

SOLUTIONS

Vol. 43, No. 2 / Spring 2012



> **THE CLEAN AIR WARS**

EDF's tenacious legal team holds the line against the Clean Air Act's biggest opponents PAGE 6

WHERE WE STAND

By EDF President Fred Krupp



Is natural gas really better than coal?

As I write, EDF staff are prowling the streets of Austin, TX, in a car with a suitcase-sized sensor in its trunk. The device, called a Picarro Surveyor, scans the air for methane, which appears on a passenger's laptop as blue columns.

Why are we doing this? Because amid all the hype over America's abundance of natural gas, we can't forget that unburned natural gas—methane—is a greenhouse gas pollutant 72 times more damaging than carbon dioxide over the first couple of decades after it is emitted. Too many leaks in the gas distribution system potentially could erase the advantage of gas over coal or oil in the fight against global warming.

This is no small problem. In 2011, the shale gas boom propelled the United States to become the world's leading gas producer, ahead of Russia. EPA estimates that between the gas well and the final consumer, more than 2% of methane is lost to uncontrolled venting and leaks. Over the next two decades, those leaks will have as great an impact on global warming as two-thirds of all U.S. coal-fired power plants put together. But 2% is only an estimate. Some believe even more gas is escaping.

Up-to-date measurements are urgently needed. That's why EDF is bringing science to the debate. We're working with scientists and responsible energy companies to develop a more complete picture of methane leakage nationally (*see article p. 4*). No analysis on this scale has ever been attempted with modern instruments, such as the Picarro device we're deploying in Austin. Our goal: to motivate regulators, the gas industry and large gas consumers, such as power plants, to close leaks. Our target: to reduce leakage rate to below 1% nationwide.

But measuring and fixing methane leaks is only half the challenge. We must also dramatically improve environmental safety and performance in natural gas drilling. Industry secrecy has spurred public mistrust, and the Secretary of Energy's Advisory Board on Natural Gas, on which I served, has called for better oversight and enforcement, strong regulation of water and air pollution, and disclosure of fracking chemicals. No community should be forced to trade clean water, clean air and good health for jobs.

It is crucial for industry, regulators and the environmental community to work together to make sure every molecule of natural gas is produced in a safe, responsible way.

A handwritten signature in black ink that reads "Fred Krupp".



Environmental Defense Fund's mission is to preserve the natural systems on which all life depends. Guided by science and economics, we find practical and lasting solutions to the most serious environmental problems.

Our work is made possible by the support of our members.



ON THE COVER:

The Clean Air Act and the Environmental Protection Agency are under sustained attack in Congress and in the courts.

Solutions goes to Boulder, CO, home base of EDF's legal team, for an inside look at the high-stakes campaign to defend America's bedrock environmental protections.

Cover illustration: Kurt Huggins and Zelda Devon

SOLUTIONS

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EDF SUPPORTERS SPEAK OUT

The election and the environment

As the U.S. presidential campaign heats up, environmental issues have largely been on the back burner. So we posed this question to our members: If you were a moderator at a presidential debate, what would you ask the candidates about the environment? Here is a sampling of the many thoughtful responses we received.

“Why are we allowing China to take over the manufacturing of wind turbines? Northeastern

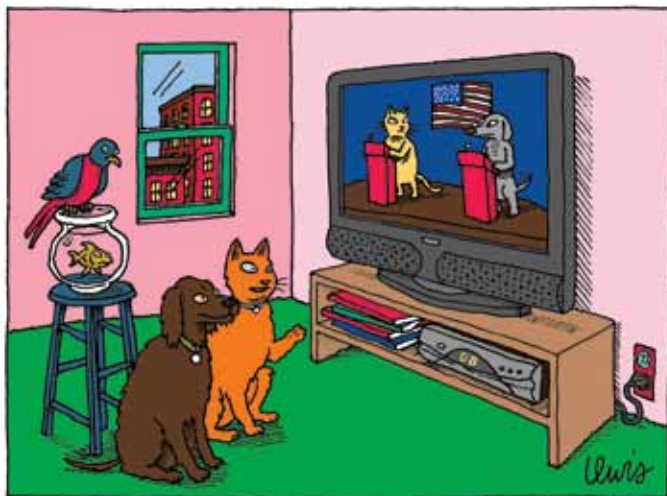
Ohio has the factories and the people to do this!” —**Sandi P. (via Facebook)**

