

How's this for a surprise? Gregg Butler, professor of science in sustainable development at the University of Manchester in the U.K., says he would be happy to have a nuclear waste storage facility in his backyard. Wait...he said...what?? Yes, it's true, but it's not just because of the safety of properly disposed radioactive waste—it's the comparison with the alternative. All things considered, the health consequences of nuclear waste and accidents combined may pale in comparison to the enormity of the consequences of our current largest source of energy—**fossil fuels.**

The Cost of the **CHARGE**

Health consequences of energy choices

By **Claudia S. Copeland, PhD**

FOR MANY, THE IDEA OF NUCLEAR ENERGY BRINGS with it fear and distrust. The symptoms of radiation sickness are horrific, and the potential impact of accidents is tremendous, and terrifying. The Chernobyl meltdown, with radiation fallout as far as Western Europe, and the Fukushima Daiichi nuclear disaster, which displaced 160,000 people, are alone enough to win nuclear power the crown for scariest source of energy. Add to this the fact that, for all practical purposes, nuclear waste lasts forever, and it certainly seems that nuclear energy must be the worst way to power our lives, in terms of human health.

In reality, though, major failures of civilian nuclear power plants are few and far between: the Fukushima disaster in 2011, the Chernobyl disaster in 1986, the Three Mile Island partial meltdown in 1979, which resulted in no deaths and no significant increases in cancer afterwards, and the 1961 explosion and meltdown of SL-1, a remote army nuclear power reactor near Idaho

Falls, that killed three operators. In contrast, deadly disasters in coal mining have been a steady constant throughout its history, with more than 100,000 miners killed in the past century in the U.S. alone, and almost double that number killed in China. Globally, an estimated 12,000 coal miners die every year from accidents, according to the BBC. But accidents in the coal mine are only the



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IMAGE VIA WIKIMEDIA COMMONS

there is no such solution for the waste generated by fossil fuels. It enters our air, water, and soil. Filters can help, as can increases in fuel efficiency through technology, but the fact remains that pollution from fossil fuels is a huge health issue. In the U.S. alone, each year sees over 16,000 hospital admissions for asthma, pneumonia, and cardiovascular conditions linked to pollution from fossil-fuel power plants. In addition, such pollution is implicated in more than 7,000 emergency room visits for asthma, more than 18,000 cases of chronic bronchitis and 59,000 cases of acute bronchitis, more than 1 million lower and upper respiratory infections, and more than 30,000 premature deaths. Annual lost work days due to air pollution number over 5 million.

Outside the developed world, with fewer regulations and weaker enforcement, air pollution from fossil fuels is far worse, as any traveler to big cities in Latin America, south-east Asia, or Africa can tell you. Africa not only hosts the world's most air-polluted city (in Nigeria), but also suffers from widespread oil-related water pollution that affects drinking water and fishing, a staple source of food and income for villagers. A United Nations Environmental Programme report documented extensive oil-related contamination of soil and water in the Niger Delta region; in the most serious case, they found an 8-cm thick layer of refined oil floating on the groundwater serving the community wells. In one community, drinking water in wells was contaminated with levels of benzene over 900 times the WHO upper limit.

Latin America also suffers from oil-related environmental health problems. A 2004 Pan-American Health Organization report on the oil industry in the Amazon basin of Ecuador documented a range of toxicological effects associated with oil exposure. Spontaneous abortions were 2.5 times higher in women

↑
**FUKUSHIMA
 DAIICHI NUCLEAR
 DISASTER**
 Radiation hotspot
 in Kashiwa.



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Burning coal affects health almost as dramatically as mining it. An unintended de facto experiment in China, in which officials gave free coal for heating to northern regions, but not southern ones, allowed the consequences of increased coal burning to be

measured. According to a regression analysis reported in PNAS in 2013, the impact of the increased total suspended particles (TSPs) translated into a decreased life expectancy of 5.5 years among northerners due to cardiorespiratory diseases associated with the higher use of coal. Of course, oil and natural gas are cleaner than coal, but also generate substantial pollution, as well as accidents.

