

Essentials for Sustainable Housing & Development

David Hodgins (LA-BBC), Jake Tisinger (Association for Energy Affordability), & Alex Turek (GRID Alternatives)

October 27, 2023

California Community Colleges Real Estate Education Center Conference

Context: National Energy Transition

The Inflation Reduction Act (IRA) directs nearly \$400 billion in federal funding to clean energy with the goal of substantially lowering the nation's carbon emissions by 2030.

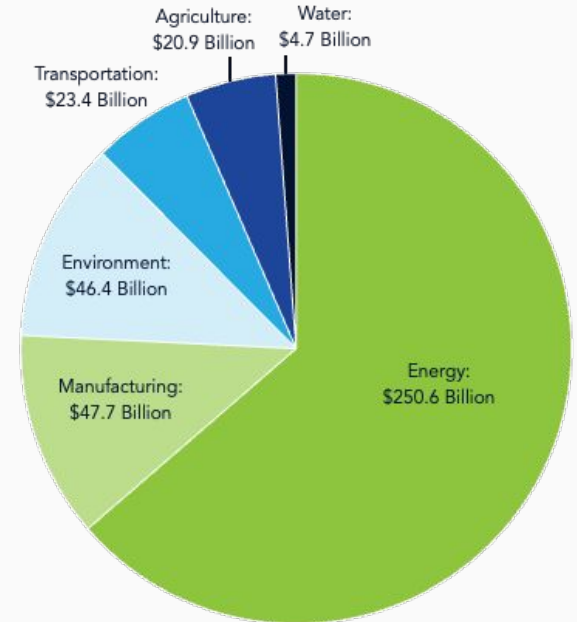
- Funds will come through a mix of:
- Tax Incentives
- Grants
- Loan Guarantees



Context: National Energy Transition

The Inflation Reduction Act (IRA) directs nearly \$400 billion in federal funding to clean energy with the goal of substantially lowering the nation's carbon emissions by 2030.

- Funds will come through a mix of:
- Tax Incentives
- Grants
- Loan Guarantees

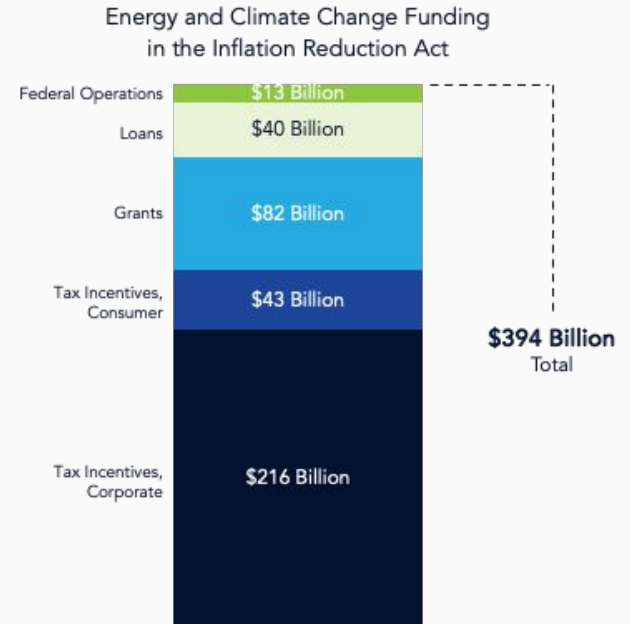


Source: [McKinsey & Co.](#)

Context: National Energy Transition

The Inflation Reduction Act (IRA) directs nearly \$400 billion in federal funding to clean energy with the goal of substantially lowering the nation's carbon emissions by 2030.