“How do you sleep at night? The environment is put last almost every time legislation is discussed.”
—**Josh L. (via Facebook)**

“How are you going to make solar and wind energy more affordable for average Americans? We’d all like solar panels on our homes—they’re just so darned expensive.”
—**Miriam P., MI**

“What long-term preparations are you making for water shortages here and abroad?”
—**Pat K. (via Facebook)**

“What scientific evidence do you need to take steps to save the planet for your grandchildren?”
—**Jennifer G., WA**



“Hmm...tar sands? Is that where fat cats do their business?”

The media and climate change

On another timely issue, we asked: Is it journalists’ responsibility to report both sides of the climate debate equally?

“When one side is far from fact, why should it be given equal billing? Dentist versus tooth fairy is not a legitimate debate. I might believe that chips, ice cream and soda cure cancer because chemo makes me sick and I don’t want to do it—but it is childish to do so.” —**Brena E., IN**

“Should we give equal representation to those who say that cigarette smoking doesn’t cause cancer? We should weigh positions based on the data that supports them, not on the powers that fund their representation.”
—**Stephanie B. (via Facebook)**

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EDF wants to hear from you. Email us at editor@edf.org or visit solutions.edf.org. All printed letters are edited for clarity and length.

FOCUS ON EARTHQUAKES AND FRACKING

“Can you comment on the possible connection between fracking and the increase in the number of small earthquakes in Oklahoma?”

—**Helen Wise, WA**

Scientist Dr. Lisa Moore responds:

Hydraulic fracturing itself does not trigger strong earthquakes. But the disposal of wastewater from the fracking process can induce seismic activity, including earthquakes. Scientists have known since the 1960s that injecting wastewater—from all sorts of activities, not just fracking—into rocks deep below ground can cause earthquakes.

The vast majority of these earthquakes are too small to be felt, but in a few cases sizeable quakes have been linked to disposal wells, such as a magnitude 4.0 event last year near Youngstown, OH. Researchers haven’t yet determined the cause of recent earthquakes in Oklahoma.

Geophysicists say that with enough geological data about potential well sites and ongoing seismic monitoring of sites, operators could minimize the risk. But in general monitoring and reporting of seismic activity are not required, so companies can pick high-risk disposal sites or miss warning signs of impending quakes.

EDF supports new rules and strict

monitoring to make sure disposal does not take place in areas of earthquake activity or near vulnerable faults.



Earth-shattering? Injecting wastewater deep underground can cause earthquakes.

THE TRANSPARENCY PROJECT

New rules push the natural gas industry to reveal its secrets



Jim Parkin/Photos.com

Natural gas production is booming because of hydraulic fracturing, or “fracking.” Fracking involves injecting water, sand and chemicals deep underground to create fissures in shale formations and release the gas locked inside.

Today, there are some 45,000 shale gas wells in the United States, triple the number in 2005. This boom has created real concern over health and environmental damage from air pollution, groundwater contamination and degraded forests, farms and fields.

It doesn't have to be this way, but so far, the gas industry has largely opposed tougher regulation, including basic disclosure of the chemicals used in fracking. “To say the natural gas industry has a credibility problem is an understatement,” says Mark Brownstein, chief counsel for EDF's energy program. “Industry has been slow to engage legitimate public concerns in a serious way.”

A win in Colorado

EDF won an important victory in December 2011, when the state of Colorado adopted a new rule requiring drillers to disclose the chemicals used in fracking on a well-by-well basis.

The groundbreaking rule, which could become a national model, calls for an online database, searchable by company, chemical and location. EDF worked

closely with Gov. John Hickenlooper, local groups and a few forward-thinking gas companies to get the rule adopted.

