



SEVERE WEATHER AND RESTAURANTS

COMPARING THE COST OF SEVERE WEATHER AND
NEW POWER PLANT EMISSION STANDARDS ON THE
RESTAURANT INDUSTRY

NOVEMBER 2015

CONTENTS

INTRODUCTION	3
KEY FINDINGS	4
DISCUSSION	5
Significance of Restaurant Industry to the U.S. Economy	5
Restaurant Economics	5
U.S. Food Production	5
Food Imports and Global Interdependence	6
Climate Change’s Current Impact on Farms and Ranches	7
Displacement and Stranded Assets	8
Impact on Restaurant Supply Chain	9
Restaurants’ Investment in Energy Efficiency and Sustainable Production	11
Severe Weather’s Impact on Restaurant Traffic	12
Impact of New EPA Standards on Restaurant Costs and Profits	12
METHODOLOGY	14
ENDNOTES	15
CONTRIBUTORS	17

INTRODUCTION

This is the second in a series of reports by Business Forward that examine the impact of climate change on American industries. Our first report examined manufacturing with particular emphasis on the automotive sector. This report looks at the restaurant industry, including climate change's impact on (1) the quality, price, and availability of key food ingredients; and (2) consumer demand for restaurant meals.

Our reports combine industry cost and revenue analysis with case studies and testimony from local business leaders that have participated in Business Forward briefings.

In most cases, the impact of severe weather, extreme temperatures, and drought associated with climate change are still modest. But industry trends and the commentary provided by thousands of business leaders who have participated in Business Forward briefings suggest that the impact is measureable and increasingly material.

We also compare the costs associated with climate change to the potential costs of the Environmental Protection Agency's (EPA) Clean Power Plan that limits the amount of carbon American power plants are permitted to emit.

**“AS A CHEF, I WORRY THAT
EXTREME WEATHER, LIKE
CALIFORNIA’S DROUGHT, MAY
BECOME THE NEW NORMAL.”**

— Patrick Mulvaney, chef and
proprietor, Mulvaney’s B&L,
Sacramento, CA

KEY FINDINGS

- In 2015, America's nearly **1 million restaurants are predicted to generate \$709 billion in sales**. The industry employs one in 10 U.S. workers and generates 4 percent of U.S. GDP.ⁱ
- A successful upscale casual restaurant can serve **350,000 meals per year, generate \$7 million in sales, and purchase \$2.5 million worth of food and other ingredients**.ⁱⁱ
- Restaurants rely on large supply chains. **The average pound of fresh food purchased in the U.S. travels 1,000 miles from farm to table, and 20 percent of the food Americans buy is sourced from other countries**. Imports vary by season. For example, a restaurant that buys American soybeans in summer shifts to Brazilian soybeans in winter. Not surprisingly, restaurant executives report higher levels of supply chain risk than other industries.ⁱⁱⁱ
- The quality, availability, and price of the food restaurants serve and the supply chains that deliver that food are being disrupted by extreme heat, drought, heavy rains, and severe weather associated with climate change.
- Farmers are responding to recent severe weather by investing more in irrigation, using more pesticides, changing how they rotate their crops, and changing the mix of crops they grow. Ranchers have responded, in part, by slaughtering more of their livestock and shifting more livestock production from the drought-afflicted Southwest to cooler climates in the Upper Midwest.
- **If temperature and severe weather trends continue as projected, crop yields and livestock health will decrease further**. As the optimum climate for growing a particular crop shifts north, farmers will have to find replacement crops or move. Many farms and ranches will no longer be

“ANY SEVERITY IN CLIMATE THAT AFFECTS FARMERS AND CROPS WILL ALSO AFFECT PRICES FOR RESTAURATEURS AND ULTIMATELY THE CONSUMERS AS WELL.”