- Funds will come through a mix of:
- Tax Incentives
- Grants
- Loan Guarantees



Technology Review

Photovoltaic Solar



Battery Storage



EV Supply Equipment



Vista Ballona Multifamily Case Study



- 50 unit, all electric building
- Leveraged Building Initiative for Low-Emissions Development (BUILD) Program
- 20-kW system

Ormond Beach Multifamily Case Study



- 39-unit, veteran affordable housing
- 68 kW-dc PV solar system
- Leveraged \$175,000 in SOMAH rebates to offset full cost of system
- 88% of benefits for residents, 12% for common area
- Tenant education and workforce development opportunities

BAAEC Residential Case Study



50 homes in Avocado Heights receive full building retrofits, including:

- Solar and battery storage
- Smart electric panel upgrade
- Cool roofs
- Electrification upgrades:
 - Induction range and stove
 - Electric heat pump water heaters

Technology Overview

- Electrification measures



Do it all with electricity!

Space Heating



Cooking



Water Heating



Laundry
Pool Heating
Fireplaces



Key Technology: Heat Pumps



What is a heat pump?

A device that **moves heat** from one place to another using **refrigerant**.

Just like an air conditioner or refrigerator.

What is a heat pump?



What's so great about heat pumps?



3x more efficient than electric resistance



Can deliver heating and cooling in a single system



Wide variety of form factors for all project types



Operate efficiently in all climate zones



Heat Pumps - Individual



Ducted Heat Pump



Mini-Split Heat Pump (Ducted or Ductless)



Vertical Terminal Heat Pump (VTAC)



Packaged Terminal Heat Pump (PTHP) / Room Heat Pump



Variable
Refrigerant
Flow



Packaged Rooftop
Heat Pump



Heat Recovery Chiller

Why don't we
just use
electric heat?



Why don't we just use electric heat?



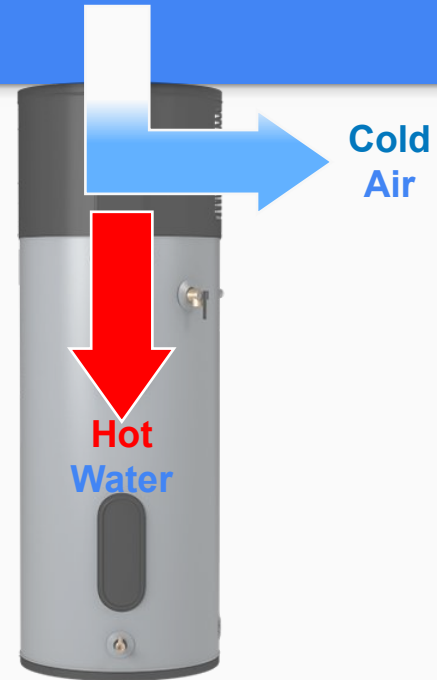
- Electric resistance heating **3x less efficient** than heat pumps.
- Much **higher heating bills** than heat pumps.
- Will incur considerable **T24 compliance penalty**. May not even comply at all.
- Should have **excellent envelope and ventilation** to reduce loads.
- Requires a separate cooling system.

Water Heating

Heat Pump Water Heaters

How do they work?

- Use refrigerant to **move heat** from the air to the water.
- Intake ambient air and **output cold air**.
- The heat from the air is used to make **hot water**.





