Efficiency is Efficient

An Equitable Path Forward to 100% Clean Energy Economy

The Unsung Story of a Champion

V. 4.7.2020 .L. Colon de Mejias .Solve Climate by 2030 http://www.solveclimateby2030.org/

The Spin on Energy……

Many of us are focused on “Climate talk”, “Carbon Talk”, “Clean Energy”, “Green Energy” , EV policy, EV infrastructure build outs, Wind, Solar, Geothermal, Transportation, workforce, Ratepayer Funds, Green Bank Finance Programs, Outreach needs, highest carbon emitters, where to start, who should pay for all of what we want as goals, who should be allowed to use incentives, who can’t use the incentives and programs, what they can be used for, cost effective testing, what is the best plan to lower carbon, protect health, mitigate climate change, grow our economy, lower energy burdens, close affordability gaps, protect people, water and air, educate people, ensure Equity for all. **What steps do we need to take to lay the foundation for our success. Because without a plan a goal is just a wish…..**

Climate Change is Real . Pollution is Harmful - Waste is bad...

Whether or not you believe humans are the cause of climate change will not matter to our common goals on reducing energy waste, lowering energy costs, and creating a stable sustainable energy future.

We likely agree that **pollution is bad.** We likely think **wasting any resource is not the best approach for people or the economy.**

Most of us agree that creating jobs, enhancing economic growth, lowering energy prices, lowering pollution, closing affordability gaps, supporting positive health outcomes, and increasing equity are GOOD choices.

Conservation is a conservative approach to being efficient with our resources. Energy Efficiency results in doing MORE with LESS.....

Today we use more energy than ever before!

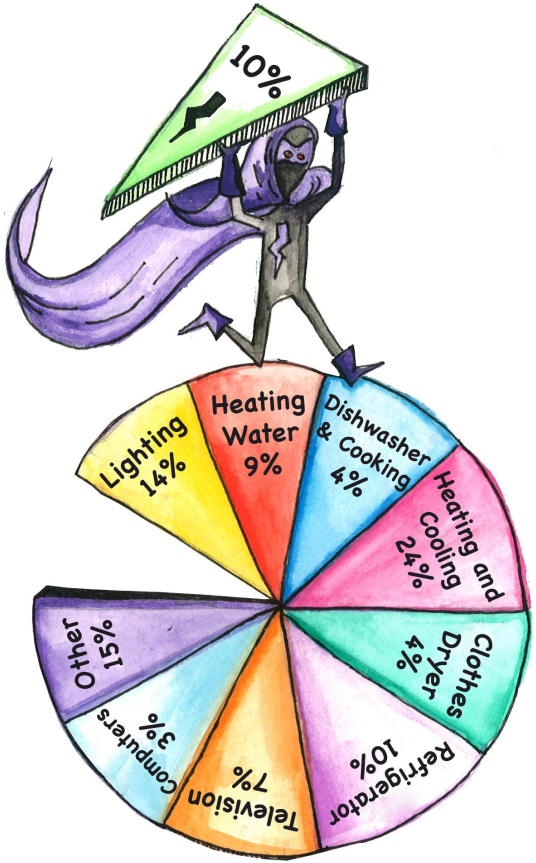
Problem:

From morning till night, and even while we sleep, our human demand for energy is ever increasing.

As a society we have never been this connected or dependant on electronics for our daily needs.

We have never had to make changes as rapidly as we need to make them now.

Today we use more energy than ever before!



Credit Defeating the Phantom Draw www.greenecowarriors.org

But…Where Does our Electricity Come From?

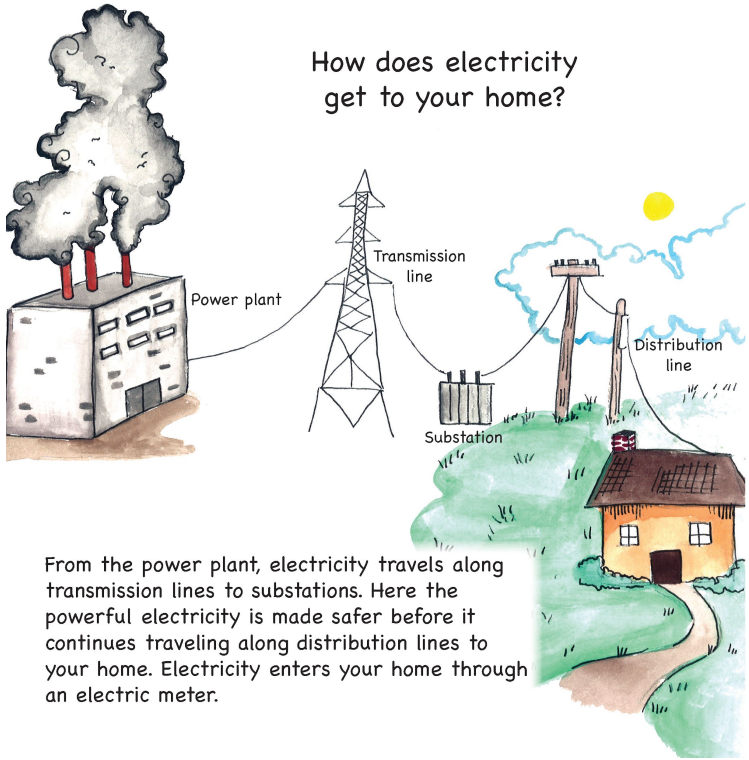
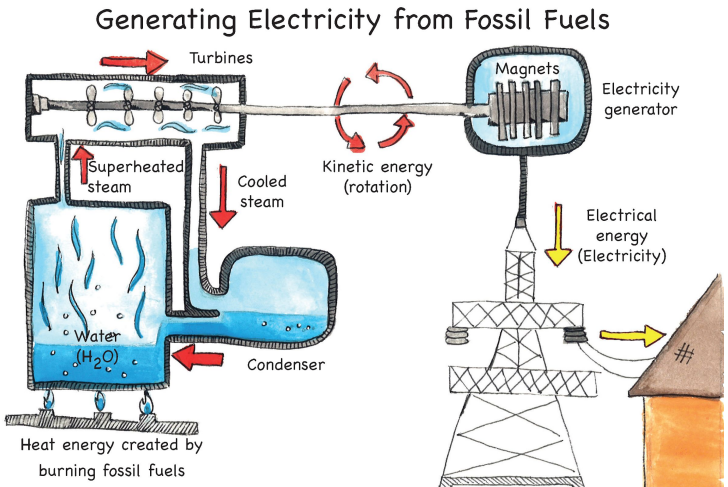


Image: Dinero Defeats the Phantom Draw https://www.gewportal.org/store/

- Unless you work in the energy You probably are not thinking about where your electricity comes from or how it got to your home or business.
- **Very little has changed in the world of electric generation.**
- <u>We keep creating new ways to use energy but spend very little time thinking about where the energy will come from or how it will impact us.</u>

But…Where Does our Electricity Come From?