— Marc Murphy, chef and owner, Benchmark Restaurants and Benchmark Events by Marc Murphy

suitable for their current uses.^{iv}

- While it is difficult to parse severe weather-related costs from other factors in the supply and demand for U.S. food, severe weather has had a profound impact on some of the America's most important food-producing regions. Drought in California alone has caused the price of beef and more than 100 produce items to rise. **Wholesale food prices have risen by approximately 25 percent over the past five years**, approximately two and a half times faster than general inflation. Beef prices rose 23 percent in 2014 alone.^v
- **Restaurants are energy-intensive enterprises**, using five to seven times more energy per square foot than other commercial operations.
- **Electricity represents about 2 percent of a restaurant's costs**, about twice the average for all industries.
- Even with the industry's comparatively high electricity usage, the projected increase in electricity costs caused by the **EPA's new power plant standards would add only one cent to the cost of a \$20 meal**.^{vi}

DISCUSSION

SIGNIFICANCE OF RESTAURANT INDUSTRY TO THE U.S. ECONOMY

In 2015, America's nearly 1 million restaurants are projected to generate \$709 billion in sales. The industry employs 14 million U.S. workers, about 10 percent of the U.S. workforce. Its sales represent 4 percent of the country's GDP.^{vii} By 2020, restaurant sales could grow by \$95 billion (in current dollars).^{viii}

Nearly half of every dollar spent on food is spent at a restaurant (47 percent). This percentage has nearly doubled over the past sixty years.^{ix} 7

RESTAURANT ECONOMICS

A successful upscale casual restaurant can serve about 350,000 meals per year, generate \$7 million in sales, and purchase \$2.5 million worth of food and other ingredients.^x

Costs vary from category to category (including quick serve, fast casual, family dining, casual dining, and fine dining) and market to market, but a restaurant's largest costs are labor and food. For one successful, mid-sized upscale casual chain in the Midwest, food represents 28 percent of its costs, and approximately 70 percent of the food it buys is fresh. Labor and rent are 26 percent and 22 percent of its budget, respectively.^{xi}

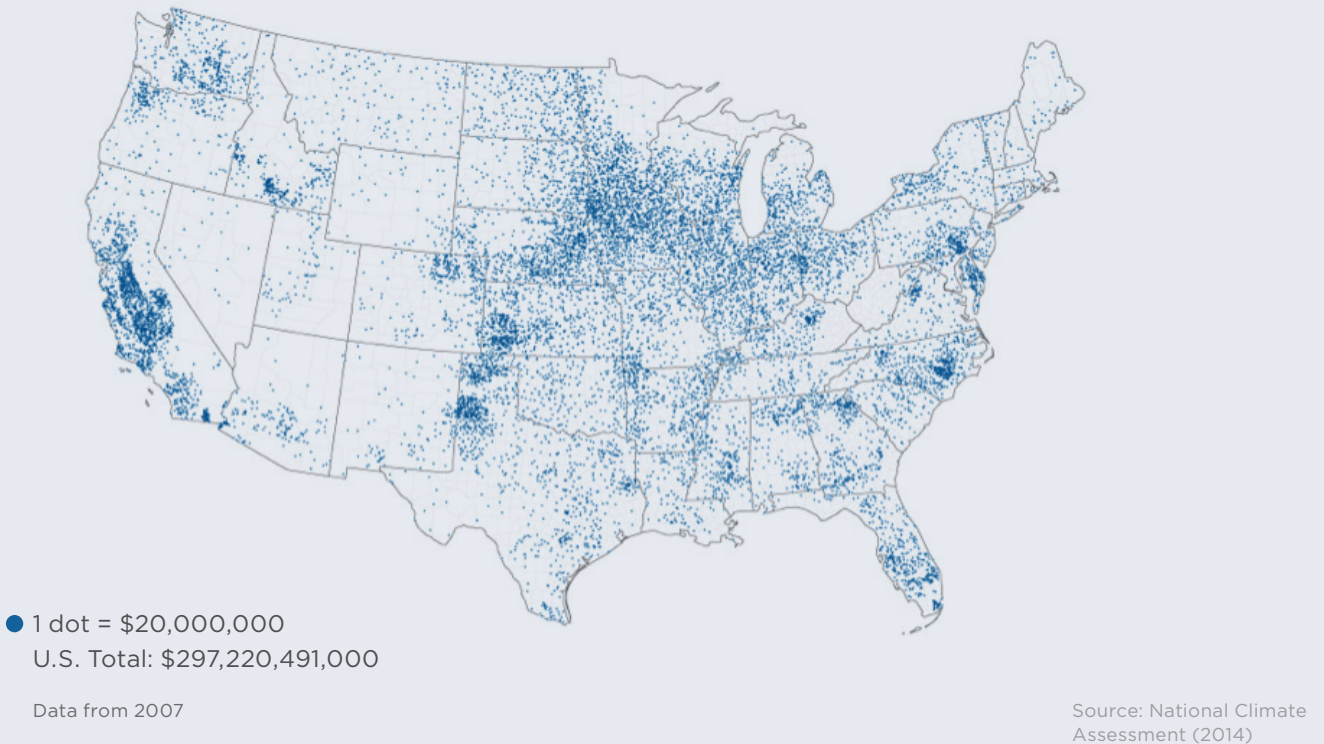
In a 2014 survey by the National Restaurant Association, the nation's largest restaurant trade group, "table" service restaurant owners (family, casual, and fine dining) ranked food costs as their most significant challenge, above concerns about the economy, attracting new customers, or bringing back repeat customers. Similarly, the Manufacturing and Wholesale Distribution Survey found that companies in the food and beverage industries report higher levels of supply chain risks than other industry segments. More than half of industry executives consider transportation disruptions or weather disruptions to be significant risk factors, compared to about 25 percent for other industries.^{xii}