Split Heat Pump
Water Heater

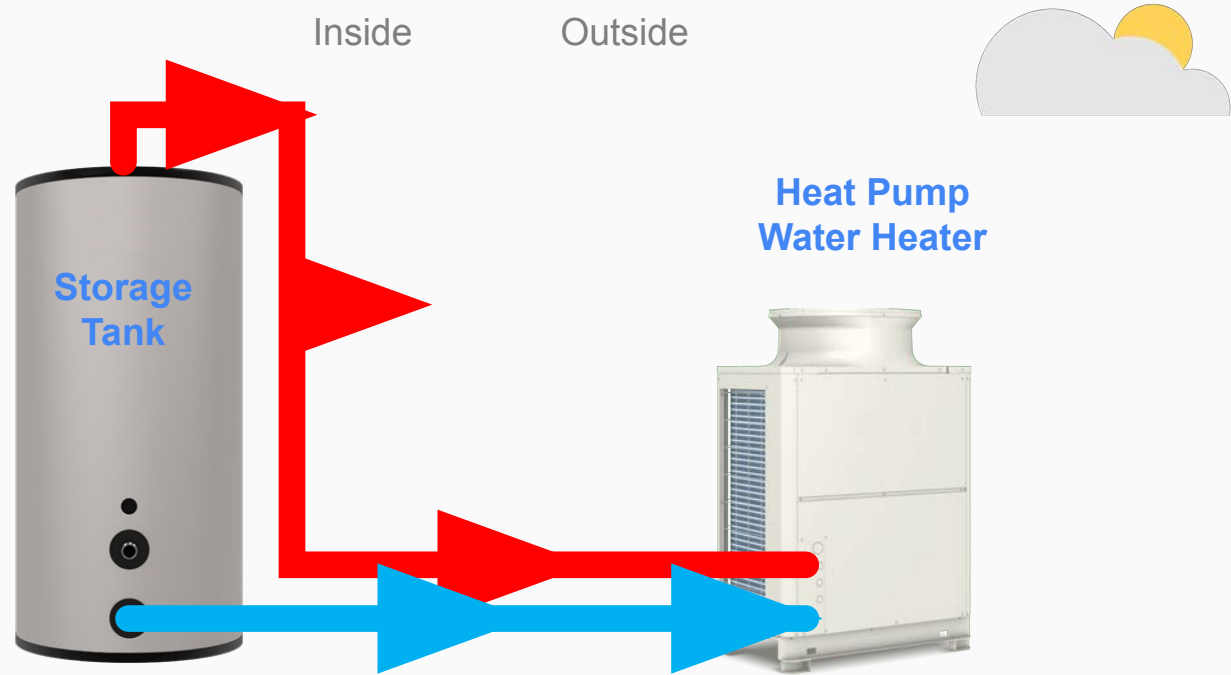


Combined Heat Pump
Water Heater



Central Heat Pump Water Heaters

Central Heat Pump Water Heating



Central HPWH Equipment Options







Image: AEA





Can we use
tankless
electric water
heaters?



Tankless Electric Water Heaters?



- **Cannot comply with Title 24** if used extensively.
- Would require **significantly larger electrical service** to serve entire apartments/building.
- Viable application: Common area sinks with very low utilization

Electric Cooking



Induction



Radiant



Resistance

What's so great about induction cooking?

- **SAFEST** Cooktop
 - Heats the pan, not the cooktop
 - Auto-shutoff
- **FASTEST** cooktop
 - Faster than gas or electric resistance
 - Boils water in ½ the time of any other
- Extremely precise heat control
- Less waste heat = less overheating
- Lots of cookware and cheap adapters



Other appliances

Residential Clothes Dryers



Electric Resistance
Dryer



Combo Washer +
Resistance Dryer

Heat Pump Pool & Spa Heaters



Electric Vehicle Charging

- EV prices are coming down with incentives, including for used EVs.
- EVs are more affordable to own and maintain long-term than gas cars.
- Low-income residents should have access to charging.
- Charging equipment available with 3rd party management.
- Plan ahead for future charging!



Battery Storage

- **Prescriptive requirement** for new multifamily buildings, along with solar PV.
- Can **improve resiliency** by powering critical systems during a power outage.
- Storage can also **reduce peak** electrical charges.
- All new projects should be built **storage-ready** for future battery installation



All-Electric Design & Technologies

- Equipment may look different and need different space allocation in an all-electric building
- **Heat pumps** are your new best friends
- There are many options for every application.
- The market is evolving quickly, so what you did last project may no longer be best practice
- Programs have TA and are here to help!