In early 2011, President Obama directed Energy Secretary Steven Chu to appoint a seven-member panel of experts to recommend ways to reduce the health and environmental risks of gas production. EDF President Fred Krupp served on the panel, which in November 2011 issued a report that proposed steps to increase industry oversight and transparency.

“As a starting point, we must all agree that everyone—no matter where they live—has a right to clean air and clean water,” Krupp wrote in *The Wall Street Journal*.

The methane puzzle

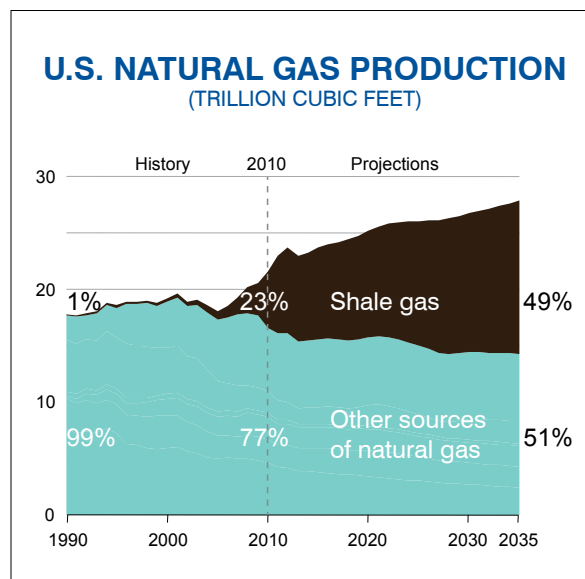
If shale gas production and distribution is done right, it could help wean our nation off coal. It emits roughly half the greenhouse gas pollution of coal when burned, with none of the mercury, sulfur dioxide and other toxic air pollutants that come from coal.

But natural gas is mostly methane, a greenhouse gas pollutant many times more potent than carbon dioxide. So even relatively small leaks could mean that increased use of natural gas

would accelerate climate change.

The problem is, no one knows the rate at which methane leaks from wells and pipelines. So in February, EDF partnered with scientists and industry leaders on a rigorous study to find the answer.

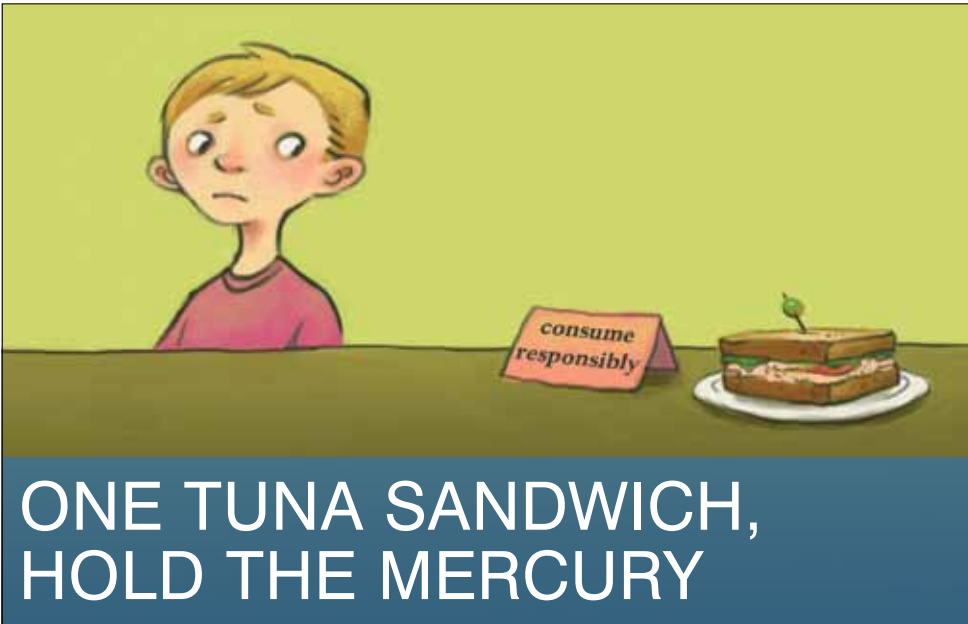
Our goal is to use this information to create regulations and operating procedures to limit leakage rates to less than 1%. We're also working on tough rules that will protect water and local communities from the impact of drilling. This will help assure that the natural gas boom serves people and the environment, as well as the economy.