U.S. FOOD PRODUCTION

The U.S. produces \$395 billion in agricultural commodities each year (roughly half from livestock and half from crops). Crops and livestock are distributed widely across the U.S., based largely on the optimum climate for each species.^{xiii}

Nearly 10 billion pounds of fish are caught in or near U.S. waters each year with an estimated value of \$5.5 billion.^{xiv}

MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD



FOOD IMPORTS AND GLOBAL INTERDEPENDENCE

The U.S. imports \$104 billion worth of agriculture and livestock products each year, including 13 percent of the grains, 20 percent of the vegetables, nearly 40 percent of the fruit, 85 percent of the fish and shellfish, and almost all of the tropical products (coffee, tea, bananas, etc.) Americans consume.^{xv}

Production and sales shift from season to season. As fields in California's Central Valley grow colder, production picks up in Arizona and Mexico. In winter, American restaurants buy more of their fruit and some of their vegetables from South America. Brazil has recently emerged as a major grower of staples, including soy.

Most of the shrimp and crab served in U.S. restaurants is caught or raised in Asia, while most farmed salmon comes from Chile and Argentina. When severe weather affects production in those regions,

restaurant prices in the U.S. are likely to rise.

“When it comes to restaurants, the world is smaller than you think,” says one restaurant executive for a mid-sized chain in the Midwest. “Prices in the U.S. depend heavily on supply and demand in other markets.” In 2013, a drought in China hurt poultry production there, causing a spike in demand for U.S. poultry that increased prices for American buyers, including restaurants. A drought in Russia had the same impact on U.S. wheat prices in 2010. During the winter of 2013-4, the polar vortex affected lime orchards in Mexico, causing a temporary, six-fold increase in U.S. lime prices. Sudden cold waves during spring bloom have also affected avocado and nut production in Mexico.^{xvi}

“MORE FREQUENT AND MASSIVE HEAVY RAINS IN A SHORT PERIOD OF TIME FOLLOWED BY MONTHS OF LITTLE OR NO PRECIPITATION TREMENDOUSLY REDUCE OUR YIELD. THE ONLY WAY I SURVIVE AND CONTINUE TO GROW THE FOOD WE ALL EAT IS WITH THE HELP OF FEDERAL CROP INSURANCE, BUT WE’D BE BETTER OFF INVESTING IN SOLUTIONS TO CURB CLIMATE CHANGE.”

