Faces & Facts of Energy Efficiency

The Unsung Story of a Champion
Welcome and Thank YOU for being here.

Thank YOU for caring

For fighting for a safe sustainable energy future.

For your valuable time, ideas, efforts, resources, and support for our work on common goals and equity based policy and program outcomes in 2019!

Thank you Vivian Perez, Stephanie Weiner, Clean Water Action, Guy, Anne & Patrice, Andy, EFA, Jennifer, Edgardo, Lorenzo, Mark, Bernie, Peter, E4 the Future, and Efficiency First National!

Thank you to Jeff Hush & John Greeno, CHEER, Diane Duva, and DEEP
WHY ARE WE HERE TODAY?

We are here today because we care.

We desire to make positive improvements to our energy policies, plans, and programs which support increased equity, lowered energy demand, energy stability, and generate our collective energy needs with sustainable resources in our state.

We respect each other’s work, and desire to collaborate where we can find and leverage commonality.

We have different areas of expertise and we can leverage those skills together to support common goals, bigger outcomes, faster assimilation by leaders and communities.
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) energy policy advocacy group. Our goals are to educate the public and our 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 local and national 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 cleaner environment.

https://efficiencyforall.org/wordpress/2018/12/18/efficiency-is-efficient/
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 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 water and air, educate people, ensure Equity for all, and what steps we need to take this year to lay the foundation for our success. Because without a plan a goal is just a wish.....
The Lens for Today

1. We ALL have our own Belief Systems which drive our individual and our collective efforts. This is the lens through which we see the world.
2. It is NOT likely that We will change our Belief Systems today.

Today will FOCUS on Energy Efficiency, What it is, What it does already, and how we can support EE to meet the expressed common goals.

3. How can we maximize our efforts to attain our shared desired outcomes?
4. How does efficiency help reach carbon and renewable goals?
5. How does efficiency relate to Equity for ALL of Connecticut's people?
6. Who do we need to work with to reach our common goals?

A Goal without a Plan... is just a Wish.... We are past the time for wishes....
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 and being sustainable.

We likely agree that pollution is bad.

We likely think wasting any resource is not the best approach.

Most of us think that local jobs, economic growth, lower energy prices, lowering pollution, closing the affordability gaps, supporting positive health outcomes, increasing equity efforts 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.
Where Does our Electricity Come From?

- Unless you work in the energy field, 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.

- 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.
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.....
What is Demanding the Energy?

Buildings - The structures where we live, work, play, sleep, eat, learn, lobby, shop, charge our smartphones, watch TV, wait for our airplane, keep or food cold, cook our food, wash our clothes, take a hot shower, iron, fire your boiler, cool off in summer, read with light....

Connecticut Buildings and the energy they demand represent a collective 31 % of energy demand. * GHG GC3 report - CT DEEP

Buildings are where “we use the electricity” and Buildings demand Heating and Cooling. We heat with Natural Gas, Oil, Propane, electric heat, pellets, wood or other fuels as heating resources. Cooling = Electric usage
Carbon Emissions by Sector - Historical

Carbon Emissions by Sector - Historical


Buildings & Carbon

- 17.5% Residential
- 4.7% Industrial
- 8.8% Commercial
- 31% Carbon from Buildings
Carbon Emissions by Sector - 2014 by the Numbers

- **Total Combined Buildings** - 31%
  - Residential electric buildings demand - 17.5%
  - Commercial buildings Demand - 8.8%
  - Industrial Buildings - 4.7%

- **Electric Power Generation Demand** - 22.6%
  - Building Electric Power Generation Demand - 19.52%
  - Noin-Building Electric Power Generation Demand - 3.08%

- **Transportation** - 35%
- **Industrial Processes** - 4.9%
- **Waste** - 5.6%
- **Agriculture** - 0.06%

**NOTE: Energy Demand GC3 Data was 2014 data - Where did the demand go? The grid? Buildings? Street lighting?**

Carbon Emissions by Sector 2014 - Summary

- Other Sectors & Other Sectors
  - Electric Power Gen., 14.18%

- Buildings & Buildings Electric
  - Power Gen., 50.52%

- Transportation, 35.30%

Connecticut Energy Consumption by End-Use Sector, 2016

- Residential: 31.2%
- Commercial: 26.2%
- Industrial: 11.0%
- Transportation: 31.7%
What does this data mean to our common goals?

