Nebraska Energy Quarterly

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DEPT. OF ENVIRONMENT AND ENERGY

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Energy team changes at NDEE

The Nebraska Department of Environment and Energy has seen a few changes in its energy team lineup. Here is some news on recent promotions and a retirement.

Promotion

Katie Svoboda
Grants Section Supervisor

Katie became the Grants Section Supervisor in June 2022 after previously working as a fiscal compliance analyst and staff assistant for the Weatherization program. She has been with the agency for eight years.

"I'm looking forward to growing the grant programs to maximize the economic and environmental benefits for Nebraska citizens and bringing awareness to the Low Income Weatherization Assistance Program and how its benefits go beyond just energy efficiency."

Job change

Andrew Hug
Dollar and Energy Saving Loans Section
Environmental Specialist

Andrew has worked with NDEE for three years, previously serving as an environmental assistance coordinator. He began his role as an energy specialist with the Dollar and Energy Saving Loans Section on Sept. 26.

"I'm looking forward to new challenges as the state begins to manage new federal funds that improve energy efficiency and facillitate the energy transition," Andrew said.

Retirement

Ed Holbrook

Ed served as the DESL Federal Aid Administrator. He retired on May 20, 2022, and served the state of Nebraska for seven years.

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October is Energy Awarness Month

Gov. Pete Ricketts has proclaimed October as Energy Awareness Month and recognized Oct. 30 as Weatherization Day.

Energy Awareness Month and Weatherization Day aim to share information about energy efficiency and energy conservation. They also celebrate the economic and environmental benefits driven by energy efficiency. Energy efficiency is using technology that requires less energy to perform the same function, while energy conservation is any behavior that results in the use of less energy.

Photo by Onur Binay on Unsplash

Throughout October, the Nebraska Department of Environment and Energy will share energy tips on its Facebook page to celebrate Energy Awareness Month. These tips, such as not leaving your cell phone plugged in overnight, aim to promote energy conservation and efficiency.

The Nebraska Department of Environment and Energy plays a critical role to protect and improve human health, the environment, and energy resources. NDEE's Dollar and Energy Saving Loans Program (DESL) helps thousands of Nebraska residents, local business, school districts and municipalities make their homes and buildings more energy efficicent. Since March 1990, the DESL program has financed more than 30,000 energy saving projects totaling more than $385 million.

The department's Weatherization Assistance Program enables low-income families to make their homes more energy efficient, resulting in savings on their energy bills. Since 1977, the Weatherization program has spent more than $220 million to make energy efficiency improvements in more than 70,000 homes.

The goals of Energy Awareness Month and Weatherization Day are to share tips, tools and stories that promote the multiple benefits of energy efficiency, from lower costs to healthier homes. It's important to implement actions to improve energy efficiency on a daily, weekly, monthly, and annual basis. Energy impacts every citizen.

Throughout October, NDEE will post energy tips on its Facebook page. Be sure to like and follow the agency's page so you don't miss this important information.

The energy team at NDEE is also planning internal events to help other team members better understand energy and energy savings. Events include Energy Bingo and Energy Trivia, an energy presentation during the department's NDEE University – an internal training program – and a lunch and learn about the agency's Weatherization Program.

By the end of the month, NDEE hopes its teammates and all Nebraskans will have learned more about energy and energy savings, and have had a good time doing it.

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Electricity storage options open up for homeowners

by Andrew Hug
Environmental Specialist, NDEE

In the past, the primary option for whole house backup electricity was a generator powered by air-polluting diesel, propane or gasoline. But newer options are available, including battery storage systems designed specifically for the home or an electric vehicle.

There are several household battery storage system chemistries to choose from, including the lithium-nickel-manganese-cobalt battery used in many electric vehicles; lithium iron phosphate; several kinds of flow batteries; semi-solid state; and lead-acid car batteries. Each has advantages in terms of cost, safety, time it supplies power, and number of years before the battery performance degrades.

Lithium-ion and lithium iron phosphate have been the most common household storage batteries, but companies have recently introduced both flow batteries and semi-solid state batteries for the home market. Flow batteries are less expensive and last for decades, but also occupy more space than the lithium-based batteries. The semi-solid state batteries charge quickly and provide a lot of power in a compact package, though pricing is not yet available. An increasing number of battery manufacturers are in the market, the largest of which are Tesla, LG Chem, Sonnen, Duracell, and Panasonic, plus there are many startups.

Buyers commonly purchase systems rated for about four hours of power, which is sufficient for the majority of outages. But, of course, battery life depends on demand choices. Additional batteries will increase the time covered, but the cost can be considerable relative to the odds of needing that capacity in any given year.

