

## ENERGY EFFICIENCY IN CONSTRUCTION





# ABOUT HILLMANN

**Hillmann is a full service Due Diligence, Construction Risk Management, and Environmental Health & Safety Firm with over 30 years of experience.**

Currently 667 active construction projects throughout the nation, with an additional 288 to begin over the next 3 months.

Majority of construction projects are multifamily development projects - many being LIHTC, NMTC, and HTC deals.

## **Purpose**

Make a better future for all the communities we touch.

## **Values**

Integrity | People | Service | Expertise | Business Acumen

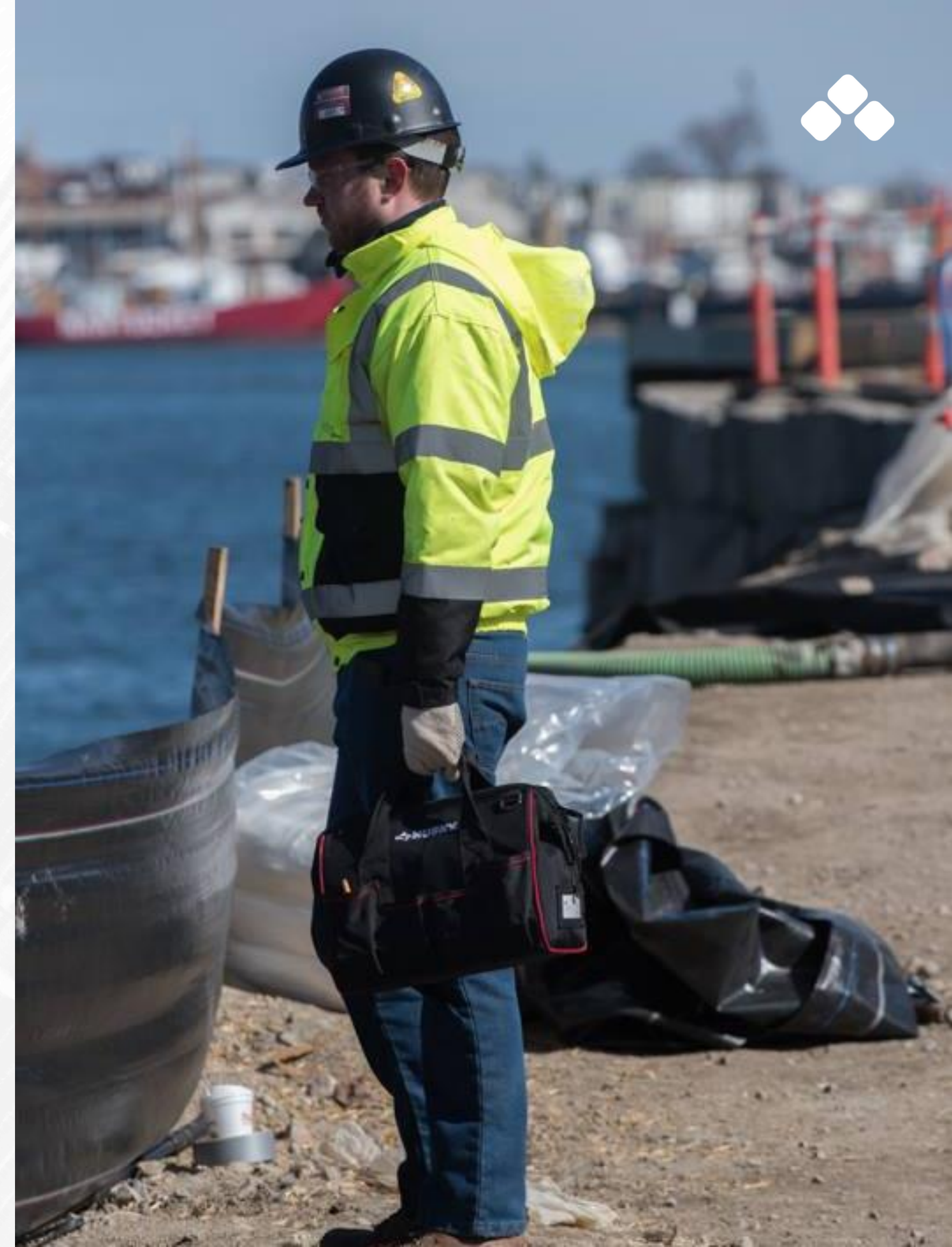


# OUR STAFF

250+ PROFESSIONALS

Our staff of technical experts are appropriately-trained, credentialed, and licensed in their respective fields.