— David Kolsrud, co-founder,
The Funding Farm, Brandon, SD

CLIMATE CHANGE’S CURRENT IMPACT ON FARMS AND RANCHES

Climate change is affecting crops and livestock in three ways.^{xvii}

First: Consistently warmer temperatures stress plants and livestock. Temperatures across the U.S. are 1.3 to 1.9 degrees warmer, on average, than they were when measurements were first recorded in 1895, and most of this increase has occurred since 1970. Nineteen of the 20 hottest years on record occurred in the past two decades, and that has had a measurable impact on crop yields and livestock health. By comparison, weeds tend to be more temperature tolerant than food crops, which has forced farmers to increase their use of pesticides as

temperatures rise. Heat waves have become more frequent and intense, particularly in the West. For example, in 2011 and 2012, heat waves occurred at three times the long-term average.

Second: Rising surface temperatures are disrupting weather patterns, affecting rainfall and even the timing and duration of growing seasons. Heavy downpours are increasing nationally, particularly in the Midwest and Northeast. The average growing season from 1991 to 2012 (defined as the number of days between the last freeze of winter and the first freeze of fall) is six to 19 days longer (depending on the region) than it was from 1901 to 1960, on average.

Nationwide, the amount of rain falling each year has remained relatively consistent, but that rain falls in fewer, more intense storms. Storm rains are more likely to run off fields without being absorbed by plants. In extreme cases, they cause soil erosion. Because these changes are driven by weather patterns, they vary from region to region. Generally speaking, recent weather data suggests that drier regions of the U.S. are growing drier, while wetter regions are growing wetter.

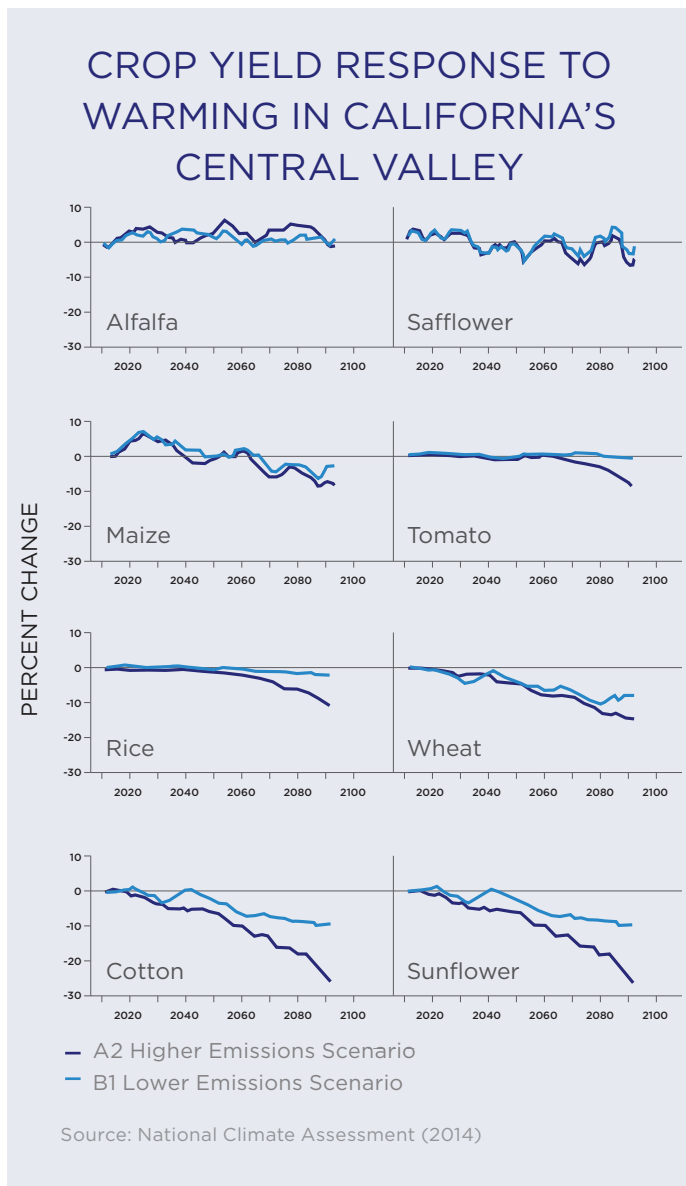
“AS WE DEBATE HOW TO RESPOND TO THIS NEW, SEVERE WEATHER, I HOPE THE REST OF AMERICA WILL UNDERSTAND JUST HOW VULNERABLE OUR FARMS CAN BE.”