Fossil fuels must travel far on boats, trains and trucks to get to power plants. Fossil fuels are burned to heat tanks of water (H_2O). The hot water turns to steam, spinning a turbine attached to a generator. Coils of metal wire are wrapped around the generator's powerful magnets. As the magnets spin around the wire, the metal's electrons jump from atom to atom. This movement of electrons is called electricity.

Image: Dinero Defeats the Phantom Draw https://www.gewportal.org/store/

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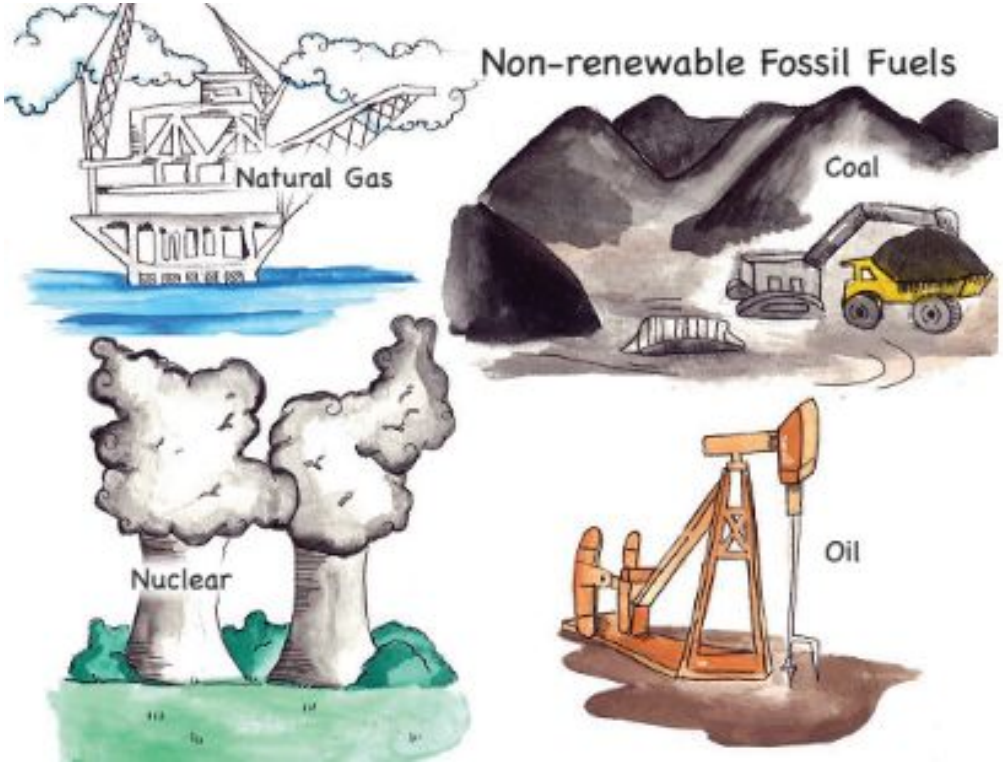
95% of Connecticut's electricity is Non-renewable



- **ONLY 5% of CT electric generation energy was Renewable in 2017**
- **Nuclear power 48% and Natural Gas 47% supplied the vast majority of electricity generated in Connecticut 2017.**
- Natural gas power has been on the rise accounting for nearly half of the state's electricity generation last year.
- Using less of ANY resource to do the same amount of work is a good thing…..

www.EIA.gov

https://yearbook.enerdata.net/electricity/world-electricity-production-statistics.html

World Carbon Emissions by Demand 2019

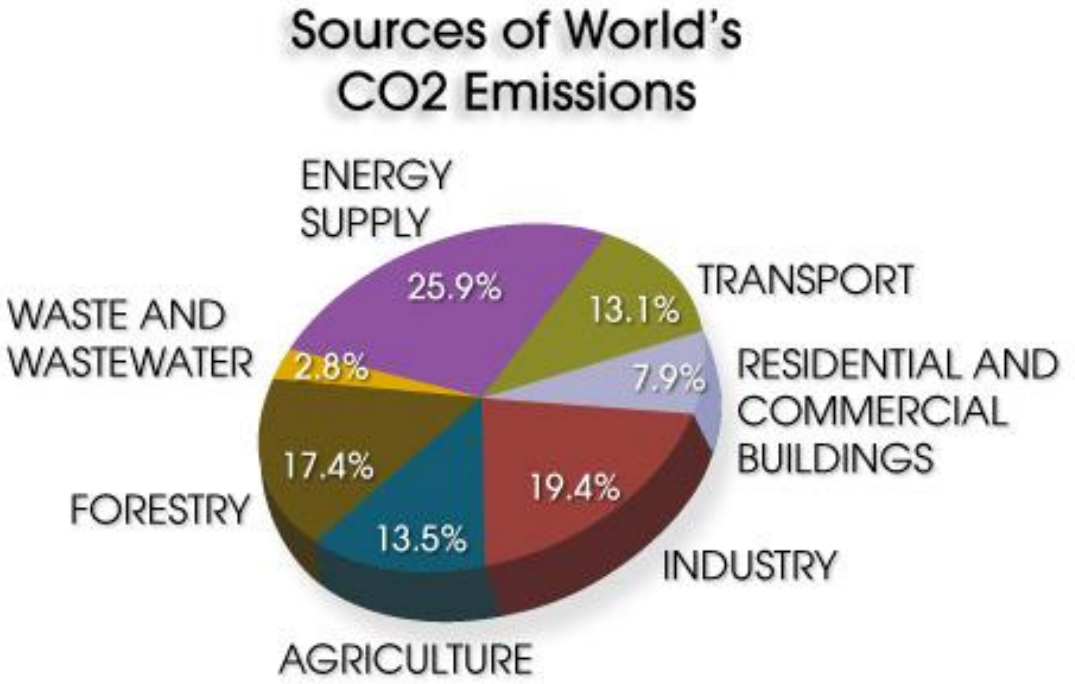
Energy Generation 25%

Buildings 7.9%

265.9+ 7.9 =

34 %

Buildings & Electricity



https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

Global Power Consumption Accelerated in 2018 (+3.5%)

Electricity consumption in the United States, which dipped by 1% in 2017, recovered in 2018 (+2.2%).

Most of this U.S. increase came from the residential sector (+6.2%), mainly due to an increased electricity consumption for appliances (representing around half of the electricity consumption) and air-conditioning (nearly 90% of US homes use centralised or house individual air conditioners).

Economic growth and industrial demand also raised power consumption in Canada, Brazil and in Russia. It also increased in Africa, especially in Egypt, and in the Middle East, spurred by Iran.

As in 2017, electricity consumption remained stable in Europe in 2018: it declined in France and Germany, stagnated in other large countries (UK, Italy, Spain) and it increased in the Netherlands, Poland and Turkey.