- Professional Engineer (PE)
- Registered Architect (RA)
- Certified Energy Manager (CEM)
- Commissioning Professional (CxA)
- Certified Industrial Hygienist (CIH)
- Certified Safety Professional (CSP)
- Certified Hazardous Materials Manager (CHMM)
- Professional Geologist (PG)
- Registered Environmental Manager (REM)
- Registered Environmental Property Assessor (REPA)
- Certified Microbial Investigator (CMI)
- Certified Environmental Consultant (CEC)
- Site Safety Manager (SSM)





## Focus On Our Residents & Communities

Our properties are not only investments, they're sources of great pride for the owners and communities they serve. We understand this special relationship and are committed to creating a positive resident experience.

Through our preservation efforts, we provide support for meal service, coordinators, employment opportunities, public spaces, recreational initiatives, education programs, social services and more at our communities.

And with all the work we do, we never forget that for our residents, their apartment is more than a place to live. It's home.







## Focus On The Environment

We are dedicated to creating a more sustainable future. We improve affordable housing communities, so that they run on renewable energy sources and help tenants save money – all while creating local green jobs.

In addition to many other green initiatives, these improvements can include the installation of solar panels to generate electricity at a much more affordable and sustainable manner than fossil fuels. By going solar, our tenants get to enjoy a cleaner, greener property as well as lower monthly utility bills.





# PROCESS, NOT PRODUCT YIELDS BETTER SOLUTIONS

- The buildings sector, which includes energy used for constructing, heating, cooling and lighting homes and businesses, as well as the appliances and equipment installed in them, accounts for over one third of global energy consumption and emissions.
- The operations of buildings account for 30% of global final energy consumption and 26% of global energy-related emissions.
- (8% being direct emissions in buildings and 18% indirect emissions from the production of electricity and heat used in buildings).







# WHY ENERGY EFFICIENCY IN CONSTRUCTION IS SO IMPORTANT

- According to the International Energy Agency (IEA), buildings could potentially account for 41% of global energy savings by 2035 if energy-efficient construction practices are followed.
- Minimum performance standards and building energy codes are increasing in scope and stringency across countries, and the use of efficient and renewable buildings technologies is accelerating.
- Energy used directly in the construction sector includes large volumes of diesel for machinery as well as electricity for powering buildings and tools, presenting many opportunities to save on energy.





# PRIMARY WAYS TO IMPROVE CONSTRUCTION ENERGY EFFICIENCY

- To achieve energy efficiency in buildings, the IEA identified three important ways to approach construction practices. Each factor has its own return, but it's the combination of all three that really pays back in energy efficiency.
- Using advanced designs and construction techniques that reduce heating, cooling, ventilation and lighting energy consumption.
- Upgrading buildings and replacing equipment with energy-saving devices.
- Managing energy consumption with active and ongoing methods.







# EFFICIENT MACHINERY AND VEHICLES

- Newer diesel machines offer efficiency gains over equipment older than 15 years, as well as much better emissions control technology.
- Engine idling can be a significant operating cost. On average, equipment on construction sites are idle around 25% of the time. Trucks are idle up to 50% of the time. In addition to unnecessary fuel consumption, this increases maintenance needs.
- Many diesel-powered construction machines can run on biodiesel blends of up to 20%. Biodiesel does not cost more than ordinary diesel but can substantially reduce CO2 emissions.
- Managing energy consumption with active and ongoing methods.

**BENEFITS OF Biodiesel**

While Cummins' Destination Zero™ strategy is integrating the widest range of power technologies, we know that our customers need solutions to reduce carbon intensity today. Biodiesel is one alternative fuel customers can integrate into their fleet for immediate impact on their carbon emissions.

Biodiesel is a renewable, biodegradable fuel manufactured domestically from vegetable oils, animal fats or recycled restaurant grease, commonly referred to as used cooking oil.

Biodiesel properties are similar to those of diesel fuel, as opposed to gasoline or gaseous fuels, and are therefore capable of being used in compression ignition engines.

Here are some key benefits of biodiesel →

**We're on a mission to lower lifecycle carbon emissions.**

Cummins engines are committed to meeting future emissions regulations. Emissions can be further reduced using biodiesel. Most Cummins diesel engines have been approved to use biodiesel blends up to B20.

**FAST FACTS**

- Carbon intensity scores are lower for biodiesel than petroleum diesel.
- Biodiesel has lower sulfur compared to petroleum diesel.
- Using biodiesel can reduce life cycle carbon emissions. CO<sub>2</sub> released from biodiesel combustion is offset by the CO<sub>2</sub> absorbed from growing soybeans or other feedstocks that produced the fuel.

