

# July – September 2022



building energy exchange

### BE-Ex team

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We reached brand new audiences, invited new collegues into the space, and released new educational programing on building decarbonization and electrification strategies.

### September 22, 2022

Beyond Zero Series: Burn Ban – The Benefits of Induction Cooking At this Beyond Zero Series event, Building Energy Exchange and NYSERDA hosted a discussion with experts about how induction cooktops enable full building electrification and significantly improve the health, comfort, and safety of New Yorkers.





## September 14, 2022 High Rise / Low Carbon: Sharing Heat

BE-Ex & NYSERDA hosted an event on thermal networks and their potential to redefine the way we heat and cool our largest buildings. Participants learned about thermal networks, hydraulic systems, and waste heat recovery deployed in retrofits at this program featuring Empire Building Challenge Partner projects.

https://be-exchange.org/high-rise-lowcarbon-sharing-heat/

# September 27, 2022 WISE: Leadership in Climate Tech

During the annual WISE keynote event, a panel of women developing innovative technology solutions to address the climate crisis spoke to the state of the industry, the ability of technology to transform society, and their personal experience within their professions.

https://be-exchange.org/wiseleadership-in-climate-tech/

# column: Now We're Cooking With(out) Gas: The Merits of Induction Cooking

by Grennan Milliken Associate, Projects Building Energy Exchange

Michael Faraday couldn't have **known in 1831**, as he wrapped two coils of wire on opposite sides of an iron ring and strung one of those strands to a battery, that he would revolutionize the way that people cook their food. But, as induction ranges and cooktops become increasingly popular in private homes and commercial kitchens. he seems likely to have done just that. Faraday is credited with having discovered electromagnetic induction through his little experiment and the phenomenon has since been used as the fundamental operating principle in transformers, generators, various electrical motors, and solenoids, a key component of car engines. In

ranges and cooktops, the technology of induction has been around since the 1970s, but only in recent years has it started to take off with the catastrophic threat of climate change looming overhead. Expanding knowledge of the negative impacts of gas ranges on respiratory health has also contributed to induction cooktops' rise in popularity.

### What is it?

Induction ranges and cooktops hack the natural properties of electromagnetic fields to generate heat in a pot or pan. They work like this: When you turn an induction cooktop on, an alternating electric current is generated in a series The process of induction cooking cuts out the intermediate step of heating up a burner, as an electric stove top does... making it faster and more efficient than regular electric cooking.

of coils underneath its glass cooking surface. This alternating current naturally produces a fluctuating magnetic field. Now what Faraday discovered with his experiment in 1831 was that when a conductor—in this case a pot or pan—is placed within the electromagnetic field, a new electric current is triggered—or induced inside that conductor. That tiny electric current has its own magnetic field which changes as the current grows.

This induces other tiny currents, which in turn induce their own.

This new electric current generated in the bottom of the cookware—about one volt—encounters electrical resistance. The pushback caused by this resistance on the electrical currents churning around in the bottom of the pot or pan is what creates heat. For induction to work properly, the cookware must be at least partially ferrous, meaning it must have some iron in it. So cast iron and stainless-steel pans are a yes, copper or aluminum pans, a no. This is because iron is a relatively poor conductor, which means it has a high electrical resistance and therefore generates heat in the cookware efficiently and effectively. If you were to use a great conductor like copper or aluminum, you would have to use significantly more electricity to generate any kind of heat because they have low electrical resistance. Most of the heat used to cook food is generated from this process. The rest comes from changes in the magnetic structure of the cookware itself.

The process of induction cooking cuts out the intermediate step of heating up a burner, as an electrical stove top does, and then transferring that heat to a pot or pan, making it faster and more efficient than regular electric cooking. Since the heat is generated in the pot itself, induction cooktops are even able to outperform gas units and come with a more precise ability to control cooking temperatures. That control is what has made induction so attractive to some chefs. Chef Justin Lee of Fat Choy, a vegan Chinese restaurant in Manhattan, told Building Energy Exchange that he cooks with induction because "In general, it is so much more precise than cooking with fire, especially at the lower range," adding "you can't necessarily put something on and walk away forever, but it is a significantly better moderator of heat than fire would be."