72%

Contribution BRICS to the global increase in power consumption between 2010 and 2018. BRICS is the acronym coined for an association of five major emerging national economies: Brazil, Russia, India, China and South Africa. Originally the first four were grouped as "BRIC" (or "the BRICs"), before the induction of South Africa in 2010.

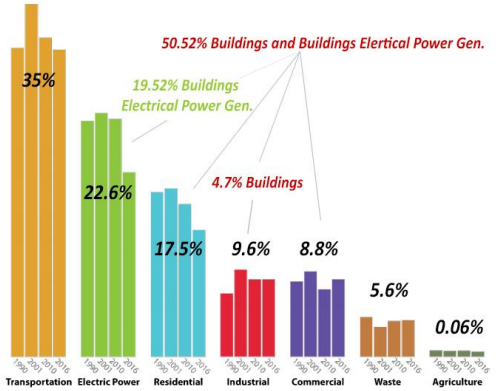
https://yearbook.enerdata.net/co2-fuel-combustion/CO2-emissions-data-from-fuel-combustion.html

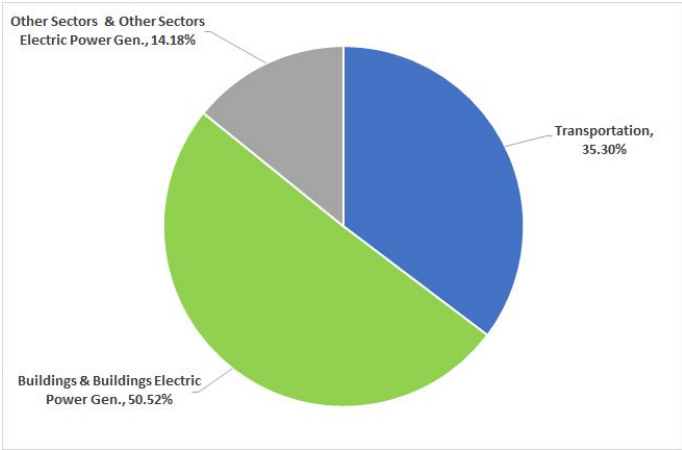
What is Demanding the Energy?

Humans- Energy demands are connected to everything we do: working, smartphones, TV, food safety, cooking, washing, showers, heating, cooling, driving,

Buildings and the energy we demand in them represent a collectively one of the largest sources of carbon emissions.

Like Air, we don't often think about electricity or heat until they are not available.





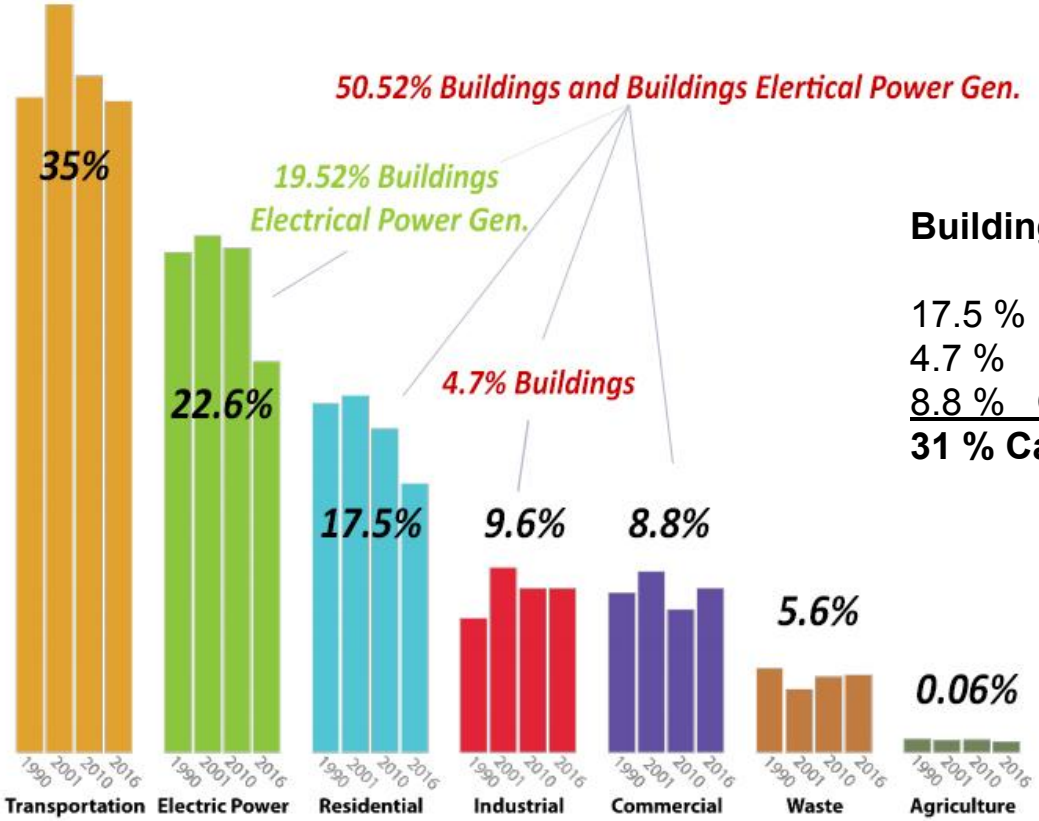
2014 CT data CT DEEP.gov
GHG GC3 report - CT DEEP