— Jake Braken, manager, Green
River Companies Alfalfa Farm,
Green River, UT

Third: Consistently warmer ocean surface temperatures are increasing the power and frequency of storms and severe weather. For example, warmer ocean waters sustain hurricanes better than cooler waters, which means, all else being equal, hurricanes will travel farther, last longer, and generate more power as ocean surface temperatures rise. Storms are particularly damaging to crops and livestock when they occur during pollination or blooming season, which can reduce crop production significantly.

DISPLACEMENT AND STRANDED ASSETS

Each species of plant and livestock has its own temperature threshold that defines its geographic range. Warming temperatures are already forcing farmers, fisherman, and ranchers to change where or how they do business. For example, as ocean temperatures have risen, some fish species are migrating north to cooler waters. Among those affected most are American cod fishermen. In 2013, commercial fishing vessels caught less than 5 million pounds of Atlantic Cod in New England, a 71 percent drop from 2011's catch of 17.5 million pounds.^{xviii} As the Southwest drought has continued, cattle production has shifted north, from California and Oklahoma to Minnesota, Michigan, and Wisconsin. Soy farmers, who supply feed to cattle ranchers, followed the cattle industry north. In February 2013, the drought caused Cargill to shutter a 2,000-employee meat processing facility in Plainview, Texas. It had invested \$50 million in the facility over the previous five years.^{xix}



If temperatures continue to rise, farms will have to switch crops or see production fall. Over time, these rising temperatures could force producers to shift production altogether, leaving obsolete farms, ranches, or fishing fleets as “stranded assets.” Risky Business, a research organization founded by three of America’s most successful CEOs, projects that the lower half of the Midwest (Missouri, Illinois, Indiana, and Iowa) could suffer significant corn yield losses by mid-century if no changes are made.^{xx}

Production shifts will be particularly disruptive to orchards, which take more time to plant and mature. Facing shorter frost periods and more hot nights, California’s fruit and nut orchards are expected to be at serious risk within the next 25 years. The current growing area for grapes is expected to decline by 50 percent by the end of this century.^{xxi}

IMPACT ON RESTAURANT SUPPLY CHAIN

Average wholesale food prices increased by more than five percent in 2014, with beef prices rising 23 percent. This was the fifth consecutive year of wholesale food price increases. Over the past five years, wholesale food prices have increased by approximately 25 percent, approximately two and a half times faster than general inflation.^{xxii}

“IT’S BEEN HARDER AND HARDER TO FIND RELIABLE, AFFORDABLE LIMES OVER THE PAST FEW YEARS. WE’VE BEEN IN THIS BUSINESS A LONG TIME AND IT’S BEEN REALLY ALARMING FOR THE SUPPLY CHAIN TO BECOME SO UNRELIABLE LATELY.”

— Mary Sue Milliken, co-chef and owner, Border Grill Restaurants & Truck, Los Angeles, CA

Produce: California grows nearly half of the nation’s fruits and vegetables, including 70 percent of the lettuce, 76 percent of the avocados, 90 percent of the grapes, and virtually all of the almonds Americans consume. Unfavorable conditions in California mean higher prices for restaurants across the country. To date, the California drought has increased the cost of more than 100 products, including lettuce, strawberries, oranges, lemons, onions, and tomatoes. Produce costs have risen approximately

five percent each of the past two years, on average. Since the beginning of the drought, California tomato prices have risen nearly 20 percent.^{xxiii}

With California reservoirs at historic lows, the state has reduced water allocations, forcing most farmers to scale back their planting. For example, 45 percent of rice land went unplanted last year. Researchers at UC Davis estimate that drought will prevent farmers from planting nearly 430,000 acres this year, costing the state \$2.2 billion.^{xxiv}

“We’re spending a lot of time talking to farmers about how to secure production,” says Patrick Mulvaney, chef and proprietor of Mulvaney’s B&L in Sacramento, CA. “Our cherry and apricot seasons were early and short this year. We used to think about how to use the produce coming in. Now, I have to make sure it is coming in at all.”