Whereas radioactive waste from nuclear power plants can be vitrified into glass, coated in concrete, and buried deep underground,

living near oil fields, and the rates of several forms of cancer were elevated: cancers of the stomach, rectum, skin melanoma, soft tissue, and kidney in men, cancers of the cervix and lymph nodes in women, and hematopoietic cancers in children. In China, outdoor air pollution contributes to 1.6 million deaths per year, according to a 2015 study by Berkeley scientists Rohde and Muller, reported in *PLoS*; this number represents 17% of all the deaths in China.

CLIMATE CHANGE

Beyond the effects of pollution looms the potential global catastrophe of climate change. Excessive and rising carbon dioxide in the atmosphere from fossil fuels emissions is predicted to lead to global warming, acidification of the ocean, changes in rainfall, sea level rise, and increases in the frequency or severity of extreme weather effects. How might this affect our health locally?

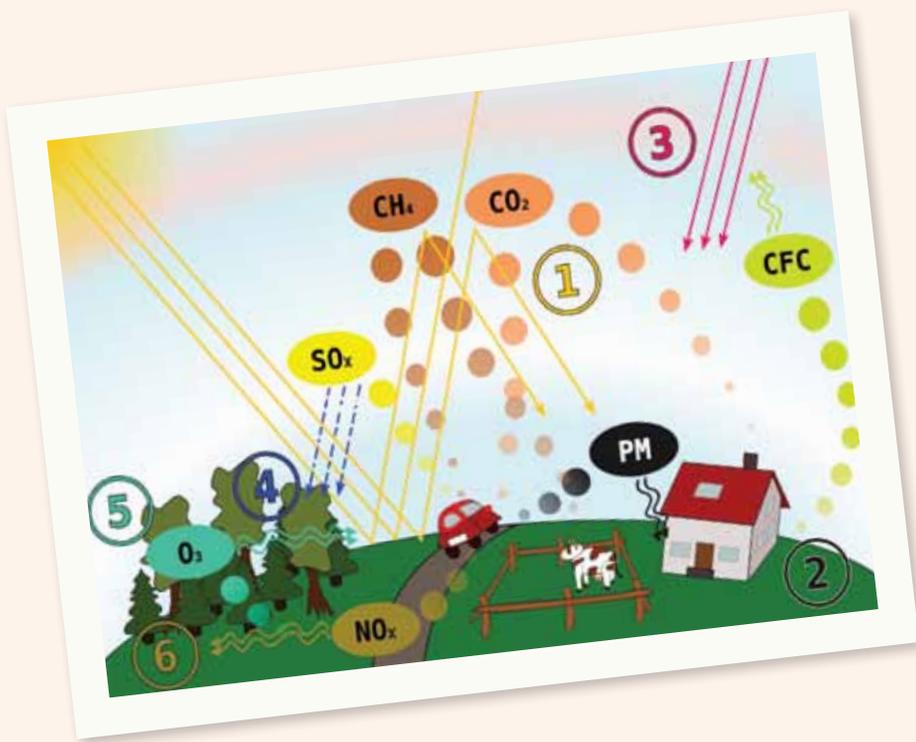
Hot temperatures can lead to heat stroke, dehydration, and increased cardiovascular, cerebrovascular, and respiratory disease. According to the EPA, heat-related deaths in the United States could reach the thousands

to tens of thousands of additional deaths each year by the end of the century during summer months. Rising temperatures also adversely affect air quality, which increases asthma and other respiratory illnesses. Among the most problematic predicted air quality issues linked to climate change is an increase in the amount of ground-level ozone, which can damage lung tissue and inflame airways, aggravating asthma and other respiratory conditions. According to the US Global Change Research Program (USGCRP), by 2030, ground-level ozone-related illnesses and premature deaths due to climate change could number in the thousands if no mitigating air quality policy changes are put in place.

Rising temperatures can also adversely affect water quality, through increased runoff leading to pollution of recreational and drinking water sources, and through infectious disease. Disease-causing microbes expected to increase with rising temperatures include *Vibrio* bacteria and other pathogenic bacteria, toxin-producing algal blooms, and waterborne parasites like *Cryptosporidium* and *Giardia*.