Local Carbon Emissions by Sector - Historical

CT GC3 findings

Bar graph of Carbon Emissions

With labels and percents on the bar graph



Buildings & Carbon

17.5 % Residential
4.7 % Industrial
8.8 % Commercial
31 % Carbon from Buildings

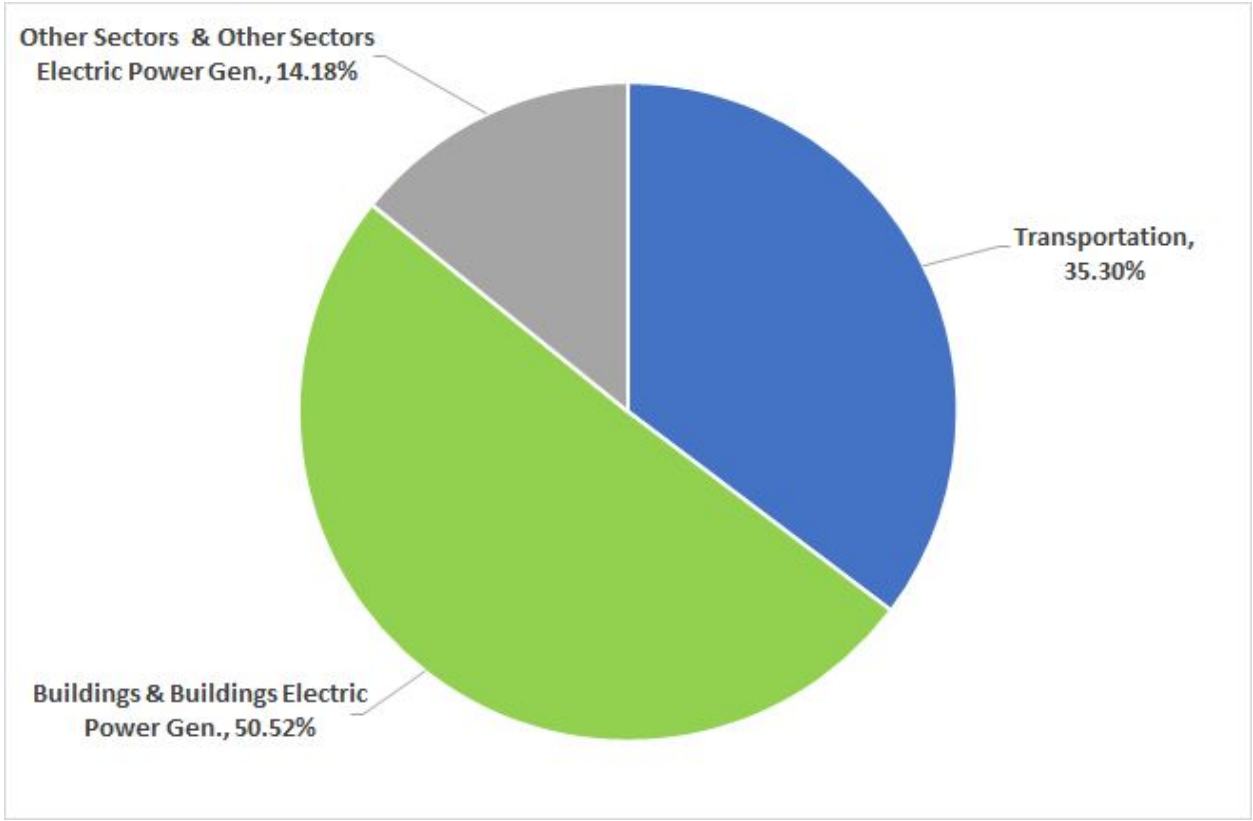
Source : https://www.ct.gov/deep/lib/deep/climatechange/publications/building_a_low_carbon_future_for_ct_gc3_recommendations.pdf

CT Carbon Emissions by Sector 2014 - Summary

Nonrenewable Energy Consumption = Carbon Emissions

Electricity that is generated with nonrenewable resources creates carbon emissions

95% of Electricity is generated with nonrenewable energy



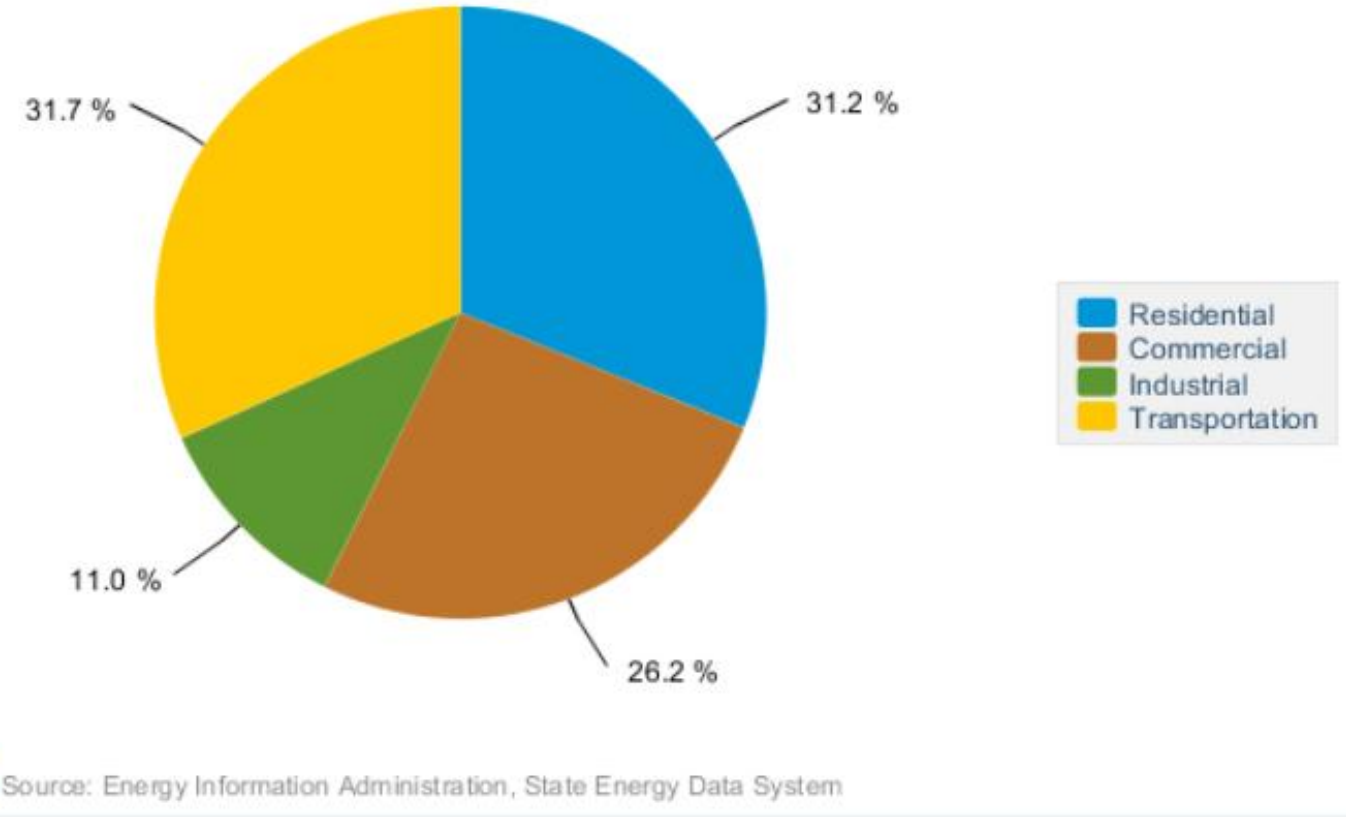
Source : https://www.ct.gov/deep/lib/deep/climatechange/publications/building_a_low_carbon_future_for_ct_gc3_recommendations.pdf https://www.eia.gov/state/?sid=CT#tabs-2

Connecticut Energy Consumption by End-Use Sector, 2016

Less Energy Waste =

Less Carbon Emissions =

Less Energy Waste Closes the Gap that we need to ramp up to 100% clean energy

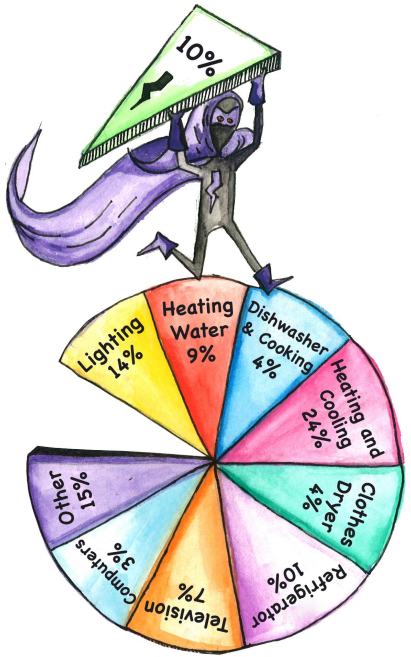


What does this mean to solving Climate Change

Buildings and Transportation use energy and emit harmful pollution and carbon.