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 in transmission processes pollution can occur.

LESS Energy WASTE = LESS POLLUTION = Better Health & Fewer Environmental harms

LESS Energy WASTE = LOWERS COSTS = Helps affordability, Stability, Economic growth

COMBINING CONSERVATION AND RENEWABLES = WIN WIN WIN FOR ALL
HOW - Efficiency Programs Work in Connecticut

Connecticut laws direct utilities to collect money on energy bills, direct demand reduction plans, and work with RGGI carbon plans. (Laws = Goals)

These funds are intended to support any COST effective efficiency upgrades which are less expensive than another procured source of electricity.


The Plan includes budgets for: Residential Market rate, Residential Low Income, Small Business, Commercial industrial, and Multi-family housing.

Programs, incentives, and budgets are set by the Energy Efficiency Board, Public utilities, hired consultants, and are reviewed and approved by DEEP.
Connecticut has several Plans that should work together to meet the goals.

DEEP - Is the state Entity that manages these plans. CES, C&LM, GC3.

Plans are managed by boards: EEB, GC3, LIEAB, Green Bank board, Joint Committee (GB and EEB), DEEP holds a seat on the Green Bank Board.

Policy / Laws are directed by DEEP, Governor, Legislators and are voted into law and guide our state plans and direct funding collection, sources, and distribution of these resources to the Plans.

It is a benefit to all of us if the plans work together to meet energy goals.
Equity in Planning or Lack of Equity

Equity is a tricky word...

- There is a clear need to continue to view issues through the lens of equity.
- **Energy is connected to EVERYTHING.** It impacts our quality of life, ability to work, be warm, have access to information, use our phones, and on and on......

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

The **Affordability Gap in Connecticut** is getting wider every year
Over 400K CT ratepayers can’t afford Electricity

- *230,000 Eversource (ES) residential customers* were behind on their electric bills. This is 20% of the residential customer base. *As of May 1, 2018 for Eversource*

  The total ES delinquent balance was **over $130 million**.

- 70,000 electric service disconnects occurred through October 2018. That is almost twice the number that occurred for all of 2014 and 2015.

- At **UI, *23,000 customers*** were behind on their bills.

  They collectively owed a whopping **$56 million**. *As of May 1, 2018*

- **UI = 55,000 accounts terminated in 2017**, an astounding and troubling almost 20% of their residential customer base.

* Energy transition Team - OCC presentation Dec 2018
Thermal Improvements Lower Heating & Cooling Demand

Buildings - 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](http://www.eia.gov)
Heating & Cooling Loads - Yes Efficiency can help!

Heating and cooling buildings are a source of energy demand, thus air pollution, and carbon emissions in Connecticut. We have both a high winter heating demand, and a high summer cooling demand. These high use times are called Peak Demand. Seasonal daylight hours and the need for increased indoor activities correlate with Peak Demand Seasons and Times and exacerbate 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)

Our Innovative Building Performance C&LM programs - Include Thermal Improvements, and lighting upgrades, and lower our demand for heating, cooling, electricity, and water. They help during Peak Demand when we most need them.

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

The C&LM 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 Demand Reduction.

The Economic, Energy, and Health Impacts of our CT Efficiency Programs 2017 Annual Reports Facts up next........
C&LM benefits to Connecticut - One Year Benefits

- **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

Diverting CL&M Funds Just Doesn’t Make Cents

$2.4 Billion
Total impact to Connecticut economy over the next 2 years due to diversion of funds

$147 Million
Total diversion of Energy Efficiency Funds and RGGI over next 2 years
C&LM benefits to Connecticut

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

1. Residential and business customers experienced a decreased energy burden, allowing them to remain competitive with $3.7 Billion dollars in savings.

2. The 11.4 million tons of reduced emissions is the equivalent of removing 2.4 million cars off the road.

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.

Saving Energy Saves Lives and Improves Them...

