Warmer summers risk chilling energy bill hikes at supermarkets

July 3 2020, by Simon Levey, Sara West

Credit: CC0 Public Domain

A new report from Imperial and Sainsbury's outlines how well-managed fridges can keep food cooler, be greener, and cut costs.

The conditions of summer of 2018, with record breaking temperatures and 650 additional deaths in England and Wales, are likely to be

considered "normal" by 2050 unless significant action is taken to cut the level of climate change-causing greenhouse gasses in the atmosphere. A hotter climate poses challenges for cooling homes, working conditions and critical business operations so that people can live and work comfortably.

Supermarkets face the added costs associated with keeping food refrigerated to prevent fresh products such as vegetables, fish and pre-prepared meals from going to waste, and keeping drinks and ice creams and other chilled products cold. They must also minimize energy use to avoid higher bills and follow laws to reduce their carbon footprint to zero by 2050.

Now, Imperial College London researchers and students, working with leading UK supermarket Sainsbury's, have calculated the scale of this refrigeration challenge, and make recommendations how all supermarkets could minimize the increased energy used by refrigerators on hotter summer days.

Findings from the new report indicate that a 2°C increase on today's average UK summer temperature boosts the energy demand for refrigeration by 6 percent.

The recommendations, published in a new report, aim to help global supermarket businesses reduce their contribution to global warming, by cutting greenhouse gas emissions and improving their ability to 'be green' while keeping food and drink chilled for customers.

Baking in a hot oven

According to official Met Office data, the average temperature in the UK during July 2018 was 2.2°C above the long-term average from 1981-2010, and the average maximum temperatures in central and

southern parts of England were over 4°C above average. Recent research has shown that climate change is predicted to lead to more unusually hot summer days, as experienced in 2018, and heatwaves as felt across the northern hemisphere in 2019.

Researchers from Imperial's Department of Chemical Engineering measured the energy consumed by refrigerators in 30 Sainsbury's stores in London and South East England during summer 2018. They found that the machines were working harder, requiring 5-11 percent more energy compared with summer 2017, when temperatures were considered by the Met Office to be average for the time of year.

The researchers also recorded that some refrigerators broke down more often, as they struggled to keep food chilled during hotter days. This increased costs for stores, paying for repairs, as well as their energy bills, with food potentially being wasted if the products from broken refrigerators weren't transferred quickly enough to another cold space.

Dave Merefield, who is Carbon, Utilities & Engineering Manager at Sainsbury's, said: "We recognize the significant threat posed by climate change which is why we've committed to bringing our carbon emissions down to net zero by 2040. As a supermarket retailer, the energy used in refrigeration is a key area for reducing carbon emissions so this research helps us to better understand some of the challenges we may face in adapting to a warmer climate while reducing our environmental footprint."

A chilling conclusion

Dr. Salvador Acha from Imperial's Department of Chemical Engineering, who manages the research program with Sainsbury's, said: "A warmer climate will mean refrigeration systems work harder and use more energy, however thorough monitoring and proactive maintenance

regimes are a step in the right direction to solve these problems. Identifying recommendations for each supermarket needs to happen on a site-by-site basis and includes a range of technological, managerial and behavioral solutions."

Credit: Imperial College London

The report recommends that each supermarket conducts a rigorous maintenance program of its refrigerators before summer temperatures start to heat up. Dr. Acha added: "Our findings indicate that a close relationship with maintenance teams is fundamental in ensuring systems are reliable during extreme hot weather periods."

Other low-tech solutions that lead to significant improvements include

installing doors on the front of all fridge cabinets to keep cold air in, properly maintaining the working parts, using insulating blinds that reduce energy use at night, and ensuring refrigerators are not overstocked with products as this makes them work harder. Behind the scenes, where supermarkets have cold-storage rooms, they should have properly used and well-maintained swing-doors to keep the cold air inside.

These actions could help to reduce the stores' energy bills by between 3 and 10 percent, according to researchers, while helping supermarkets to keep food chilled whilst temperatures increase outside.

Essential engineering experience

Matthew Hart and William Austin, final year undergraduate students from the Department of Chemical Engineering visited the stores and analyzed their energy performance.

Matthew said: "Undertaking this work demonstrated the power of collaboration between industry and academia by sharing expertise and acquired knowledge. Applying fundamental engineering principles to a real-world commercial problem gave me invaluable insight into the research underpinning investment decisions for large corporations."

Dr. Acha said: "They both are young engineers enthusiastic about driving a positive change across industry and have picked up valuable skills and experience from the work with Sainsbury's."

Climate smart innovation

After the UK government passed legislation requiring the country to reduce its operational carbon footprint to zero by 2050, businesses have

been investing in solutions that will see them achieve or better this target.

The authors of the report suggest that it is the government's responsibility to encourage all companies using refrigerated units to reduce their energy consumption—as there are many easy low-tech solutions, as well as the opportunity to develop high-tech alternatives.

Dave Merefield said: "Businesses need to be up to date with the latest technology innovations to future-proof their growth in a sustainable manner."

More information: Impact of a Warming Climate on UK Food Retail Refrigeration Systems. www.imperial.ac.uk/grantham/pu … ons-for-industry.php

Provided by Imperial College London

Citation: Warmer summers risk chilling energy bill hikes at supermarkets (2020, July 3) retrieved 27 July 2024 from https://phys.org/news/2020-07-warmer-summers-chilling-energy-bill.html