**And we don't just mean lower emissions someday. We mean today.**

Biodiesel is a drop-in fuel, meaning that customers with Cummins-powered vehicles can immediately reduce their emissions. This requires minimal investment while benefiting from an already established infrastructure.

Customers can use biodiesel as a drop-in fuel or blend with traditional fuels in their existing engines using the current infrastructure.

**Biodiesel can support customer's reduced emissions targets.**

Switching to lower carbon alternatives like biodiesel helps customers make an impact on their carbon target goals now with their current fleet. Biodiesel helps lower lifecycle carbon emissions and customers' Scope 1 Emissions that result directly from the operation of their machinery.

**Through the energy transition, Cummins continues to develop engines that ensure the same reliability and power to guide the industry towards future technologies.**

More than anything, however, Cummins strives to provide products that help our customers get the job done. Biodiesel is another resource to support this mission towards improved performance.

- The cetane rating measures fuel quality.** It indicates how well the fuel will burn within the engine cylinder. The higher the cetane number, the shorter the ignition time, meaning better combustion. The scale for measuring cetane ranges from 0-100.
- Today's diesel engines require fuel with a cetane number ranging from 40-45.** Biodiesel, however, requires a minimum cetane number of 45, ultimately indicating a shorter ignition time and better performance. Depending on the biodiesel blend, the cetane number could range anywhere from 45-55.

**Cummins biodiesel compatibility**

Through innovation and advanced technology, biodiesel blends have evolved tremendously to reduce life cycle carbon emissions while supporting the needs of customers.

Most Cummins diesel engines have been approved to use biodiesel blends up to B20.

Cummins' HELM™ platform and advanced diesel engines are supporting customers in their journey to lower emissions through biodiesel compatibility.

INTERESTED IN LEARNING MORE ABOUT BIODESEL? SCAN THIS QR CODE TO FIND OUT MORE.

The information contained herein is believed to be reliable but we make no representations concerning the accuracy or completeness of the data. Our policy is one of continuous improvement. Reserve the right to discontinue models, or change specifications or design, without notice, at any time and without incurring obligation or liability.

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# WASTE REDUCTION

- 30 to 40% of the global waste stream is estimated to be Construction and Demolition waste. Annual construction waste is expected to reach 2.2 billion tons globally by 2025.
- As much as 30% of all building materials delivered to a typical construction site can end up as waste.
- More than 75% of all construction waste from wood, drywall, asphalt shingles, bricks and clay tiles ends up in landfills.
- Excavation waste can sometimes be re-used on site, such as being pressed into concrete masonry blocks. This reduces both landfill waste and construction truck traffic. Non-recyclable construction waste might be used in waste-to-energy processes, like powering kilns or producing liquid fuels.