### Why Induction?

According to the latest report by the Intergovernmental Panel on Climate Change—the body of climate science experts convened by the United Nations—countries around the globe need to drastically slash emissions from coal, oil, and natural gas within the next few years to avert the most harrowing dangers of a changing climate. Induction ranges and cooktops are just one piece of solving this puzzle, but they could be a big one. Nearly one third of all households in the US—or 40 million homes—still cook with natural gas.

The main component of natural gas is methane, which has 25 times the atmospheric warming potential of carbon dioxide. About one percent of this is released unburned during cooking, but a recent study demonstrated that 75 percent of an average gas range's emissions occurs when the appliance is off, due to leaky fittings and connections with service lines. Induction ranges and cooktops have none of these onsite emissions.

Cooking food, regardless of the type of range or stovetop, also results in some amount of indoor air pollution, but no other ranges pollute at the levels or potency of gas units. During cooking on these ranges, which involves the combustion of natural gas, high levels of nitrogen dioxide, carbon monoxide, and fine particulate pollutants known as PM2.5 are released. At the size of 2.5 micrometers or less, PM2.5 particles are small enough to directly enter the bloodstream from the lungs making them especially dangerous. Tests show PM2.5 emissions from gas ranges can be two times higher than from electric units. The most heavily produced pollutant from natural gas combustion. however, is nitrogen dioxide (NO2).

Without Environmental Protection Agency (EPA) standards for indoor pollution levels, gas stove companies have not had to worry about what, or how much, is spewing out of their machines as you cook your food. As a result, many homes with gas ranges have unhealthily high levels of NO2, which is emitted during cooking and can take hours to dissipate. Old ranges in ill-ventilated kitchens are the worst culprits and are a common feature of many low-income households. This reality makes replacement of older gas cooking equipment an equity issue that currently impacts historically marginalized populations at a greater rate. In fact, the Rocky Mountain Institute (RMI) reports that homes with gas ranges have 50 to 400 percent higher NO2 concentrations than those with electric ranges. And the risks to health are well documented by the EPA. Long term exposure to NO2 can lead to the development of asthma in children and presents a danger to people living with other respiratory illnesses like

chronic obstructive pulmonary disease and emphysema. A 2013 meta-analysis of 41 different studies found that children growing up in a home with a gas range have a 32 percent increased risk of having asthma. All in all, the seemingly harmless act of gas cooking brews up a cocktail of pollutants in your home that are some of the main components of smog.

The emissions and health reasons for induction cooking over natural gas are myriad, but what about induction over regular electric cooking? Those come down to usage experience and efficiency. Induction is approximately 10-15 percent more energy efficient than regular electric ranges. This energy efficiency helps induction hobs cook faster too. According to Consumer Reports, induction ranges and cooktops are 20 - 25 percent faster than regular radiant (gas or electric) stovetops at bringing water to a boil. Using six quarts of water, that works out to about two to four minutes faster. That may not seem like a big deal, but in the middle of a busy day or in the bustling blur of a commercial kitchen, that can make a small, yet significant difference in time saved.

In addition to improving homeowner and tenant health, induction ranges also greatly reduce the danger of burns. Because induction is generating heat in the bottom of the cookware and not the hob, the glass surface of the cooktop remains relatively cool. Furthermore, because heat occurs only if the conductor, or pan, is sitting on the hob, if a dial is accidentally turned on, it won't get hot. "Within minutes it is more or less safe to touch. It's amazing," said Lee.

### Installation

Installing an induction range or cooktop is not as complicated as it may sound. In fact, replacing a regular electric with an induction is basically a one-to-one swap, but if switching from gas, as Consumer Reports points out, expect to pay an electrician to install the necessary wiring. This is key, especially if the home or building in question has older electrical infrastructure. Induction cooking requires a significant electrical pull and aged wiring can be dangerous if overloaded.