Electricity generation results in emissions at the site of the energy production, and through combustion processes, and we also have losses in transmission processes.

Many buildings and homes are old and inefficient. It is time to address the root issues that are causing the waste of energy and wasting our resources while they are polluting.



Plans to lower carbon emissions ....

- **Goals** need **Plans** that **work implement specific steps to reach the goals.**
- **Policies & Laws** are directed by leaders such as governors and legislators. Policy is voted into law and guides our plans, directs funding collection and distribution of resources, and distribution of these resources to support the Plans.
- It is a benefit to all of us if the plans work together to meet both energy and carbon goals.
- We should diversify the parties writing and implementing the plans to ensure an equity lens and start with options that help the most people.

Learn more at https://efficiencyforall.org/wordpress/wp-content/uploads/2017/04/EE-2_13-Slides-2.pdf

Equity in Planning or Lack of Equity

There is a clear need to continue to view issues through the Equity Lens.

- **Energy is connected to EVERYTHING.** It impacts our quality of life, ability to work, be warm, have access to information, use our phones, cook food at home, keep food cold and safe, use medical equipment.

- **Some people have problems related to energy affordability, housing, and even, our health outcomes are impacted by our collective energy choices.**

The Energy **Affordability Gap will also continue to impact energy choices.**

*Please see OCC and Operation Fuel reports

Increase Energy Savings to lower Carbon Emissions

Reduced energy waste outcomes help close the affordability gap, while protecting the planet and people by lowering pollution and waste.

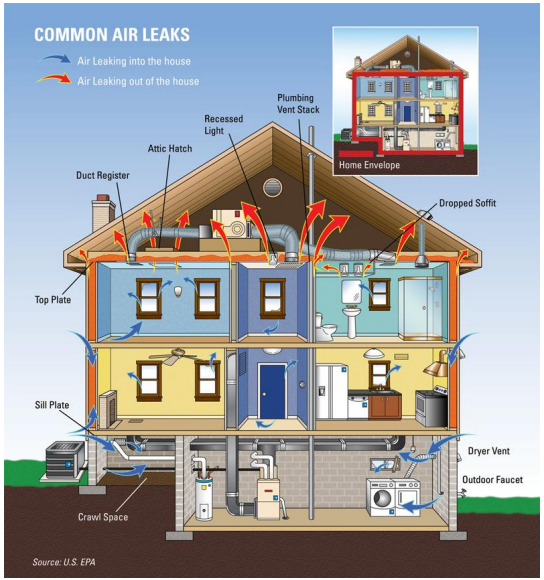
Expanded building efficiency such as: Air sealing, insulation, window upgrades, improved HVAC controls will address thermal boundary and heat loss issues.

Our energy costs are dependant on supply and demand. Lowered waste = Lowered cost per KWH.

https://efficiencyforall.org/wordpress/wp-content/uploads/2017/04/EE-2_13-Slides-2.pdf

Climate Change impacts Heating/Cooling demands

Thermal Improvements Lower Heating & Cooling Demand



Thermal improvements in Buildings can lower energy waste by 30%

Carbon emissions from this sector arise from on-site burning of fuels for heat in buildings, hot water, or cooking in homes.

(Note: Emissions from electricity use in buildings are excluded and are instead covered in the Electricity and Heat Production sector)

Source: www.eia.gov

There is an answer which we Can Afford. Expand Efficiency!

Energy Efficiency is cost effective

Lowers Energy costs

Lowers Carbon Emissions

Increases positive Health outcomes

Lowers water waste

Closes the affordability Gap in multiple ways: reduces Peak Demand and onsite costs of energy

Heating & Cooling Loads - Yes Efficiency can help!

Heating and cooling buildings are a source of energy demand, thus air pollution, and carbon emissions. We have both a high winter heating demand, and a high summer cooling demand. **High use times are called Peak Demand.** Seasonal daylight hours and the need for increased indoor activities correlate with heating demands summer and winter exacerbate our state's energy capacity problems.

Almost half of CT's Electric Generation comes from Natural Gas. Expanded Natural Gas heating infrastructure, has created a LNG supply concern in our region. (ISO_NE 2017)

Building Performance and Conservation Load Management programs - Include Thermal Improvements, and lighting upgrades, and lower our demand for heating, cooling, electricity, and water. Efficiency helps most during Peak Demand when we need the help.

Pg 46 of the CT CES http://www.ct.gov/deep/lib/deep/energy/ces/2018_comprehensive_energy_strategy.pdf

Why Expand EE & Building Performance programs

Efficiency programs have been working so well that we did not notice them.

Like our parents who get up early and stay up late.. **Efficiency programs, and the people who work in them, are the unsung Champions of Clean Energy Progress.**

The Economic, Energy, and Health Impacts of Energy Efficiency Programs are well documented and excellent.

www.efficiencyforall.org

Efficiency benefits to Connecticut - One Year Stats

GSP $1.4B

Gross State Product Increase

2016 Energy efficiency programs brought $1.4 billion to Connecticut's economy

NET TAX BENEFIT $140M

Tax Revenue Increase

Estimated Net Tax Revenue increase of $140 million

LIFETIME SAVINGS $962M

Lifetime Energy Savings

Ratepayers will save $962 million over the lifetime of energy efficiency measures installed in 2016

ENERGY JOBS 34,000

Energy Efficiency Workforce

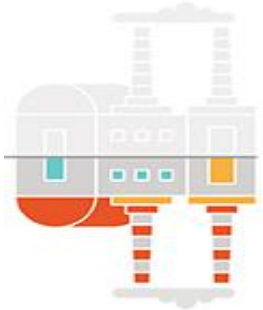
Connecticut's clean energy workforce is 34,000 strong, local, good-paying jobs.