NAR Green



- NAR's GREEN Designation is designed for agents looking to learn about issues of energy efficiency and sustainability in real estate.
- Complete the course and pass exam
- Access to marketing tools, market research, listing in the online GREEN directory, industry webinars, promotional tools
- [GREEN \(nar.realtor\)](http://nar.realtor)

Incentives/Rebates

The Good News

- A lot of funds are available in California for affordable MF to incorporate electrification in their buildings. Much more \$ than most other states

The Bad News

- Large variety, each with unique rulesets (geographies, timelines, eligibility, funding, measures)



Key Considerations – New Construction

- Not a major difference in construction cost between all-electric and mixed fuel
- New Construction incentives can help make project more attractive. Review program rules to ensure it is a good fit
- Program-provided Technical Assistance and support to design team can be extremely beneficial (Architect, Engineer, Energy Code Compliance)
- After the first 1 or 2 all-electric new construction projects, the design team will have a template and comfort level to work from



Current Funding Trends

- Community Choice Aggregators (CCAs), Municipal Utilities, Investor-Owned Utilities (IOUs), State Agencies (CSD, CEC, CPUC)
 - HPWH Incentives
 - C-HPWH Incentives
 - Space Conditioning (HP HVAC)
 - Energy Efficiency
 - PV and Battery
- Federal funding – Coming 2023/24 (some via State Agencies)

Clean Energy Incentive Program Matrix for Multifamily Rental Housing

BUILDING TYPE	INCENTIVE PROGRAM NAME	MEASURES COVERED			
		Electrification	Energy Efficiency	Solar PV	Battery Storage
NEW CONSTRUCTION	Building Initiative for Low-Emissions Development (BUILD)	X	X	X	
	Energy Smart Homes (ESH)	X			
	California Energy Design Assistance (CEDA)	X			
	Zero by Design	X			
EXISTING BUILDINGS	Low-Income Weatherization Program (LIWP)	X	X	X	
	Comprehensive Affordable Multifamily Retrofit (CAMR)	X	X	X	
	Solar on Multifamily Affordable Housing (SOMAH)			X	
	TECH Clean California	X			
	Energy Smart Homes	X			
	Self-Generation Incentive Program (SGIP)				X

Existing Building Layering Examples

- Targeted Scope Example

- LIWP, TECH, or CAMR Only

- Moderate Scope Example

- LIWP+TECH or CAMR+TECH

- Comprehensive Scope Example

- LIWP+TECH+SOMAH
- Plus LIHTC where timelines align

Clean Energy Incentive Program Matrix for Multifamily Rental Housing

BUILDING TYPE	INCENTIVE PROGRAM NAME	MEASURES COVERED			
		Electrification	Energy Efficiency	Solar PV	Battery Storage
NEW CONSTRUCTION	Building Initiative for Low-Emissions Development (BUILD)	X	X	X	
	Energy Smart Homes (ESH)	X			
	California Energy Design Assistance (CEDA)	X			
	Zero by Design	X			
EXISTING BUILDINGS	Low-Income Weatherization Program (LIWP)	X	X	X	
	Comprehensive Affordable Multifamily Retrofit (CAMR)	X	X	X	
	Solar on Multifamily Affordable Housing (SOMAH)			X	
	TECH Clean California	X			
	Energy Smart Homes	X			
	Self-Generation Incentive Program (SGIP)				X