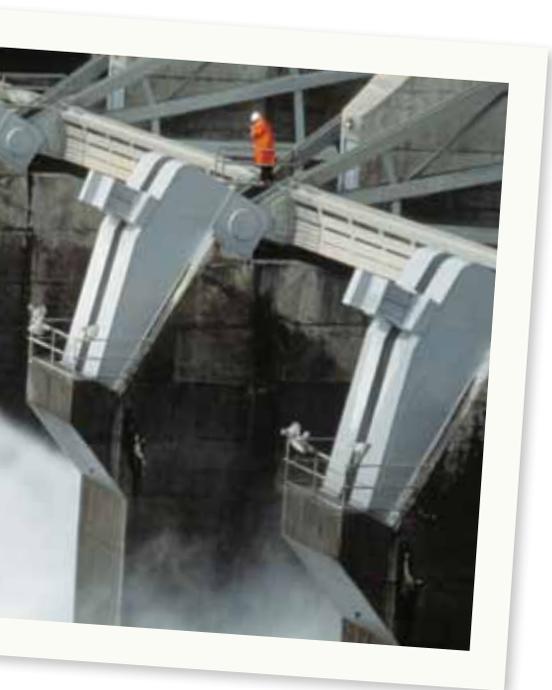
In addition to waterborne diseases, climate change is also predicted to affect vector-borne diseases. The activity of ticks that transmit Lyme disease, for example, is restricted by climate. As temperatures rise, these ticks are likely to become active earlier, and their geographic range is expected to expand. Mosquitoes transmit a great



REASONS AND EFFECTS OF AIR POLLUTION

- Carbon dioxide from exhausts and energy production
 - Methane from cattle breeding
 - Sulfur oxides from exhausts and industry
 - CFCs from refrigerants and propellants
 - Nitrogen oxides from exhausts and industry
 - Ozone from air with high oxygen level, catalysed by nitrogen oxides
 - Soot and particulate from exhausts and industry
1. Greenhouse effect by keeping sun warmth and light from reflecting back into space
 2. Particulate contamination affecting respiratory systems
 3. Raised UV radiation levels by destruction of the ozone layer
 4. Acid rain leads to acidification and forest dieback
 5. Increased ozone levels affecting respiratory systems
 6. Contamination by nitrogen oxides affecting respiratory systems

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number of diseases, many deadly. Currently, mosquito-transmitted viruses like Dengue and Zika are not seen in temperate and northern climates because the mosquitoes that transmit them cannot survive the northern winter, curtailing the infection cycle. The more warming, the greater the range of these mosquitoes, potentially affecting large numbers of people. Globally, temperature increases of 2-3°C would increase the number of people who are at risk of malaria by several hundred million, according to the World Health Organization.

Beyond infectious diseases, climate change may affect general health through impacts on food quality. This can be through toxins—higher sea temperatures are expected to lead to an increase in mercury in seafood—or pathogens; for example, food poisoning caused by *Salmonella* increases with heat. In addition, nutrition can be affected by an increase in carbon dioxide, with lowered levels of proteins and essential minerals in crops such as wheat, rice, and potatoes. The relationships between climate change and agriculture are well-documented, according to the USDA, with risks to food security increasing with higher concentrations of greenhouse gases and extending “beyond agricultural production to other elements of global food systems that are critical for food

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security, including the processing, storage, transportation, and consumption of food.”

One effect of particular concern to Gulf Coast residents is a predicted increase in extreme weather events. Storm-related damage to roads and communication infrastructure disrupts access to healthcare services, especially impacting the elderly and people with disabilities. Carbon monoxide poisoning due to improper use of generators increases during storm-related outages, and mental health effects such as depression or PTSD increase following storm-related trauma or loss.