BETTER HEALTH $814M

Avoided Health Costs

A 2008-2014 RGGI program study found that RGGI decreased healthcare related costs by $5.7 billion

https://www.ct.gov/deep/lib/deep/energy/conserloadmgmt/final-2019-2021-clm-plan-11-19-18.pdf



Expanding Efficiency Makes Sense

What ratepayer funded EE has accomplished 10 Years of EE in CT

RATEPAYER SAVINGS

CARS OFF THE ROAD

1. Residential and business customers experienced a decreased energy burden, allowing them to remain competitive with $3.7Billion dollars in savings.
2. **The 11.4 million tons of reduced emissions is the equivalent of removing 2.4 million cars off the road 2.4M**
3. Decreased need for new power generation means fewer emissions, lower energy prices, and greater energy security with over **2,625 MEGAWATTS SAVED in CT**

https://www.ct.gov/deep/lib/deep/energy/conserloadmgmt/final-2019-2021-clm-plan-11-19-18.pdf

Saving Energy Saves Lives and Improves Them…

30,000
Fewer Asthma Attacks

$20 BILLION
Avoided Health Harms

6 LIVES
Saved Every Day

HARTFORD

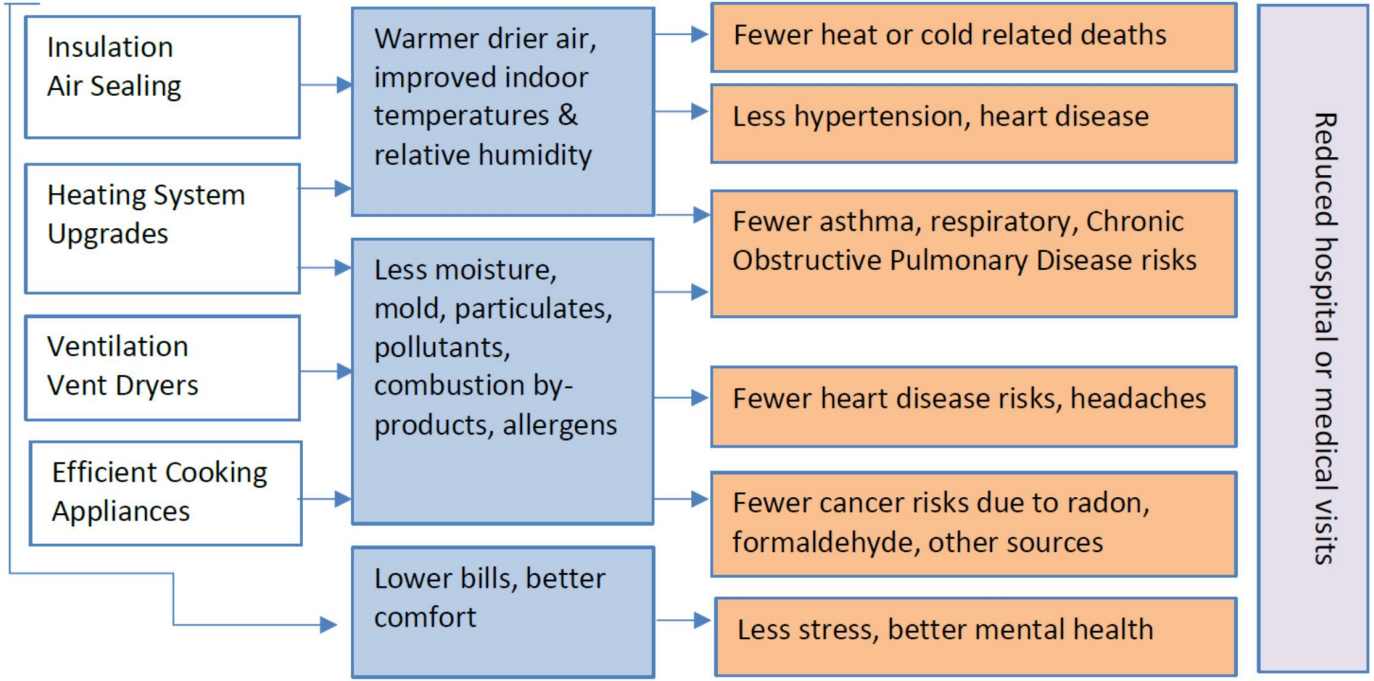
A **15% reduction** in energy use could **reduce health impacts by $73 per capita annually**

15th highest in the nation among large metro areas

Source : E4 the Future Occupant Health Benefits of EE- 2016

How does efficiency Save and Improve Lives?

Figure ES1: Occupant Health and Indoor Environmental Benefits of Residential EE



Source : E4 the Future Occupant Health Benefits of EE- 2016- ACEEE Physicians for Health

Clean Energy Policy is like making Rice and Beans

Energy Efficiency, Conservation are to Renewables as Rice is to Beans ..You can eat Rice and Beans independently from one another and they will quiet your hunger .. but...

When eaten together (efficiency and renewables) can sustain us, end our hunger for cleaner energy, and **provide both short and long term benefits to our economic and environmental systems**. Together they form part of sustainable healthy planning.

Like rice and beans Energy Plans require : planning, timing, and the right ingredients, (ingredient choices based are on accessibility, cost, taste, regional influences and **“the who is at the table” also influences the outcome.**

Listen at https://btlonline.org/energy-efficiency-critical-to-reducing-carbon-emissions-reducing-costs/

Can Rice and Beans (Energy Plans) have diversity?

Energy Conservation and Renewables are like Rice and Beans Continued..

Many regions in the world eat rice and beans as part of their cultural diets…. each region has its own flair on the dish. This is also true for regional energy plans.

Ingredients in (Rice and Beans) and in our **(Fuel mix or energy policy and plans,) are dependant on available resources and associated costs.**

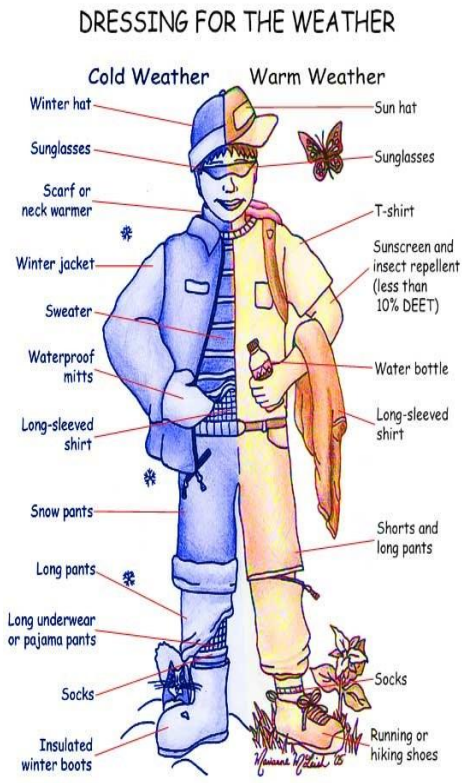
National, Regional and even local energy plans are meant to keep our energy supply stable healthy and safe.

Everything from our Belief System, knowledge base, associations, self interests, influences, and access to information or case studies, as well as our real life experiences help shape and define what we each think the energy plan should consist of.