Before installing a backup battery system, be sure to verify the battery's compatibility with your existing technology. For example, some batteries will only accept a charge from a home solar system, others only from the grid and others from either. Some come with a built-in inverter while others require a separately purchased inverter. Some that work with your solar system accept alternating current (AC) while others accept direct current (DC), so consult with your solar installer or an electrician to ensure all components work together properly.

When buyers must purchase a new panel, they should also consider purchasing two additional pieces of hardware: a critical load panel that pulls together just the most important circuits you want to maintain during an outage, and a smart electrical panel that provides circuit level monitoring, control and flexibility.

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Another alternative to the generator has also entered the marketplace – electric vehicles with bi-directional charging that can deliver power back to the household. The Ford F-150 Lightning offers this bi-directional charging already and other car makers – including General Motors, Tesla, Toyota, Nissan and Volkswagen – are quickly following suit. Car and Driver notes that the Ford F-150 normal range battery (98 KWH) can power a house for several days . Electricians need to install wiring and hardware to enable cars or batteries to power homes just like a generator.

Costs Present and Future

The U.S. Department of Energy labs and industry analysts such as Bloomberg and IHS Markit expect battery prices to continue to drop even while their capabilities improve. Both the technology itself and manufacturing processes are on the steep portion of the innovation curve, and economies of scale are becoming more fully developed with tens of billions being invested in over a dozen U.S. battery factories, most of which are expected to be online by 2025.

Of course, supply chain issues are currently pushing prices up, which is happening to a large number of manufacturers, but those issues are expected to be temporary and battery prices are expected to continue their decline.

Researchers across the world are investing billions per year to engineer batteries that are simultaneously technologically superior and less expensive than current technologies, and several of them will enter the marketplace in the next two to three years.

For example, the journal Nature reported in August 2022 that a global team led by MIT has produced a battery consisting of sulfur and aluminum electrodes and a chloro-aluminate electrolyte – components that are more abundant and less expensive than those found in current lithium-ion batteries. They project the cell-level cost to be less than one-sixth the cell-level cost of current lithium-ion technologies. The team has patents and an established business ready to market it. The battery allows for faster charging times, is inherently able to prevent damaging dendrite formation and uses a non-flammable electrolyte – all advantages over lithium-ion chemistry .

Home energy storage systems can be expensive–running from $7,000 to $20,000 for a home, depending on size and preferences. However, an equivalent whole-house diesel generator with connection hardware and installation costs between $6,000 and $11,000 on average, plus fuel costs of $50 to $150 per day, according to Forbes Advisor. Some customers can offset costs by buying electricity when it is inexpensive and selling it back when it is expensive. Costs can also be offset by utility and government programs that offer a variety of incentives for energy efficiency investments, and the Inflation Reduction Act, signed into law on August 16, 2022, provides for an additional set of rebates and tax credits for home energy storage systems as well as for any needed upgrades to the panel and wiring.