### Potential Drawbacks

Despite the promising aspects of induction cooking, there are some drawbacks to be considered. The biggest is the up-front cost. While prices for induction ranges have come down in recent years, Consumer Reports has them selling for roughly \$1,100. That's more than double some of the least expensive gas or electric ranges. Yet the long-term savings, improved safety, and healthier home environment offset this initial investment.

Another potential incurred cost is the cookware. Because induction cooking can only be done with ferrous metal, owners may have to replace copper and aluminum cookware with cast iron, stainless steel, or composite pots and pans.

Lastly, a possible hold-up to induction cooking for some users could be the

# "At the end of the day, it is better for the environment and, eventually, better for our wallet."

# - Chef Justin Lee

slight learning curve required to use ranges and cooktops. Some have regular knobs like gas or electric stoves, but some just have buttons and screens with temperature settings on them. For those that derive analog iov out of using a knob, switching to screens may feel awkward. And yet, as Lee pointed out, there is some amount of learning with any range. "If I write a recipe and I put 'medium high flame:' are the BTUs in my kitchen the same as the BTUs in your kitchen? Who's to say? So, you're learning to use flames the same way you're learning to use a number on a dial. Or on an LED display screen."

Gas ranges have often been a barrier to full building electrification. Gas has historically been cheap, people are comfortable with what they're familiar with, and regular electric ranges have for a long time been, simply, not as good as gas units. This has been especially true for chefs in commercial kitchens. But as cities move away from gas—New York City has banned all gas hookups in new buildings starting in 2023—homeowners and tenants will have to adjust, and induction ranges present a superior alternative in health, safety, comfort, and control. To chef Lee it was the best option. "We wanted it to be cost effective, which induction is, and then also powerful, which induction also is. At the end of the day, it is better for the environment and eventually—better for our wallet."

### programs

We've had a particularly active summer, delivering a host of highly subscribed BE-Ex programs, and hosting major partner events, like NYSERDA's RTEM Hackathon Demo Day and the NESEA Awards Ceremony.

### **BE-Ex hosted events**

BE-Ex hosted an exciting mix of partner events in Q3, spanning international round tables to awards ceremonies.



## **BE-Ex developed events**

### diversity goals

**1.** No all male panels Q3 number: 0

### 2.

50% female speakers across BE-Ex events Q3: 55%



average number of days on calendar, BE-Ex events 74

average attendance, BE-Ex events

## • audience

BE-Ex saw both steady audience growth, and one of our highest quarterly download counts in Q3, following the release of two industry resources—the Induction Cooking Tech Primer and High Rise / Low Carbon Profile: 345 Hudson.



Passive House Summer School Campaign

# Passive - House Summer School

live deliveries and free on-demand courses with code PHSUMMER August 1st to 31st

The Building Energy Exchange in partnership with the Passive House Network and NYSERDA offered an array of courses on the Passive House building standard as part of their comprehensive Passive House training pathway, supporting New York's ambitious carbon reduction commitments.

The Passive House Summer School aimed to spread awareness of the high-performance building standard through live and on-demand educational offerings for learners of all types— from those new to Passive House to seasoned industry professionals.

Over 700 people participated in our lives deliveries while over 100 completed courses on our on-demand e-learning platform.

## Passive House course offerings:



Primer Construction Primer Airtightness Energy Recovery Ventilation Insulation & Thermal Bridging Windows & Doors Project Process

# BE-Ex Joins ACEEE 2022 Summer Study

High-Rise Retrofits, Building Decarbonization, and Industry Climate Action

BE-Ex joined the American Council for Energy-Efficient Economy (ACEEE) 2022 Summer Study on Energy Efficiency in Buildings, across a series of panels spanning commercial tenant initiatives and scaling high-rise retrofits, to building electrification and catalyzing building industry climate action.

BE-Ex staff presented on the following panels:

- Unlocking Commercial Building Decarbonization
- Building Innovation Hubs: Accelerating and Expanding Capacity
- Electrification Continued Making It Happen

We were thrilled to present on the important research being done at Building Energy Exchange, share best practices and lessons learned with ACEEE participants, and leverage this knowledge to accelerate building industry climate action in our region—and beyond.