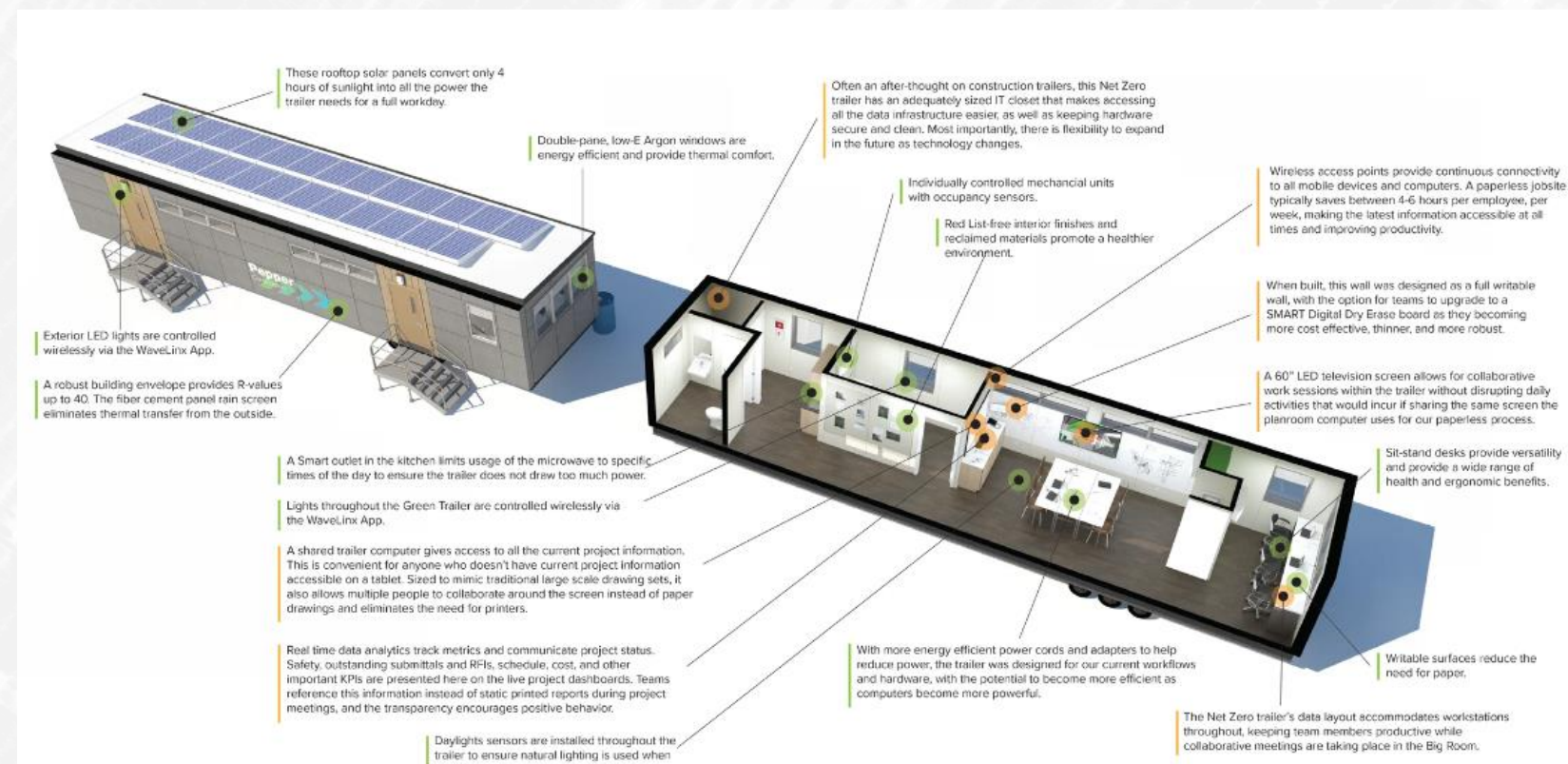






# ONSITE ACCOMMODATION

- Construction Trailer represent a large opportunities to cut energy costs.
- With better shading, insulation, lighting and appliances, accommodation energy use can be cut by half.
- Onsite solar PV can then be used to meet or offset the remaining energy demand.
- The use of onsite diesel-powered generators should be minimized to reduce carbon emissions and local health and amenity impacts.







# DESIGN AND MATERIAL SELECTION

- Careful consideration in design, specification and planning can help avoid energy and environmental impacts.
- Selecting materials and components that can be easily recycled is also a good way to reduce energy-related impacts.
- Experienced builders and architects realize that every building component affects other parts of the structure.
- Elements of a commercial building that can be made energy efficient include Building Orientation, Building Envelope, Windows and Doors and Mechanical Systems.
- Residential construction also benefits from the same energy-efficient techniques and technologies that commercial construction uses. Residential projects are smaller-scale, but there are still plenty of opportunities to save on energy costs and consumption.
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# QUALITY AND PREFABRICATION

- Quality construction lasts longer, reducing the need for energy in renovation or replacement works.
- Quality construction also avoids locking in excessive operational energy use, for example by minimizing 'downstream' HVAC needs by ensuring air tightness in new buildings.
- Prefabricating components for a construction project can offer substantial energy cost savings.
- Offsite construction typically takes place in specialized, semi-automated environments optimized for waste minimization and productivity.