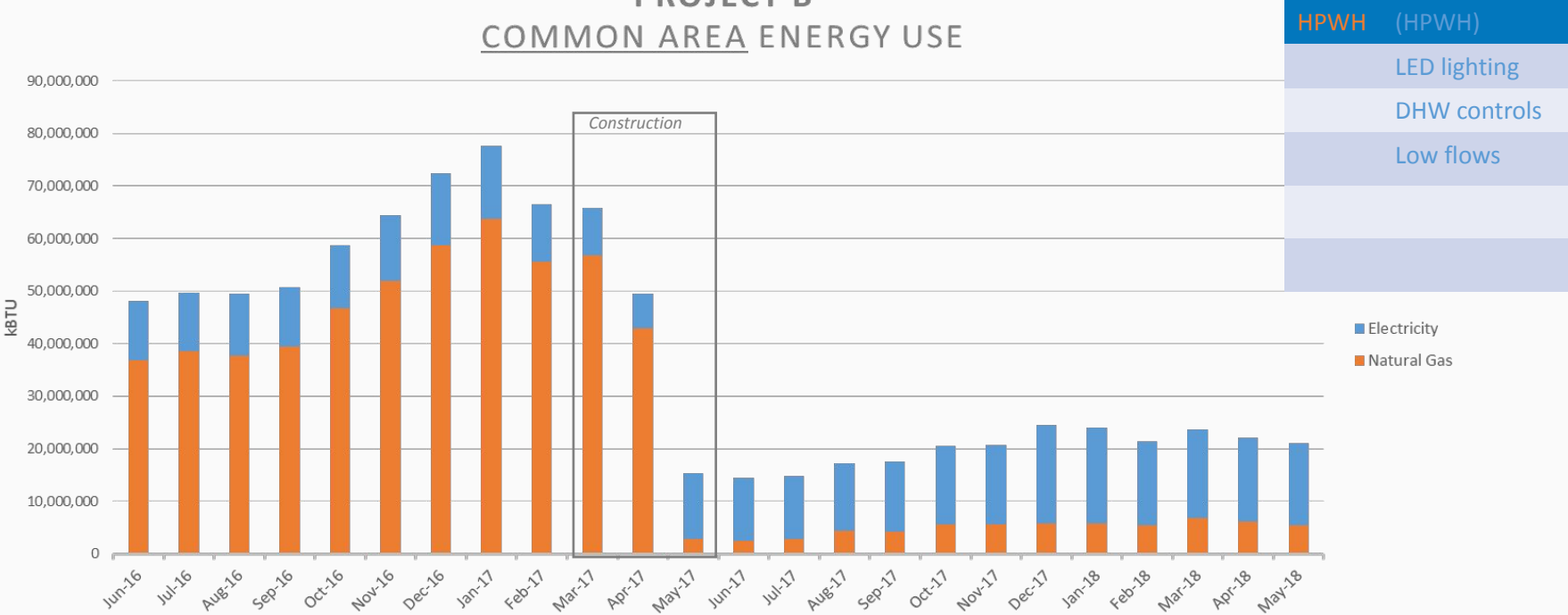
- New Construction | 66 units | 100% Affordable
- All-Electric | Completed 2018
- Owner: MidPen Housing
- Architect: David Baker Architects
- Contractor: James E. Roberts Obayashi
- Energy Consultant: AEA
- CEC EPIC grant helped support design, commissioning, and ongoing data monitoring
- Features
 - Sanden CO2 Central HPWH System
 - Ductless Mini-Split HP
 - 114kW PV system



- New Construction | 45 units | 100% Affordable
- All-Electric | Completed 2019
- Includes Trinity Center – Homeless resource center with kitchen and community showers
- Owner: Resources for Community Development
- Architect: Pyatok Architects
- Contractor: J.H. Fitzmaurice
- Energy Consultant: AEA
- Features
 - Sanden CO2 Central HPWH System
 - Ductless Mini-Split HP & PTHP
 - All-electric community kitchen



PROJECT B COMMON AREA ENERGY USE



ENERGY savings of 64% (89% gas, -33% elect)