“APPETIZER SALADS WERE TRADITIONALLY A HIGH-PROFIT ITEM FOR RESTAURANTS. BUT DROUGHTS AND SEVERE WEATHER ARE CREATING BIGGER GAPS BETWEEN REGIONAL HARVESTS, MAKING THE PRICE OF LETTUCE RISE LIKE CRAZY.”

— John D’Antonio, director of operations and purchasing, Funbars.com, New York, NY

“In my experience, climate change consistently affects the prices and ingredients within the restaurant industry,” say Marc Murphy, chef and owner of Benchmark Restaurants and Benchmark Events by Marc Murphy. “I need to be very conscious of what products are in season, as well as what have extreme climate pricing and how that correlates within our shops. For example, the recent drought in California increased prices for romaine lettuce, avocado, and almonds, to name a few. Any severity in climate that affects farmers and crops will also affect prices for restaurateurs and ultimately the consumers as well.”

Even without the current drought, if temperature trends continue, cotton, maize, wheat, and sunflower yields across California Central Valley could be materially harmed by 2040.^{xxv}

Beef and Pork: Prior to the current drought, American ranchers maintained more than 100 million cattle. In a typical year, they slaughtered nearly 600,000 head of cattle each week.

Droughts in California and Texas have hurt both the farms that grow cattle feed and the ranches that buy it. Ranchers responded to rising feed costs by slaughtering more of their cattle. By 2014, the U.S. herd had fallen to approximately 82 million, the smallest it had been since the 1950s. Ranchers are rebuilding their herds by slaughtering 40,000 and 50,000 fewer cattle per week. The national herd is now more than 90 million. Herds should reach their 95 to 98 million target in two to three years.^{xxvi}

Beef prices have increased by 34 percent from 2010 to 2014. They are now at historic highs.^{xxvii}

“LATELY, IT’S BEEN CHALLENGING TO GET THE QUANTITIES OF WINE WE NEED BECAUSE SEVERE CHANGES IN THE WEATHER HAVE HAD AN OFTEN DEVASTATING IMPACT ON WINE GRAPE CROPS, THEIR PRODUCTION LEVELS, AND QUALITY.”

— Khalid Pitts, owner, Cork Wine Bar and Cork Market & Tasting Room, Washington, DC

“IT WAS MUCH COLDER THAN USUAL SEVERAL NIGHTS THIS SUMMER, SO MANY LOCAL TOMATO CROPS FINISHED THEIR GROWING SEASON EARLIER AND IT’S BEEN HARDER TO FIND AFFORDABLE TOMATOES AT A TIME OF YEAR WHEN THEY’RE NORMALLY READILY AVAILABLE.”

— William S. Dissen, owner and executive chef, The Market Place Restaurant, Asheville, NC

RESTAURANTS’ INVESTMENT IN ENERGY EFFICIENCY AND SUSTAINABLE PRODUCTION

A September 2014 survey by the National Restaurant Association found that restaurant owners are taking substantial steps to reduce their energy use and environmental impact, including recycling fryer oils, fats, and grease (74 percent); recycling cardboard and paper (66 percent); using compact fluorescent lighting (63 percent); purchasing products made of recycled materials (61 percent); and installing efficient toilets and urinals (48 percent). Other common improvements cited by restaurant owners are optimizing hot water temperatures; investing in energy efficient exhaust hoods, deep fryers, and hand dryers; and changing start-up and shut-down

procedures to reduce idle time for cooking equipment. Restaurants are also leading local recycling and composting campaigns, promoting conservation best practices, and partnering with local food banks to reduce food waste.

According to the National Restaurant Association’s annual culinary forecast, environmental sustainability ranked third in the top 20 trends in the restaurant industry for 2015.^{xxviii} Three out of four guests are paying more attention to eco-friendly food, and 62 percent of consumers are likely to make a restaurant choice based on its eco-friendly practices. Sixty percent are more likely to pick a restaurant that serves food grown or raised in an environmentally sustainable way. Patrons also want to know how far their food traveled from farm to their table. Sixty-nine percent of adults say they are more likely to visit a restaurant that offers locally produced food items.