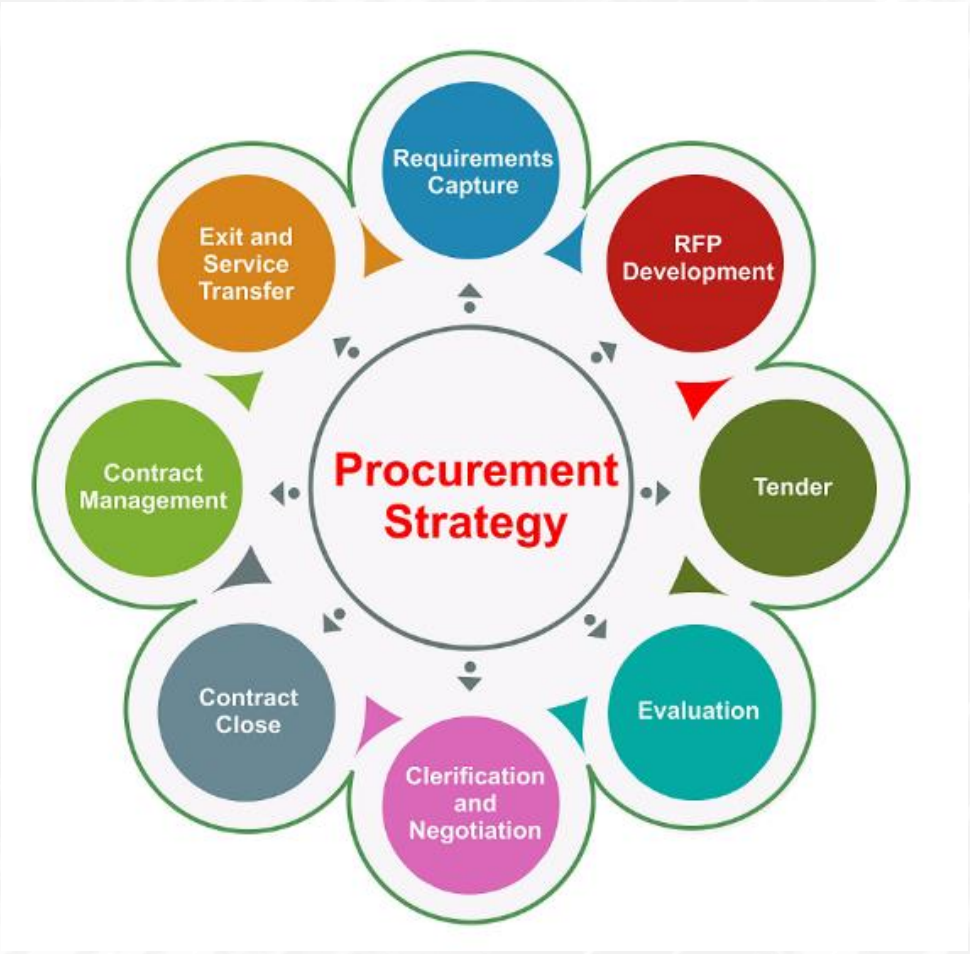






# CONTRACTING AND PROCUREMENT

- Construction projects typically require sub-contracting service providers and product suppliers. Requiring sub-contractors to meet minimum guidelines enables construction companies to reduce energy and environmental impacts in the supply chain.
- Similarly, sub-contractors are likely to benefit commercially by demonstrating good energy and environmental management practices to potential employers.







# INNOVATIONS

- **IoT refers to systems of interconnected devices with unique identifiers, enabling secure connection and data exchange. IoT platforms coordinate information from a range of sources through a common language, allowing them to co-operate with each other.**
- **The nearly-zero concept involves designing and constructing a building where its total annual energy cost is nearly equal to the amount of renewable energy created on the site.**
- **Cross laminated timber (CLT) is made by adhering timber (usually hardwoods) together into heavy duty construction elements including multi-story framing and load-bearing walls.**
- **Steel is an essential material in many construction projects, but its production is extremely energy-intensive. Reducing the need for steel, or producing it more sustainably, is beneficial in lowering emissions.**
- **Robotics is playing an increasing role in the construction sector, both onsite and in component production facilities. 3D printing is expected to revolutionize the industry by enabling components and even whole buildings to be constructed from materials sourced from the local area.**





# INTERNET OF THINGS (IOT) AND SIMULATION

- IoT refers to systems of interconnected devices with unique identifiers, enabling secure connection and data exchange. IoT platforms coordinate information from a range of sources through a common language, allowing them to co-operate with each other.
- An increasing number of large companies are providing computer-simulation training to take advantage of a machine's features for increased productivity and efficiency.