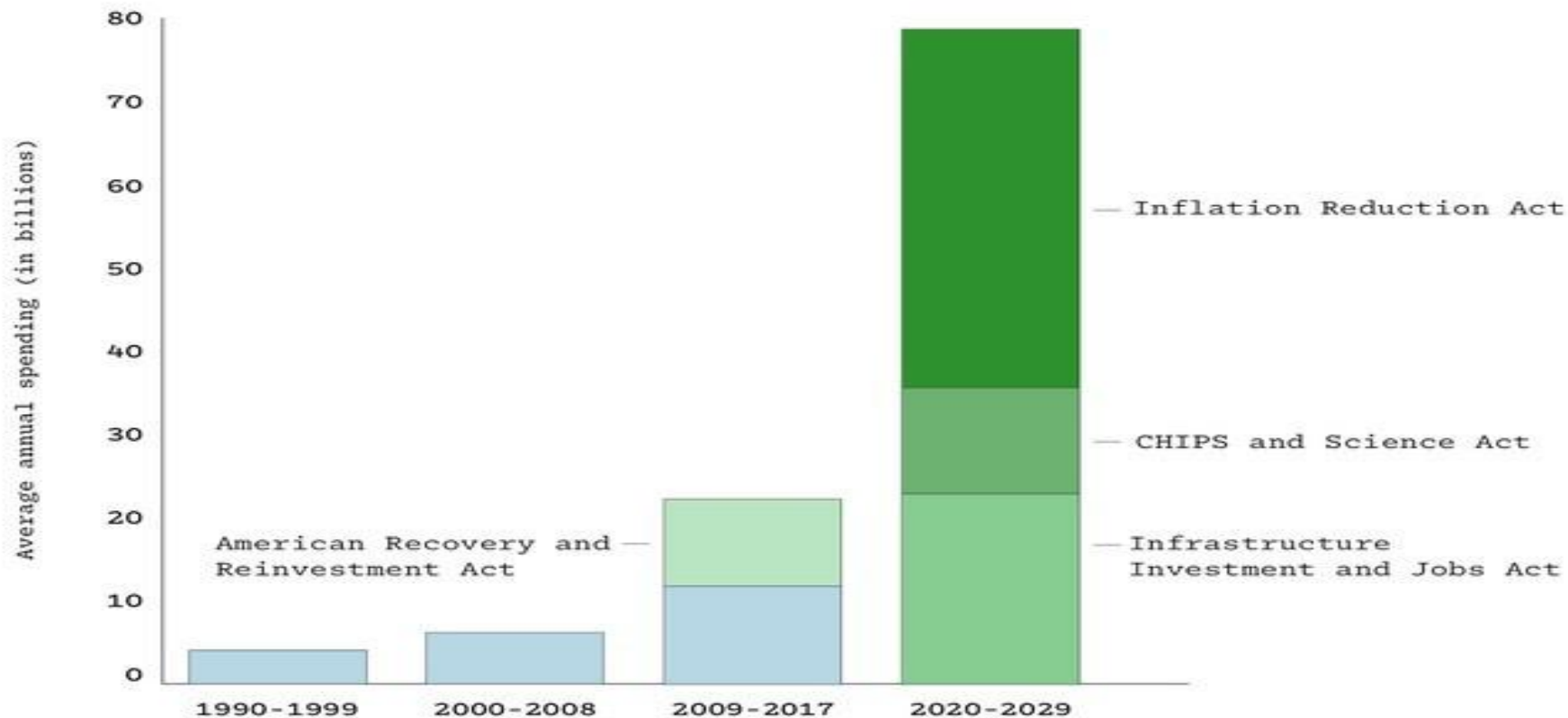
Inflation Reduction Act Overview

The Inflation Reduction Act of 2022 (IRA), signed into law on August 16, 2022, directs nearly \$400 billion in federal funding to clean energy, with the goal of substantially lowering the nation's carbon emissions by the end of this decade.

- **Goal: Upgrade, repurpose, or replace energy infrastructure.**
 - The US Department of Energy's Loan Program Office will receive roughly \$12 billion to expand its existing loan authority by tenfold and create a new loan program capped at \$250 billion to upgrade, repurpose, or replace energy infrastructure.
- **Goal: Provide incentives for consumer and private investment.**
 - Some \$43 billion in IRA tax credits aim to lower emissions by making EVs, energy-efficient appliances, rooftop solar panels, geothermal heating, and home batteries more affordable.
 - Corporations are the biggest recipient, with an estimated \$216 billion worth of tax credits. These are designed to catalyze private investment in clean energy, transport, and manufacturing.
- **Goal: Compliment and amplify.**
 - The IRA's clean-energy tax credits and product credits could catalyze and potentially amplify the \$70 billion in clean-energy technology and demonstration projects.

A \$500 Billion Investment in a Green Economy

The federal government's average annual climate spending is poised to triple this decade.