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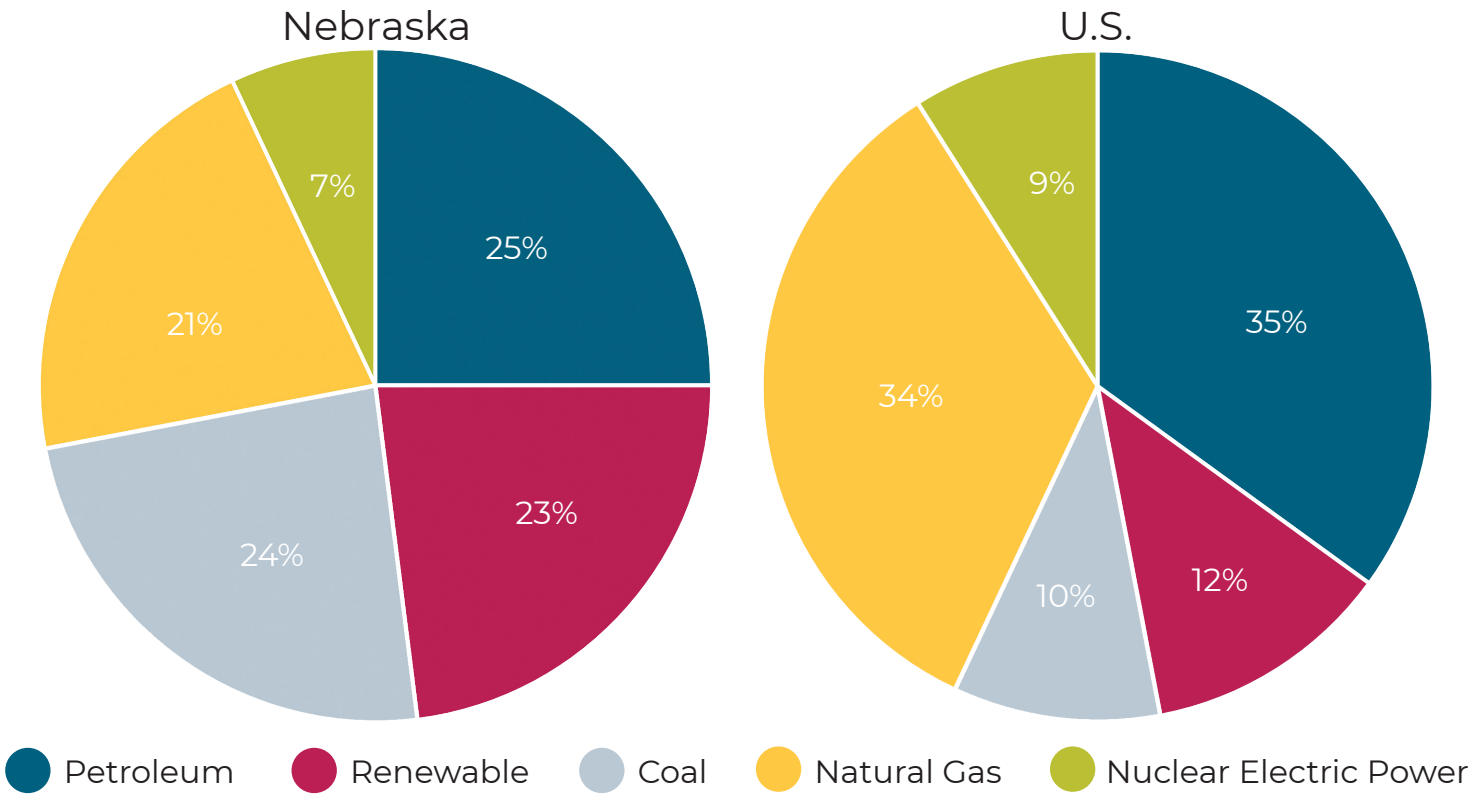
Nebraska by Numbers

Total Energy Consumption by Fuel Type in 2020



Total Energy Consumption in 2020

Nebraska

863.7 trillion Btu

U.S.

92,862.3 trillion Btu

Total Energy Consumption per Capita in 2020

Nebraska

440.3 million Btu

U.S.

280.1 million Btu

Nebraska's total energy consumption in 2020 was less than one percent of the United States' total energy consumption. However, Nebraska's energy-intensive industries and weather extremes contribute to the stat having a higher energy consumption per capita than the U.S. average, according to the Energy Information Administration (EIA).

Nebraska ranked **33rd** in energy consumption in 2020.

Texas ranked 1st with an energy consumption of 13,480.8 trillion Btu and Vermont ranked 50th with a consumption of 125.7 trillion Btu, according to the EIA.

Sources: The Nebraska Department of Environment and Energy and the Energy Information Administration

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Proper ventilation can improve home's energy efficiency

Information from the U.S. Department of Energy

Ventilation is very important in an energy-efficient home. The "appropriate" amount and type of ventilation varies from home to home and from occupant to occupant. Different households have different occupancy levels (people and pets), schedules, activities, health concerns and other preferences that will influence appropriate ventilation systems and operation.

Ventilation also helps control moisture, reducing the chances of mold growth and structural damage. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) specifies how a home's living area should be ventilated in ASHRAE Standard 62.2.

Ventilation Options

There are three basic ventilation options —natural ventilation, spot ventilation, and whole-house ventilation.

Natural Ventilation

Natural ventilation is the uncontrolled air movement in and out of the cracks and small holes in a home. In the past, this air leakage usually diluted air pollutants enough to maintain adequate indoor air quality. Today, we are sealing those cracks and holes to make our homes more energy-efficient, and after a home is properly air sealed, ventilation is necessary to maintain a healthy and comfortable indoor environment.

Opening windows and doors also provides natural ventilation, but many people keep their homes closed up because they use central heating and cooling systems year-round.

Natural ventilation is unpredictable and uncontrollable—you can't rely on it to ventilate a house uniformly. Natural ventilation depends on a home's airtightness, outdoor temperatures, wind and other factors. During mild weather, some homes may lack sufficient natural ventilation for pollutant removal. During windy or extreme weather, a home that hasn't been air sealed properly will be drafty, uncomfortable and expensive to heat and cool.

Spot Ventilation

Spot ventilation can improve the effectiveness of natural and whole-house ventilation by removing indoor air pollution and/or moisture at its source. Spot ventilation includes the use of localized exhaust fans, such as those used above kitchen ranges and in bathrooms. ASHRAE recommends intermittent or continuous ventilation rates for bathrooms of 50 or 20 cubic feet per minute and kitchens of 100 or 25 cubic feet per minute.