Source: U.S. Energy Information Administration

On the rise: Shale gas production is surging.

GREEN LIVING



Merika Cowan

“By paying attention,” says Fitzgerald, “parents can safely include tuna sandwiches in their kids’ lunch boxes, in moderation.”

Lunch, with a side of vigilance

There are two main kinds of canned tuna: chunk light and solid/chunk white (albacore). Albacore is a larger species, so its mercury levels are about three times those of the smaller skipjack, which accounts for most canned light tuna.

For this reason, parents should limit the amount their kids eat:

Canned white, or albacore. Children up to age six can safely eat it once a month (3 oz. portions); children ages 6–12 can safely eat it twice a month (4.5 oz. portions). Adults, including pregnant women, can safely eat it three times a month (women, 6 oz. portions; men, 8 oz. portions).

Canned light—the safer choice. Children up to age six can safely eat it three times per month. Older children and adults can safely eat it once a week. But products labeled “gourmet” or “tonno” may contain mercury levels comparable to canned white.

Some seafood retailers offer canned white albacore that contains significantly less mercury than well-known national brands. These purveyors (*see below*) use smaller fish caught off the West Coast with low-impact methods. A better alternative to tuna is canned salmon (sockeye or pink from Alaska), which is low in contaminants and high in heart-healthy omega-3s. It’s also sustainably caught.

The humble tuna fish sandwich. Food writer Marian Burros once called it “the mainstay of almost everyone’s childhood.” Tuna is the second most popular seafood in the United States, after shrimp, and the average American eats more than 2.5 pounds of it per year. But parents who regularly pack tuna sandwiches into their kids’ lunch boxes may also pack an unhealthy helping of toxic mercury.

How mercury gets into tuna

Tuna, like other large fish, contains higher-than-average amounts of mercury. Mercury is emitted from coal-fired power plants and other industrial sources, drifts through the atmosphere and rains down on rivers, lakes and the ocean. One tablespoon of mercury every year, deposited continuously in tiny amounts,

can make fish in a 20-acre lake unfit to eat.

In water, bacteria convert the metal into toxic methylmercury, which builds up in the tissues of marine animals. As bigger fish eat smaller fish, mercury accumulates, so top predators like tuna, king mackerel and swordfish are the most contaminated.

Mercury is particularly harmful to children. Once ingested, it can damage a child’s nervous system, brain, heart, kidneys and lungs.

The Food and Drug Administration (FDA) has mercury standards for fish, but it inspects less than 0.1% of imported seafood annually (most U.S. seafood is imported). Worse, says EDF expert Timothy Fitzgerald, the FDA provides little guidance on safe consumption of fish. That’s why EDF developed our Seafood Selector health advisories (edf.org/fishadvisories).



ON THE MENU: A SAFER LUNCH AND HEALTHIER OCEANS

Purveyors of low-mercury *and* sustainably caught canned albacore

- EcoFish sells canned albacore caught by small family boats in the Pacific Northwest. ecofish.com
- Wild Planet Foods sources tuna caught by responsible catch methods. wildplanetfoods.com
- Island Trollers offers albacore “caught one at a time” off the North Pacific coast. islandtrollers.com
- High Seas Tuna also comes from well-managed fisheries in Northwest waters. highseastuna.com

More information on mercury poisoning

- EPA’s website offers a wealth of information on mercury and human health. epa.gov/hg/health.htm
- Moms Clean Air Force has a good explanation of mercury poisoning. edf.org/mercurypoisoning



THE FRONT LINE

How our small legal team is fighting to save the Clean Air Act

By Peter Edidin

A powerful coalition is trying to undermine the Clean Air Act and EPA, but our Colorado-based legal team is fighting back. *Solutions* looks inside EDF's campaign to defend America's bedrock environmental protections.