<u>But no matter how we make the plan… We should consider equity. We must be sure that everyone has access to affordable safe energy. Energy is a necessity.</u>

Our Energy plans must be based on availability, affordability, as well as socioeconomic and health and safety concerns. Health and safety must account for Climate change Impacts and the need for people to have heat and lights at home.

Baby it's Cold outside… or Hot or Wet or Windy

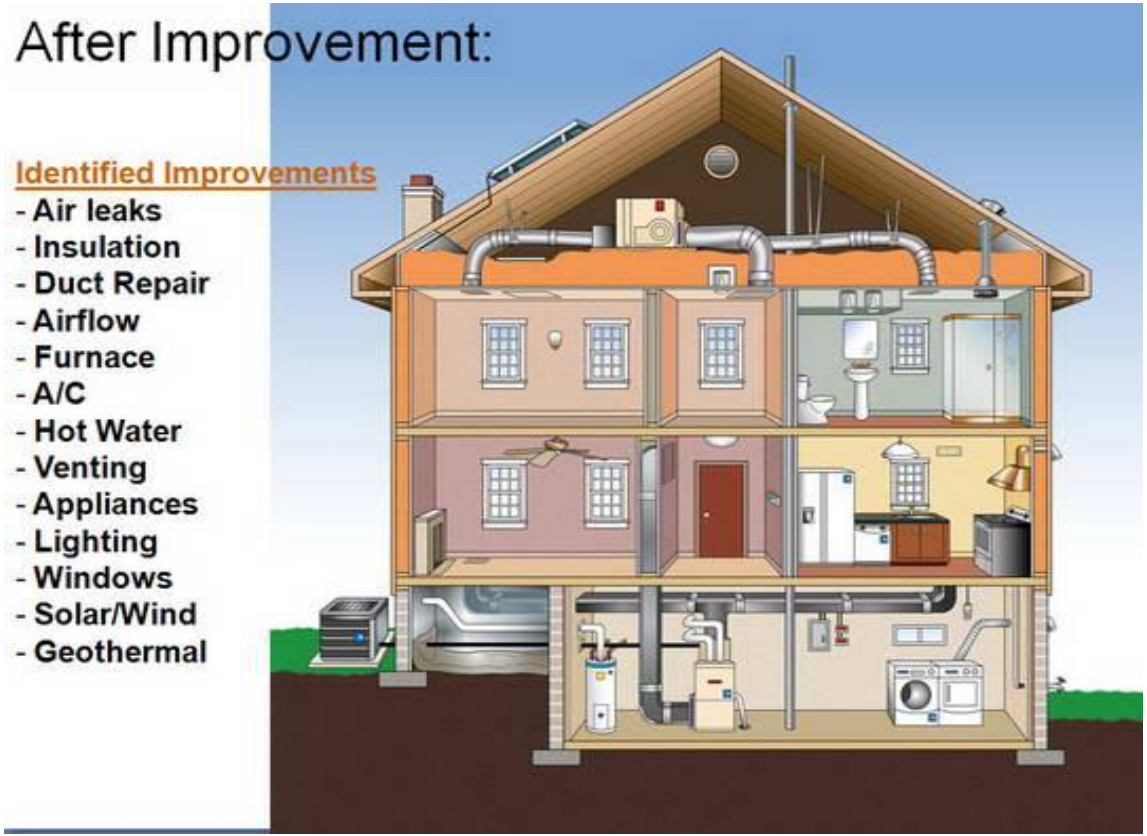


Humans require shelter and protection from the elements. No matter the weather we like to be comfortable, safe, dry, warm, and use energy to power our lives.

Similar to how we **"dress for the weather"** our buildings must be prepared for the changing weather. **Buildings are the "Shells" we live, work, play and learn in.**

Building Performance comprehensive approaches to efficiency view our Buildings as systems. Buildings breathe, use fuel and water, and require climate control. When buildings are healthy and well tuned they are safe, sustainable, climate controlled to support our housing, business and other needs.

Thermal Improvements - lower energy waste

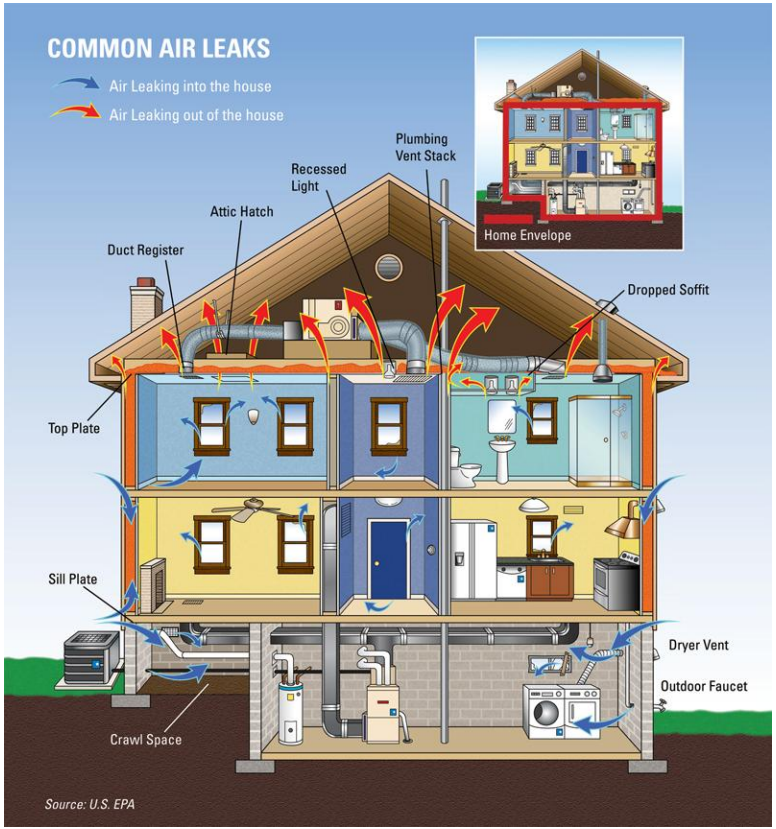


Thermal improvements are your buildings hat and boots, gloves and coat.

Insulation and air sealing lower demand for heating and cooling fuels by ensuring the building and your heating/cooling system is the right size.

Using less energy to heat and cool will lower our Peak Demand and cost of energy over all.

Heat Rises - like a balloon and we can stop that..



Building science implements tools and techniques to address health & safety, energy loss, and address the entire structure from the frost line to the ridge line.

Building science is a comprehensive approach to making buildings and homes safe, healthy, efficient, and environmentally sound.

The Loomis Chaffee School (ENERGIZECT HOME ENERGY SOLUTIONS SUCCESS STORY)

The Pilot: Prof. Dyreson's personal residence on campus, called "Mills House" was selected to serve as a pilot for energy efficiency upgrades. The students collected data from past energy use and closely monitored energy use following the phases of work completed.