Whole-House Ventilation

The decision to use whole-house ventilation is typically motivated by concerns that natural ventilation won't provide adequate air quality, even with source control by spot ventilation. Whole-house ventilation systems provide controlled, uniform ventilation throughout a house. These systems use one or more fans and duct systems to exhaust stale air and/or supply fresh air to the house.

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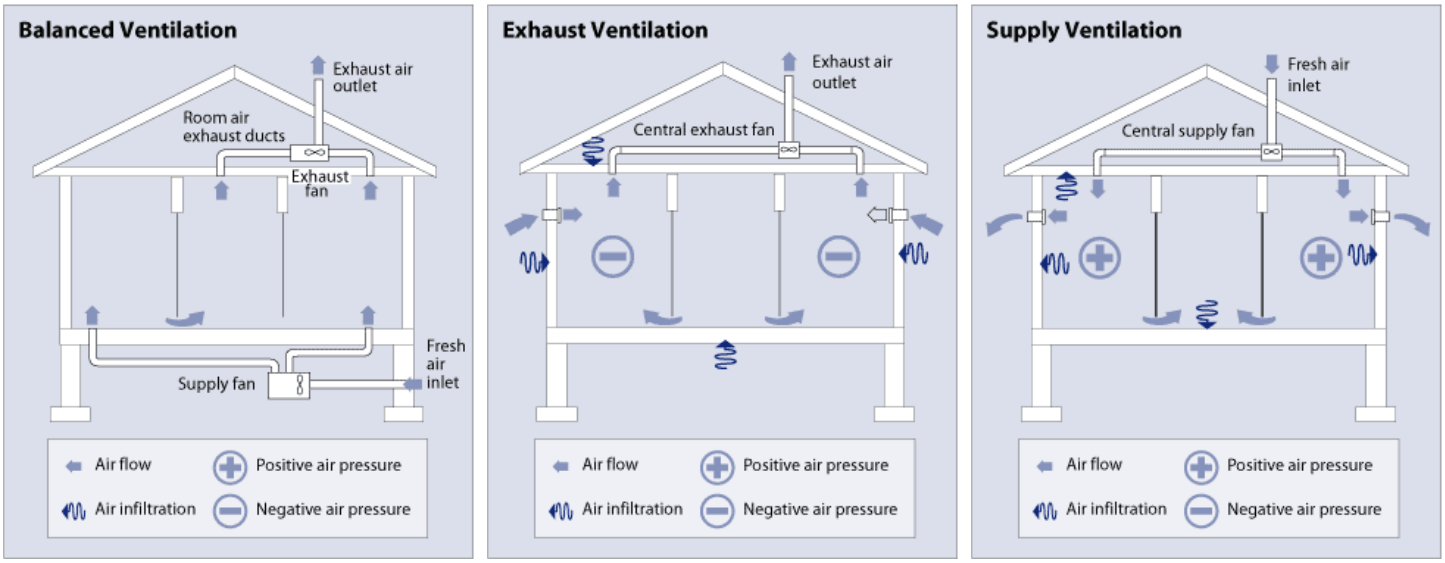
There are four types of systems:

- ***Exhaust ventilation systems*** work by depressurizing the building and are relatively simple and inexpensive to install.
- ***Supply ventilation systems*** work by pressurizing the building, and are also relatively simple and inexpensive to install.
- ***Balanced ventilation systems***, if properly designed and installed, neither pressurize nor depressurize a house. Rather, they introduce and exhaust approximately equal quantities of fresh outside air and polluted inside air.
- ***Energy recovery ventilation systems*** provide controlled ventilation while minimizing energy loss. They reduce the costs of heating ventilated air in the winter by transferring heat from the warm inside air being exhausted to the fresh (but cold) supply air. In the summer, the inside air cools the warmer supply air to reduce ventilation cooling costs. Compare whole-house ventilation systems to determine which is right for your home.

Ventilation for cooling is the least expensive and most energy-efficient way to cool buildings. Ventilation works best when combined with techniques to avoid heat buildup in your home. In some climates, natural ventilation is sufficient to keep the house comfortable, although it usually needs to be supplemented with spot ventilation, ceiling fans, window fans, and—in larger homes—whole-house fans.

Ventilation is not an effective cooling strategy in hot, humid climates where temperature swings between day and night are small. In these climates, however, natural ventilation of your attic (often required by building codes) will help to reduce your use of air conditioning, and attic fans may also help keep cooling costs down.



Images from the Department of Energy

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