ALTERNATIVES

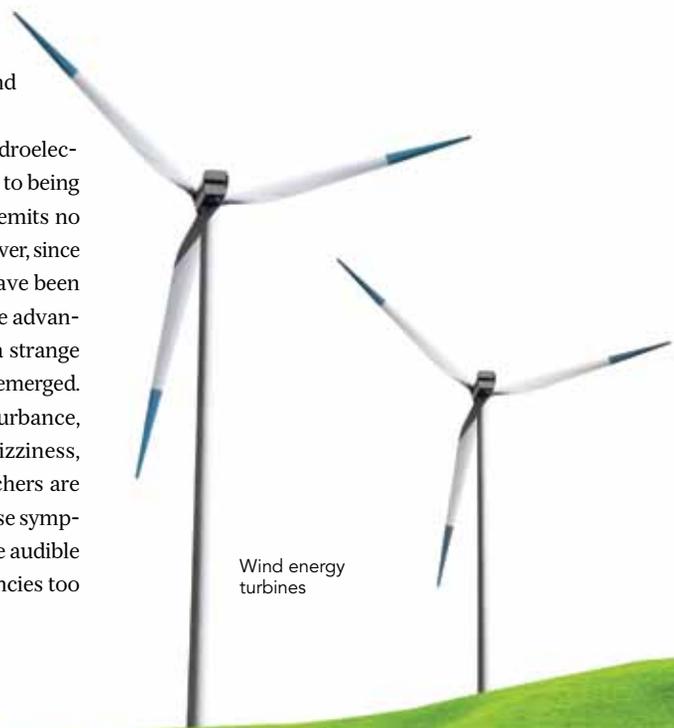
Clearly, the health effects caused by fossil fuels are dramatic and far-reaching, even here in the U.S. Other than nuclear energy, though (which many still do not feel comfortable with), how else can we power our modern world? Hydroelectric power is a relatively clean energy source, and it is not highly accident-prone. However, when accidents do happen, they are extremely deadly: for example, in 1975, a single typhoon destroyed 62 poorly constructed dams in the Banqiao Reservoir in China, killing 171,000 people and leaving 11 million more homeless. Dams can also lead to increases in water-borne diseases, such as schistosomiasis, a parasitic infection second only to malaria in terms of morbidity and mortality.

Considered even cleaner than hydroelectric power, wind energy, in addition to being low in mortality due to accidents, emits no water, ground, or air pollution. However, since wind energy is so clean, turbines have been built very close to residences to take advantage of power infrastructure, and a strange syndrome of health complaints has emerged. The complaints include sleep disturbance, headache, anxiety, depression, dizziness, and cognitive dysfunction. Researchers are not sure what exactly is causing these symptoms, but speculated causes include audible noise, infrasound (sound at frequencies too

low to be consciously heard), ground current, and shadow flicker. Shadow flicker is the phenomenon of the moving shadow of the blade of a wind turbine creating a slow flickering light effect as the shadow moves over windows, akin to someone continuously switching a light switch off and on every couple of seconds.

In spite of the large number of complaints, valid studies have revealed no scientific evidence for a direct link to human health. So, what is causing the symptoms? One explanation is a “nocebo” effect. Akin to a placebo effect, which improves people’s health through purely psychological effects, nocebos are phenomena that lead to adverse health symptoms due to the psychological effect of the belief that they are harmful. Some have asserted that wind turbine health complaints are correlated not with wind turbines, but with media attention to adverse effects, and accusations have even been made that fossil fuel industry proponents have fanned the flames of Wind Turbine Syndrome.

A critical review published in late 2015 in the *Journal of Occupational and Environmental Medicine* found no evidence of direct harm by wind turbine noise and no correlation of complaints with objective



Wind energy turbines



← Another clean energy source, well-suited to our sunny climate is solar energy.

measures of sound pressure. Instead, indirect harm appeared to stem from stress due to annoyance, and this was significantly correlated with factors such as residents' opinions of the aesthetics of the wind turbines in the surrounding scenery. A similar scenario is seen with shadow flicker; the frequency of shadow flicker brought about by commercial wind turbines is too slow to cause epileptic seizures, but it does cause annoyance. Studies of quality of life (QOL) using physical and mental health scales found contradictory results. One small study (38 participants living within 2 km of a wind turbine) found lower QOL in residents living near wind turbines, while another, large study (853 residents living within 1.5 km of a wind turbine) found significantly higher QOL levels in those living closer to a turbine. All in all, wind energy appears to be a healthy energy source, but in light of the number of complaints—regardless of whether they represent a nocebo effect—wind turbines should best not be positioned in close proximity to residences.