**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.
How does it Save and improve lives?

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

- Insulation Air Sealing → Warmer drier air, improved indoor temperatures & relative humidity → Fewer heat or cold related deaths
- Heating System Upgrades → Less moisture, mold, particulates, pollutants, combustion by-products, allergens → Fewer asthma, respiratory, Chronic Obstructive Pulmonary Disease risks
- Ventilation Vent Dryers → Lower bills, better comfort → Fewer heart disease risks, headaches
- Efficient Cooking Appliances → Fewer cancer risks due to radon, formaldehyde, other sources → Less stress, better mental health

Reduced hospital or medical visits
Rice and Beans

Energy Conservation and Renewables are like Rice and Beans

You can eat Rice and Beans independently from one another and they will quiet your hunger .. but...

When eaten together they taste great, can sustain your body, end your hunger, and provide both short and long term benefits to your body systems. Together they form part of sustainable healthy lifestyle.

How you prepare the rice and beans ie. cooking methods, timing, and ingredients, (ingredient choices based are on accessibility, cost, taste, region, a cookbook or recipe, ability to follow the recipe, cooking tools available, the cooks in the kitchen, su chefs, and personal tastes of chefs and tasters affect the final dish.
Can Rice and Beans have diversity?

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

Like many regions in the world who eat rice and beans as part of their cultural diets,... each energy region has its own flair on the dish.

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 for this purposes, our Nutritional Regimen, meant to keep our energy supply stable healthy and safe.

Everything from our Belief System, knowledge base, associations, self interests, influences, and access in information or case studies, to real life experiences help shape and define what WE each think the dish/plan should look and taste like.

But not matter how we make the dish... We should consider equity.. And be sure that everyone gets a fair chance to eat some rice and beans if they want some rice and beans....

We can add things to the beans, like soy, or steak, or chicken, or spices... lighting controls, banking products, nuclear fuel, LNG, or take them out of the recipe/ plan based on availability, affordability and socioeconomic or health and safety concerns.
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.
Heat Rises - what goes out.. must come in....

Building science implements tools and proven techniques to address health & safety, energy loss, heat load and type, airflow, controls, ventilation, ducts, and the entire structure from foundation to roof line. It is a comprehensive approach to making buildings and homes safe, healthy, efficient, and environmentally sound.
Thermal improvements are like your hat and boots, gloves and coat, they lower demand for heating fuels by ensuring the building Shell is tight and insulated, and your heating/cooling system is the right size.

Because you lose less hot or cool air, you use less energy to heat and cool lowering our Peak Demand.
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.
“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.”
Hal, from Manchester, was very surprised about the comprehensive services and incentives which helped him to replace his old drafty single-pane windows and have professionals install high-quality insulation upgrades. He was interested to learn that it was paid for in part by a charge on his energy bill. This “Energy Efficiency Fund” can be used to help customers save energy and money in their home.

Hal’s family home received air sealing to stop both hot and cold air leaks, LED lighting upgrades, and water saving shower heads and faucet upgrades. In addition, he received 21 double-pane Energy Star windows as well as insulation upgrades. Hal used less financing to help install these energy saving upgrades because the Energy Efficiency Fund helped his family by paying part of the costs. These upgrades will save Hal nearly 7,000 gallons of oil over the next 25 years, over $16,000 at today’s oil prices. Best of all Hal’s yearly savings are over $700, while his copays for these upgrades were financed.
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.
Next steps

- Use the programs available to you and tell others how to enroll - visit Energize CT

![Energize CT Logo]

- Provide your own ideas and support the mission of reduction carbon emissions and energy waste statewide
- Get involved in local energy policy
- Learn more at [www.efficiencyforall.org](http://www.efficiencyforall.org)
Common Goals!

Engage + Educate + Innovate + Advocate + Collaborate
= Positive Lasting Change

- Daily Actions Influence the Environment
- Behavior Choices = Our Survival/Success
- Information & Motivated People Make Changes
- Utilize every program and person available to you to help you get involved locally and change our outcomes statewide
- The problem is not too Big - Together we can!

CAMBIO = CHANGE
Questions?