“FOR YEARS, BUSINESSES IN MANHATTAN HAVE BEEN INVESTING IN SUSTAINABLE PRACTICES THAT ARE NOT ONLY MORE ENERGY EFFICIENT BUT ALSO LOWER EXPENSES. OVER THE PAST FEW YEARS, THESE FEATURES HAVE BECOME A PRIORITY FOR CONSUMERS AS WELL.”

— Ken Biberaj, Chairman of the Board, Manhattan Chamber of Commerce; vice president, The Russian Team Room, New York, NY

“WHEN THERE’S A SEVERE WEATHER DAY, WE HAVE A LOT OF EXPENSES IN ADDITION TO THE LOST REVENUE OF HAVING TO CLOSE. WE PAY OUR EMPLOYEES FOR THE UNEXPECTED LOST WAGES; WE MAY HAVE FOOD THAT CAN’T BE USED WHEN WE REOPEN; AND IF WE MISS DELIVERIES, WE HAVE TO GO OUT AND FIND THE INGREDIENTS AT STORES AROUND THE CITY.”

— Evan Hanczor, chef, Egg Restaurant, Brooklyn, NY

SEVERE WEATHER’S IMPACT ON RESTAURANT TRAFFIC

Extreme temperatures and severe weather affect most consumer-facing industries, but restaurants appear to be more sensitive than other businesses. For example, during the Polar Vortex of 2014, restaurant revenues fell twice as much as other retail businesses.^{xxix}

One reason for this stronger impact is that restaurant traffic is less likely to be recouped when the bad weather passes. A family shopping for a new TV might delay a trip to Best Buy due to bad weather, but it is likely to make the trip once the weather improves. Apart from special occasions, a restaurant meal is probably lost.

Biberaj notes that, “When the weather is bad, the hotels will still get their money, as will the retail stores, but not the restaurants.”

Because weather varies widely from region to region, it is difficult to parse weather-related changes in revenue from other factors, such as the condition of the economy or seasonal variations. However, even national restaurant averages were affected by Polar Vortexes of 2013-4 and 2014-5. In February 2015, restaurant revenues fell 0.8 percent from the December high. Because of February job gains and revenue recovery in March, restaurant industry economists attributed the decline to colder weather.

“Rent is a top cost for restaurants in Manhattan, and one of reasons it’s such a competitive market,” says Biberaj. “Many of our restaurants rely heavily on outdoor seating, which suffers when temperatures grow too hot, or when the weather is simply too volatile to plan a date. Restaurants are earning more of their business through takeout, which hurts profits because we have to pay for delivery and customers tend to order less.”

IMPACT OF NEW EPA STANDARDS ON RESTAURANT COSTS AND PROFITS

Electricity represents approximately two percent of total costs for a typical restaurant. This is nearly twice the average for all industries. Restaurants use between five and seven times more energy per square foot than other commercial businesses, with the bulk of this difference driven by the cost of HVAC, sanitizing the restaurant’s kitchen, and refrigerating and preparing food.

However, even an electricity-intensive industry like restaurants would experience only a small increase in costs under the new EPA power plant standards finalized in August 2015. The EPA estimates that its proposed standards could increase electricity rates by 3.2 percent in 2020, before dropping to less

“IF WE DON’T COME TOGETHER AND REDUCE CARBON POLLUTION NOW, IN THE LONG RUN WE’LL NEED TO PAY MORE TO KEEP THE RESTAURANT COOL WHILE THE OVENS ARE HOT.”

— Sally Moses, owner and manager, 212 Market Restaurant in Chattanooga, TN

than a 0.9 percent increase in 2025 and a 0.8 percent increase in 2030. When efficiency gains associated with the standards are considered, the EPA estimates that electricity bills will increase 2.7 percent in 2020 before dropping by 3.8 percent in 2025 and 7 percent in 2030.^{xxx}

Under the EPA’s rate projection (3.2 percent increase), a typical restaurant’s costs of operation would increase by 0.064 percent (2.0 percent of expenses, increased by 3.2 percent). If it costs a restaurant \$20 to produce a meal, the restaurant’s cost would increase one cent (\$20 multiplied by .00064 equals \$0.0128).