Source: RMI

Investment Tax Credit Overview

- **ITC extension at (up to) 30% for 10+ years (Section 48)**
 - Inclusion of standalone storage (>5kWh), microgrid controllers, other technologies, and interconnection costs
 - Prevailing wage and apprenticeships required for projects > 1MW AC
- **10% bonus credit for projects in “energy communities”**
 - Brownfields
 - Former fossil fuel employment, coal closure areas
- **20% bonus credit for projects providing**
 - >50% financial benefit to LMI households
 - Located within LI community or Indian Land
- **10% bonus credit for domestic procurement**

Investment Tax Credit Overview

- **Stackable up to a total of 70% (w/ 30% ITC)**
- **Direct pay for nonprofits, tribes, state and local governments, rural electric co-ops**
 - Gives access to credit by treating these entities as if they paid excess taxes in the applicable amounts to get “refund”

EPA Greenhouse Gas Reduction Fund Overview

\$27 billion investment to mobilize capital to address the climate crisis, especially in communities that have historically been left behind.

- **\$14 billion National Clean Investment Fund:** grants to national nonprofit organizations to partner with the private sector to provide accessible, affordable financing for clean technology projects across the country.
- **\$6 billion Clean Communities Investment Accelerator:** grants to national nonprofit “hubs” to deliver financial resources and technical assistance to build the climate lending capacity of community lenders working in low-income and disadvantaged communities.
- **\$7 billion Solar for All:** grants to state, local, Tribal, and territory governments to expand rooftop access to affordable, resilient, and clean solar energy in low-income, low-wealth communities.

Other EPA Funding Opportunities

- **\$3 billion for Environmental Justice Grants for community-based nonprofits**
 - Projects in disadvantaged communities
 - Community capacity building centers
 - Address disproportionate environmental and public health harms related to pollution and climate change; can include workforce development
- **\$5 billion for competitive grants to states/localities/tribes to create and implement GHG air pollution reduction plans**

DOE Funding Opportunities

- **\$4.275 billion High-Efficiency Electric Home Rebate Program**
 - Homeowner or multifamily housing owner rebate programs run through State or Tribal Energy Offices that apply (\$225m for Tribal)
 - Set amounts for service panels (\$4000), wiring (\$2500), various other appliance and non-appliance upgrades; up to a household total of \$14000)
 - Up to 100% of cost for households up to 80% AMI, affordable housing providers (or orgs working on their behalf), tribal; up to 50% for 80-150% AMI
- **\$4.3 billion Home Owner Managing Energy Systems (HOMES) Rebate Program**
 - Rebates for SF and MF energy efficiency upgrades based on energy saved

HUD Funding Opportunities

- **\$837 million Green and Resilient Retrofit Program**
 - reduce greenhouse gas emissions and improve the energy and water efficiency and climate resilience of HUD-assisted multifamily properties serving low-income residents

Other IRA Funding Opportunities

- **\$500 million** for the Defense Production Act (some of which could be used for solar manufacturing)
- **\$40 billion** in additional commitment authority for Department of Energy Loan Program Office
- **\$2 billion** in loan authority for new transmission construction in designated national interest corridors.
- **\$760 million** for the Department of Energy to issue grants to state, local or tribal entities to facilitate siting of high-voltage interstate transmission
- **\$1 billion** for rural renewable energy electrification loans and expansion of the program to include storage
- **\$1 billion** for REAP, with total grants limited to 50% of the total cost of an eligible project
- **\$9.6 billion** for loans and financing for rural co-ops to purchase renewable energy, generation, zero-emission systems, and related transmission, limited to 25% of total cost
- Incentives for build-out of electric vehicle charging networks
- Extension, expansion, and changes to electric vehicle tax credits, including a new credit for purchasing used EVs

Contact

- David Hodgins, Los Angeles Better Buildings Challenge
<https://www.la-bbc.com/>
- Jake Tisinger, Association for Energy Affordability
<https://aea.us.org/>
- Alex Turek, GRID Alternatives, aturek@gridalternatives.org
<https://gridalternatives.org/>