# October 26, 2022

Building a Better Future: Demystifying the IRA During Energy Efficiency Month, the Building Performance Partnership, a network of independent energy efficiency hubs, convenes to discuss the local and national implications of the Inflation Reduction Act for building decarbonization with perspectives across New York City, Chicago, Kansas City, St. Louis, and Washington D.C. This is the first event of an ongoing series exploring the opportunities embedded in this unprecedented climate action legislation.



https://be-exchange.org/building-a-better-future-demystifying-the-ira/

### October 26, 2022

High Rise / Low Carbon: Advanced Ventilation Goes Mainstream NYSERDA & BE-Ex invite industry experts to discuss new approaches to ventilation in large scale retrofits, covering energy recovery ventilation, decoupling ventilation from heating and cooling, and dedicated outside air systems that drastically limit humidity and loss of heat while providing fresh air to indoor occupants.

https://be-exchange.org/high-rise-low-carbon-advanced-ventilation-goes-mainstream/

### November 9, 2022

WISE: Ask Me Anything with Shepard Mullin's Gail Suchman BE-Ex board member and partner in the Real Estate, Land Use, and Environmental Practice Group at Sheppard Mullin, Gail Suchman, joins the Women in Sustainability & Energy (WISE) community for a conversation about her career and insights into the evolving field of environmental law.



# project highlights

### completed



# Tech Primer Induction Cooking Tech Primer

Debuted at BE-Ex and NYSERDA's Beyond Zero Series event, this case study explores user-friendly induction cooktops and their impact on indoor air quality, safety, and carbon emissions, within commercial and residential buildings.

## Patterns Heat Pump Planner

Our interactive Heat Pump Planner, a tool to help consumers determine the heat pump system that might be best for their home, is expanding to include patterns of additional typologies including ground source hydronic systems. Stay tuned for further content updates.



### upcoming



### Report HPD LL97 Affordable Multifamily Roadmap

This project will help affordable housing project owners and teams retrofit multifamily buildings in order to comply with Local Law 97 emissions caps. Resources will include an indepth Best Practices Manual and a set of case studies showcasing moderate and deep retrofit packages for a suite of multifamily building typologies.



### Tear Sheets & Report Commercial Data Into Action

This report will analyze energy benchmarking and auditing data from commercial office buildings to determine the GHG emissions reduction potential of various energy efficiency and electrification measures. The associated tearsheets will provide guidance on potential building retrofit pathways to achieve compliance with New York City emissions limits.

BE-Ex is glad to help building owners prepare for a climate-ready future – with resources focused on high-rise, low-carbon retrofits and upcoming guidance on recommended retrofit pathways.

### programs

Climate Mobilization Act Primer July 14th, August 11th

Passive House Fundamentals Series August 9th-30th, September 6th-27th

Passive House Project Process August 18th

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Passive House Construction Primer August 4th, September 4th, September 29th

Beyond Zero Series: Wecome to Carbon Neutrality July 21st

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A Conversation with NYC Council Member Jim Gennaro August 9th

High Rise / Low Carbon: Sharing Heat September 15th

Beyond Zero Series: Burn Ban – The Benefits of Induction Cooking

### September 22nd

WISE: Leadership in Climate Tech

September 27th

### project status

### Q3 2022

- High Rise / Low Carbon Series Partner Profile
- Induction Cooking Tech Primer
- Commercial Data Into Action Report
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- Commercial Data Into Action Office Decarbonization Pathway Tearsheets
- EGC Training: High Performance and Climate Resilient Building Design
- Ongoing

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•	Decarbonizing New York City Offices: Resources & Training
	HPD Local Law 97 Affordable Multifamily Roadmap – Case Studies & Best Practices Manual
	Heat Pump Planner Round 2
	BE-Ex Midwest Hubs Support
	Cold Climate Heat Pump Tech Primer
	Future Housing Initiative: An Equity & Carbon Database for Multifamily Housing

 Future Housing Initiative: Underwriting Standards for Low-Carbon Housing