Industry-wide, a 3.2 percent increase in electricity rates would amount to \$315 million dollars in additional electricity costs in 2020 (against total industry sales of \$750 billion, or 0.04 percent of sales). By comparison, restaurant owners in the Midwest alone lost more than \$2 billion in sales to severe cold during the 2013-4 polar vortex.^{xxxi}

In five years, EPA rules could add 1 cent to the cost of serving a \$20 meal. Meanwhile, if wholesale food prices increase over the next five years at the same rate they have increased over the previous five years, food costs will grow \$1.63.

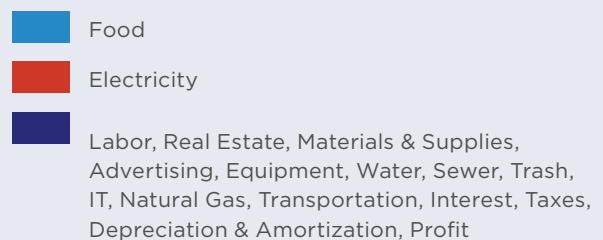
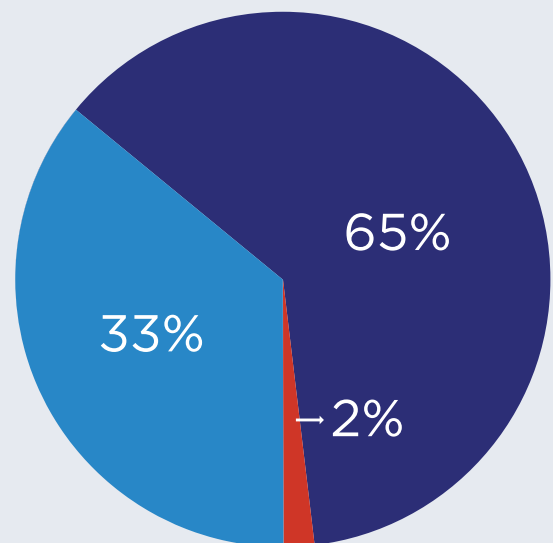
POTENTIAL IMPACT ON A \$20 RESTAURANT MEAL

\$1.63

RISING FOOD PRICES

\$0.01

EPA’S CLEAN POWER PLAN



Source: U.S. Census Bureau, 2012 Economic Census; National Restaurant Association

METHODOLOGY

EPA Cost Analysis: Our results are consistent using multiple sources and methods because (1) electricity represents a comparatively small percent of restaurant costs; and (2) the increase in those electricity costs is comparatively small. Our estimate (2 percent of expenses, increased by 3.2 percent) equals a 1.28 cent increase on a \$20 meal.

We examined survey data from the U.S. Census Bureau, the Bureau of Economic Analysis, the Department of Energy, and the National Restaurant Association, among others. The sources' methodology and metrics varied. For example, some sources calculate electricity costs as a percentage of sales, while others calculate them as a percentage of operating costs. Others combine electricity and natural gas expenditures.

Our assumption that electricity represents 2 percent of a restaurant's total costs is based on estimates that range from 1 percent (Bureau of Economic Analysis, U.S. Department of Commerce (2013, using total costs, which includes taxes and interest)) to 3 percent (U.S. Census Bureau (2015, excluding interest and taxes, and using broader definition of "food service industry")). The U.S. Census Bureau calculates electricity costs as approximately 1.5 percent of sales. For further information, see <http://www.census.gov/retail/index.html> and http://bea.gov/industry/io_annual.htm.

Our assumption about electricity rates and costs are taken from the EPA's "Regulatory Impact Report for the Clean Power Plan," which estimates the impact on both electricity rates and total bills. (The latter accounts for efficiency savings produced by the standards; the former does not.) To provide a more conservative assessment, we use the higher, rate-based projection. For further information, see <http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf>.

Food Cost Analysis: Food costs vary by category and market. Restaurant owners participating in Business Forward briefings report ranges from 28 to 36 percent of a restaurant's total costs. National Restaurant Association research suggests a range of 30 to 35 percent. For this analysis, we assume a midpoint of the 30 to 35 percent range.

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