# ENERGY EFFICIENCY CHALLENGES

- High costs of converting to energy-efficient methods
- Problems with gathering reliable energy efficiency information
- Lack of technological expertise to design, construct and maintain buildings and equipment
- Difficulty in coordinating construction industry stakeholders
- Limited access to energy efficiency financing
- Poor incentives to invest in energy efficiency programs





# ENERGY TAX INCENTIVES IN THE IRA

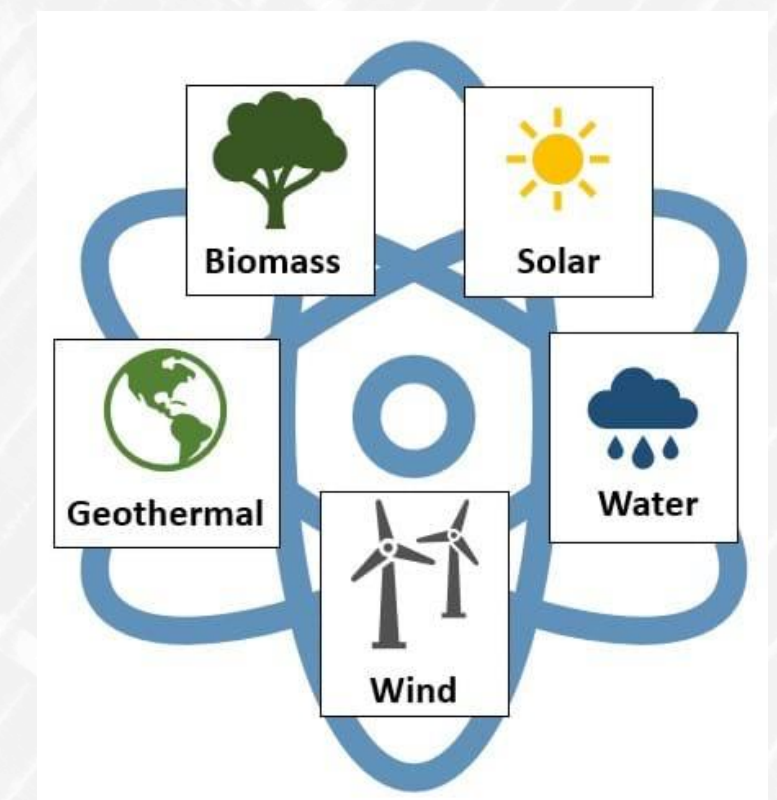
- **SEC. 13102. EXTENSION AND MODIFICATION OF ENERGY CREDIT - Section 48**
- **SEC. 13103. INCREASE IN ENERGY CREDIT FOR SOLAR AND WIND FACILITIES PLACED IN SERVICE IN CONNECTION WITH LOW-INCOME COMMUNITIES - Section 48**
- **SEC. 13303. ENERGY EFFICIENT COMMERCIAL BUILDINGS DEDUCTION - Section 179D**
- **SEC. 13702. CLEAN ELECTRICITY INVESTMENT CREDIT - Section 48E**
- **SEC. 13801. ELECTIVE PAYMENT FOR ENERGY PROPERTY AND ELECTRICITY PRODUCED FROM CERTAIN RENEWABLE RESOURCES, ETC**
- **SEC. 6417. ELECTIVE PAYMENT OF APPLICABLE CREDITS**
- **SEC. 6418. TRANSFER OF CERTAIN CREDITS.**





# ALTERNATIVE ENERGY CREDITS

- Solar Technologies with a range of 6%-70% depending on Base, 5X Bonus, Energy Community, Low Income
- Small Wind with a range of 6%-70% depending on Base, 5X Bonus, Energy Community, Low Income
- Ground Source Heat Pump with a range of 6%-50% depending on Base, 5X Bonus, Energy Comm., Low Income
- Microturbine 6% - 30%
- Combined Heat & Power (CHP)
- Microgrid Controller
- Standalone Energy Storage
- Thermal Energy Storage
- Fuel Cell
- Geothermal
- Biogas
- Waste Energy Recovery
- Interconnection Property
- Electrochromic Glass







# ALTERNATIVE ENERGY CREDITS EXPLAINED

## 5 Times Bonus (6% x 5 = 30%) (2022 - ....)

- Project with a Net Output of less than 1 MW (284 Tons?) or
- Meets the Prevailing Wage and Apprenticeship (P+A) Requirements (IRS Notice 2022-61) or
- Projects that begin Construction prior to January 29, 2023

## Domestic Content Bonus (Qualified Facility) (2023-...) (IRS Notice 2023-38)

- 100% of the cost of Structural steel and iron and
- 40% of manufactured product (49 CFR § 661.5) is produced in USA
- Calculated on the entire ITC Qualifying project
- Calculated on Manufacturer's Cost (Will this be difficult?)
- 2% Bonus (6% + 2% = 8%)
- If project meets 5x Bonus requirements, 10% Bonus (30% + 10% = 40%)