After evaluating more than four years of heating oil use, before and after upgrades, the data showed that **Core Weatherization Services, Insulation, and Window replacements led to a 32% decrease in heating oil use.**

To date: 19 properties on the Loomis Chaffee campus received energy assessments, with thirteen properties receiving window and insulation upgrades, for projected savings of $21,000 annually.

For the students, it wasn't just about saving money. They learned about carbon emissions reductions, and increased home comfort through building science and conservation. The students noted outcomes included a better quality of life through more efficiency and comfortable buildings, and most importantly they noted the real-world EE experience that the project brought.

The school's next focus is a large-scale one megawatt solar installation and electrified heating and cooling.

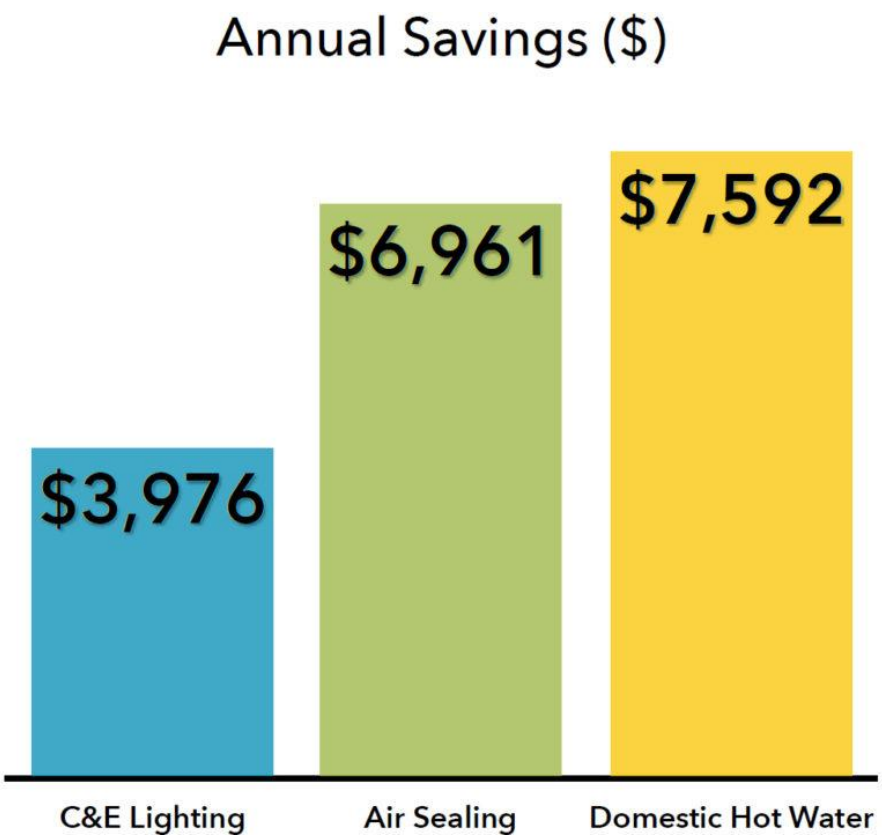
Customer Feels the Savings - Plainville, CT

"I was really surprised at the amount of work that they did in my home. They changed our lights to LEDs, they caulked and foamed, they checked my heating system, and they gave us information on more ways to save money. I decided to take their advice and get insulation, and I was so happy when I found out my copay was affordable. That was awesome because with my kids, work, and life I didn't have a lot to spend on insulation.

After they insulated my house in March of 2017 we started to notice that our heat came on less frequently, but we still felt warm. My kids' room is next to the attic, so we noticed a difference immediately.

I feel very appreciative to the program for helping us stay warmer and saving us money. People should use this program because it helps with asthma too, because it reduces air pollution. That is important to all kids and our future."

Multi-Family Success Story – Lakewood Apartments



This 250-unit apartment building in Bristol, CT received a comprehensive energy efficiency upgrade through the EnergizeCT Multifamily Initiative. The residents of Lakewood are enjoying monthly savings on their energy bills along with the cozy feeling that comes with energy efficiency.

The property is expected to yield significant lifetime savings of oil and electricity due to these upgrades, and is projected to save over $18,000 per year in energy costs.

Goals require Plans CAMBIO = CHANGE

Engage + Educate + Advocate + Collaborate
= Positive Lasting Change

- ❏ Daily Actions Influence the outcome
- ❏ Behavior Choices = Our Survival/Success
- ❏ Share Information = Motivated People Make Change
- ❏ We must increase equity and inclusion in our energy planning processes
- ❏ The problem is not too Big -Together we can!

Questions?

Creating a Culture of Sustainable Thinkers ™

Leticia Colon de Mejias is a motivational speaker and entrepreneur. Ms Colon de Mejias is the CEO and founder of the Nationally awarded company Energy Efficiencies Solutions, Chair of the nonprofit Efficiency For All, Policy Co-Chair of the National Building Performance Association, a Commissioner for the state of Connecticut Commission on Women Children Elderly Latino & Puerto Rican Affairs, and Founder and President of Green Eco Warriors, a nonprofit which works to "Create a Culture of Sustainable Thinkers". She is an awarded published children's book author with several books on environmental leadership, sustainability, as well as a line of educational science based graphic texts (comic books) which feature a cast of diverse superheroes and align with national science standards. She is the recipient of many national awards, including the **United States of America's** Department of Energy Award for work with at risk and minority populations, National Award Building Scientist Hall of Fame , Minority Small Business of the year award, National Department of Education award, and she is a two time Capital Workforce Partners Employer of the Year Award. Her companies have provided energy efficiency assessments and upgrades to over 12,000 CT households and completed full energy efficiency retrofits in over 10 million square feet of multifamily housing. Through her nonprofit Green Eco Warriors, she has provided climate and energy education to over 30,000 youth and families. She actively advocates while mentoring youth on energy plans and policy. In 2019 Leticia was called to congress to testify on an energy workforce plan THE BLUE COLLAR TO GREEN COLLAR JOBS DEVELOPMENT ACT OF 2019. Prior to working in building science, she was a manager at Hartford Healthcare and developed several nationally awarded workforce models. Her businesses are located in Connecticut.

Efficiency For All

Engage + Educate + Advocate + Collaborate + Innovate = Positive Equitable Energy Policy Outcomes

About Efficiency For All (EFA) Efficiency For All is a non-profit 501(c)(3) clean energy policy advocacy group.

Our goals are to educate the public and leaders on the importance and benefits of sound, sustainable energy policy. EFA is a stakeholder association which works to keep stakeholders informed, collect and reflect energy-related data, advocate for the stabilization and expansion of energy efficiency programs, which protect human health, support local jobs, increase positive economic outcomes, reduce long-term energy costs, and educate the public on smart energy choices. Our work supports clean energy policy, building performance, green economies, local jobs, and a healthier cleaner environment.

www.efficiencyforall.org = https://efficiencyforall.org/wordpress/2018/12/18/efficiency-is-efficient/