This brings us to another clean energy source, one that's well-suited for our sunny climate here in New Orleans and ideal for positioning close to the people using it—solar

energy. Solar has the lowest impact in terms of accidents per kilowatt hour produced, after nuclear energy (which is low due to the high amount of energy produced, not to a low total number of accident-associated deaths), and operation of solar panels does not produce pollution. However, the production of solar panels does involve potentially hazardous materials, including lead, arsenic, copper, and a number of other toxic chemicals, and improper disposal can lead to health hazards—about the same as those associated with the general microelectronic industry. Recycling can mitigate much of the impact of solar cell components, and as the components are valuable, companies are motivated to recycle them. (Of course, it is important that conditions in recycling plants are protective of workers' health.) As technology improves, these issues are also steadily improving. The Australian independent think tank TAI, in a report on the costs and benefits of solar energy, quantified the health impacts as 0.5 cents/kWh vs. 1.9 cents/kWh for natural gas, the healthiest of the fossil fuels. Some concern has been expressed about electromagnetic fields associated with solar panels, but these fears are not supported by any valid scientific studies.

All things considered, solar energy and wind energy appear to be the clear winners in terms of human health—except for one additional source: the human body itself! New Orleans has an ideal climate for bike riding. While riding a bike in traffic can lead to morbidity due to accidents, if you can find a route that is free of traffic hazards, using the energy your own body generates from food calories is not only clean, but can provide a net increase in wellness due to the health benefits of exercise. Getting the benefits of exercise together with human-powered clean energy aren't confined to bikes, either: Adam Gilmore of the University of Guelph in Canada found that harnessing electricity produced by people working out in a fitness center could recover 7.9% of the facility's energy demand. (It was not economically feasible, considering the cost of fitting pedal devices to electricity generators, but decreases in the cost of the technology or rising fuel prices could tip the scales at some point in the future.)

Researchers Suhalka et al., from Jaipur, India, and Romanian researchers Mocanu et al. have designed bicycle-powered generators, capable of providing light or powering other small devices—quite useful in off-the-grid villages. Of course, if you've ever watched a playground full of kids, you may have marveled at “how much energy” they all have. Well, Tulane electrical engineering professor S. R. Pandian has developed a system for harnessing all that playground energy using pneumatic cylinders. Low-cost systems like this have lower energy harvesting efficiency, but in the case of playground energy, efficiency is not as important, since kids want to play regardless! After the low installation cost, it's free energy, free fitness, and free fun. Now, how's that for healthy?! ■

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LSU DENTAL SCHOOL COOKS FOR FIRST RESPONDERS

More than 100 LSU Health New Orleans dental and dental hygiene students, faculty, staff, and volunteers brought out their cooking pots to make a New Orleans-style lunch for first responders on Sunday, August 14, 2016, at the LSU Health New Orleans School of Dentistry. They served up jambalaya, vegetables, and sides, along with desserts to thank those who serve and protect us. *See story on page 43*



STATE

Expanded Medicaid Enrollment Reaches 250,000

The Louisiana Department of Health announced the landmark enrollment of 250,000 new adults into Healthy Louisiana, the state's expanded Medicaid program. Enrollment began on June 1 and coverage started July 1.

Healthy Louisiana will bring health insurance coverage to an estimated 375,000 working Louisianans. In the first month and a half of enrollment, an average of 2,500 residents per day have signed up for Medicaid coverage.

One contributor to the state's success has been the Department's use of creative enrollment strategies. Enrollees of two limited-coverage programs, Take Charge Plus and the Greater New Orleans Community Health Connection, automatically gained full Medicaid coverage under Healthy Louisiana. Additionally, the Centers for Medicare and Medicaid Services granted Louisiana special permission to enroll residents using data from the Supplemental Nutrition Assistance Program (SNAP), more commonly known as food stamps. This innovative approach saves the State an estimated \$1.5 million and 52,000 man hours.