# ALTERNATIVE ENERGY CREDITS EXPLAINED (CONT'D)

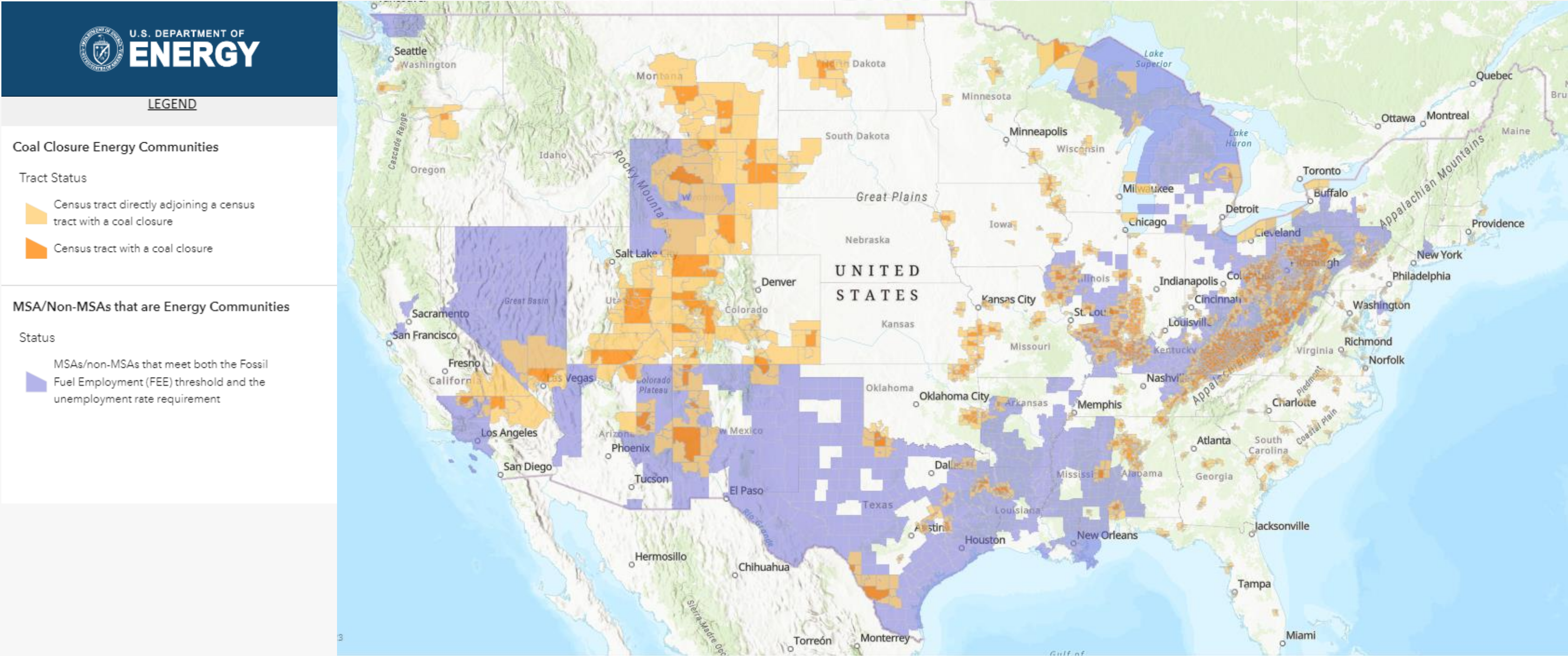
## Energy Community Bonus (IRS Notice 2023-29)

- Census Tract or adjoining tract with a Coal Mine closed since 2000 or
- Census Tract or adjoining tract with Coal Fired plant closed since 2010 or
- Brownfield Site
- Area with 0.17% direct employment related to Coal, Oil or NG and higher than avg unemployment
- 2% Bonus (6% + 2% = 8%)
- If project meets 5x Bonus requirements, 10% Bonus (30% + 10% = 40% + 10% Domestic = 50%)





