). Retrieved from https://www.gao.gov/assets/gao-10-999.pdf

U.S. Senate Committee EPW. (2022, July 28). Climate and Equity Investments in the Jurisdiction of the Environment and Public Works Committee (EPW) in the Inflation Reduction Act. Retrieved December 2022, from https://www.epw.senate.gov/public/_cache/files/2/6/26af3ca8-07f3-41ed-af31-ef0373c-cc1b7/5CCB7EB412908BDFAB25C76463BDC27D.climate-and-equity-investments-in-the-inflation-reduction-act-5-.pdf

United States. Recovery Accountability and Transparency Board. (n.d.). Inspector General Findings. Retrieved December 2022, from https://web.archive.org/web/20090917030120/http://www.recovery.gov/?q=content/ig-reports

Vogels, E. A. (2021). Digital divide persists even as Americans with lower incomes make gains in tech adoption. Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption/

Yanez, M., Veazey, L., Evans, R., & Shepherd, N. (2019). Equitable Beneficial Electrification (EBE) for Rural Electric Cooperatives. Environmental and Energy Study Institute. Retrieved from https://www.eesi.org/files/REPORT-Equitable-Beneficial-Electrification-for-Rural-Electric-Cooperatives.pdf

York, D., Bastian, H., Relf, G., & Amann, J. (2017, December 13). Transforming Energy Efficiency Markets: Lessons Learned and Next Steps. Retrieved 2022, from https://www.aceee.org/sites/default/files/publications/researchreports/u1715.pdf

York, D., Cohn, C., Morales, D., & Tolentino, C. (2022). Building Decarbonization Solutions for the Affordable Housing Sector. Washington D.C.: American Council for an Energy-Efficient Economy. Retrieved from https://www.aceee.org/research-report/u2204