Expanded Medicaid coverage is available for adults ages 19 to 64 with a household income of up to 138 percent of the federal poverty level, or \$33,534 for a family of four. Applicants must meet citizenship requirements and cannot already be covered by Medicaid or Medicare. Residents who think they may be eligible can apply in person, by phone or online at healthy.la.gov. Enrollment is ongoing.

Blue Cross Mobile App Now Includes Symptom Checker

Customers using the Blue Cross and Blue Shield of Louisiana mobile app can now search their symptoms by keyword or body area and see a suggested diagnosis and list of recommended treatments. The app also helps customers decide when they should call 911, go to the emergency room or visit their family doctor.

Other features of the app include:

- Find a Doctor or Urgent Care: Customers can use the app to get a map and directions to a nearby doctor's office or facility that is in their network, easing their access to care.

- View Benefits and Claims: Customers can see important information about their healthcare coverage benefits, including the status of their claims, deductibles, copayment amounts, coinsurance,



Mark Berger

and balances.

- Save Doctors and Claims: Customers can save doctor or claims details to a favorites list for easy access upon return visits. Customers can also save doctor information, including name, phone number and address-to their contacts list.

- Contact Us: Customers can click-to-call Blue Cross customer service or submit questions securely with claims data attached, allowing for a streamlined response. Customers can also find phone numbers, maps and directions to any of our eight local offices.

Users can find the app by searching "BCBSLA" in the Apple App Store or Google Play Store. The apps can also be found by visiting bcbsla.com/mobile from any mobile device.

Berger Named LNHA Executive Director

The Louisiana Nursing Home Association (LNHA) Board of Directors announced on Wednesday the selection of Mark Berger to succeed its long-serving executive director Joe Donchess. Donchess will continue as executive director until his retirement on December 31.

Mr. Berger currently serves as LNHA's Reimbursement Director and his experience at LNHA spans 26 years. Mark Berger has been a certified public accountant for 31 years. Beyond his accounting skills, Berger is actively involved with the legislative and regulatory processes. He has played an integral role in several major successes of LNHA, most notably the design and implementation of the case mix reimbursement system and legislative measures to advance quality care for residents of nursing facilities.

AG Makes Two Medicaid Arrests

Attorney General Jeff Landry announced that his Medicaid Fraud Control Unit arrested two people.

Donyelle Chaney, 29 of Baton Rouge, was arrested on Medicaid Fraud. Chaney allegedly

provided services to multiple Medicaid recipients after being terminated by the servicing company.

Christopher Cador, 26 of Baton Rouge, was arrested on Simple Battery of Persons with Infirmities. Cador allegedly struck a disabled individual repeatedly with a closed fist.

Chaney was booked into the East Baton Rouge Parish Prison. Cador was booked into the East Feliciana Parish Prison.

Medicaid fraud occurs when providers use the Medicaid program to obtain money to which they are not entitled. To report Medicaid fraud or abuse and neglect in residential care facilities, please contact Attorney General Jeff Landry's Medicaid Fraud Hotline at 888-799-6885 or www.AGJeffLandry.com.

Department of Health Launches Online Data Tool

A new site developed by the Department of Health and Hospitals will provide healthcare officials and researchers with information like the number of uninsured Louisianans, the rates of those with chronic illnesses or obesity, environmental statistics, and even which communities have access to healthy foods.

The Department of Health's (LDH) Center for Population Health Informatics and the U.S. Centers for Disease Control and Prevention's National Tracking Network have partnered to create Health Data, a public data portal that provides longitudinal analyses of Louisiana health data. The site will be accessible to the general public, and will prove especially useful to researchers, scientists, educators, students, health officials, and individuals seeking to learn more about the health issues affecting their community.

Dr. Rebekah Gee, secretary of the Department of Health, said the portal is fully interactive and allows users to access health, population, environmental and exposure data, and visualizations in one place.

Quick access to associated information and links is also provided. The data will be downloadable and continually curated to ensure the best and most current information is available. New data sources will be added as they are identified.

"We hope that, by allowing free and ready access to health data, residents will become more aware of the health issues facing Louisiana and community workers and health researchers will have the information they need to better understand and improve the health of Louisiana's families and communities," said Joseph Foxhood, director of the Center for Population Health Informatics.