# ENERGY COMMUNITY MAP







# ALTERNATIVE ENERGY CREDITS EXPLAINED (CONT'D)

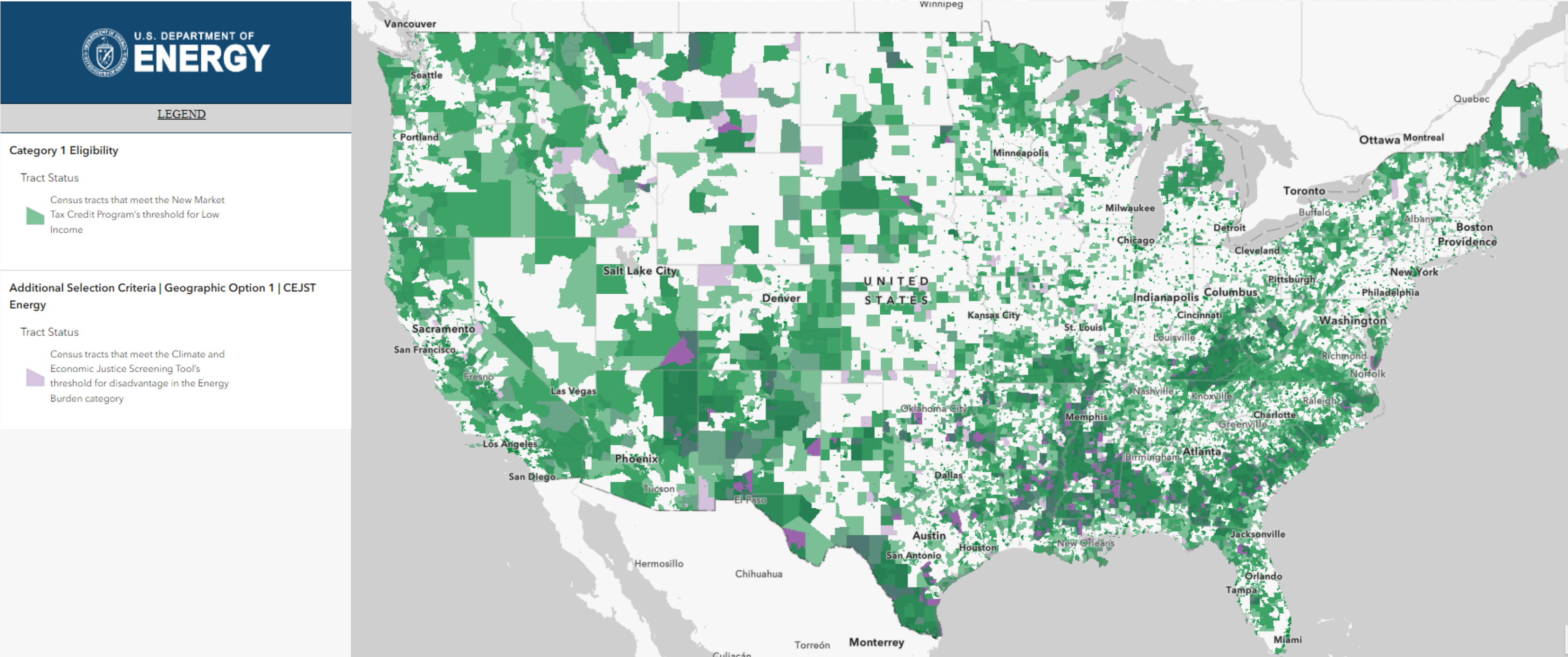
## Low Income Bonus (REG-110412-23) (IRS Notice 2023-17)

- **Category 1: Located in a Low-Income Community\* (10% credit)**  
Census Tract Poverty rate > 20% or  
Non-Metro – Census Tract Median Family income <80% of State  
Metro – Census Tract Median Family income <80% of State or Metro Area
- **Located on Native American Land (10% credit)**
- **Qualified Low-Income Residential Building Project (20% credit)**  
Resi-Rental Participating in Affordable Housing program  
Electricity allocated equitably among the occupants
- **Qualified Low-Income Economic Benefit Project (20% credit)**  
Electricity Produced provided to Households with Income <200% of Poverty Line or  
Electricity Produced provided to Households with Income <80% of Area Median Income





# MAP OF CATEGORY 1







# BENEFITS OF ENERGY EFFICIENCY

- Energy efficiency saves money, increases the resilience and reliability of the electric grid, and provides environmental, community, and health benefits.
- Energy-efficient buildings cost less to heat, cool, and operate, while industry and manufacturing plants can make products at lower cost. Energy-efficient transportation results in fuel savings.
- Energy-efficiency programs improve community resilience and address energy equity by bringing efficient, cost-effective technologies and infrastructure to the underserved including minority and economically disadvantaged communities.
- Reducing energy use is essential in the fight against climate change, because traditional power plants burn fossil fuels that release greenhouse gases and contribute to air pollution. Energy-efficient homes and buildings are also better equipped to switch to renewable energy, which does not produce harmful emissions.
- Energy-efficiency improvements reduce the amount of electricity on the grid at one time, known as load, minimizing congestion and stress on the U.S. electric grid. Less load prevents power disruptions.





# QUESTIONS?





# THANK YOU

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