Last December, Rep. Henry A. Waxman, (D-CA) released a list of 191 anti-environmental votes taken by Congress in 2011. Seventy-seven targeted the Clean Air Act; 114 were aimed at the Environmental Protection Agency.

"This is the most anti-environment House in history," Waxman said.

These are tough times for EPA and the bedrock Clean Air Act. The fossil-fuel lobby is intent on clear-cutting the nation's environmental and public health protections, and plenty of lawmakers are willing to help.

"The theme is: dismantle it all, get rid of it all," says Vickie Patton, EDF's general counsel. But even in this environment, Patton and her team are making progress.

She worked with Xcel, Colorado's largest utility, on a pioneering agreement to end coal-burning in the Denver area.

“They have more money and more lawyers, but we have the law and the facts on our side.”

—EDF attorney David Lifland

And in December, we won a huge victory on one of the most dangerous and widespread pollutants of all.

Winning the war on mercury

EPA’s new Mercury and Air Toxics Standards will dramatically cut emissions from coal-fired power plants, which spew more than 50 tons of mercury annually.

EDF president Fred Krupp calls the rule “one of the most important public health measures in a generation,” noting that it will avert up to 11,000 premature deaths and 130,000 asthma attacks annually.

In addition, every year some 400,000 infants are born with high levels of mercury in their blood. This can affect their brains and nervous systems, impairing everything from memory to language and fine motor skills.

The new standards will help end this public health menace by cutting up to 90% of power plant mercury emissions. They will also cut emissions of cancer-causing substances like arsenic, chromium and nickel.

Overall, the new rule will create more than \$60 billion in annual health and environmental benefits when fully implemented in 2016.

“We’ve been at this for a long time,” says Patton. “It took years, working with

many allies, to show the harm mercury causes, to prove that coal power plants are the major source of the problem and to show that there are tools available to fix it.”

In the end, says Patton, “EPA gave us a wonderful holiday gift for our nation’s children.”

Life in the trenches

In Boulder, CO, Patton’s corner office looks out toward the Flatirons, the sheer rock formations that rise above the city, surrounded by open parkland.

The view is inspiring, but Patton’s desk faces away from the windows. She sits amid a jumble of court documents, case files, newspaper clippings and an interesting array of half-empty snack food containers.

There’s a nice symbolism in this arrangement, because neither Patton nor her legal team—including Pamela Campos, Peter Zalzal, Megan Ceronisky and David Lifland—has much time for scenic beauty. They are on the front lines of a war to keep the Environmental Protection Agency and the Clean Air Act from being weakened or destroyed.

“I haven’t experienced a time like this since the midterm elections in 1994, when I was with EPA,” says Patton. “The 104th Congress, with Newt Gingrich as Speaker of the House, came in talking

LEGAL LEADER



John Rae

Vickie Patton’s colleagues receive emails from her so late at night and early in the morning that some wonder if she ever sleeps. (She also sends them while biking or jogging near her home in Boulder, CO.) In fact, EDF’s general counsel and mother of two never seems to take a break from the fight for clean air.

Patton, a rancher’s daughter from Arizona, was raised in the Sonoran Desert and grew up feeling a strong connection to that environment. “This was the Sunbelt,” she says. “Population was booming, and I saw development overtake whole swaths of mountain landscape. It gave me a sense of the fragility of this place I cared about.”

In 1990, Patton was hired right out of law school by the Environmental Protection Agency. That fall, Congress passed a major expansion of the Clean Air Act, signed into law by President George H. W. Bush. “For a young attorney, it was an incredible time,” she says. “There was this overwhelming sense of support for protecting the environment and public health.”

In 1998, Patton moved to EDF, attracted, she says, by its pragmatism and dedication to getting things done.

“For a lot of law school students, the dream job is to make partner at a big law firm in New York,” she says. “For me, this is the dream—to work with dedicated colleagues in the fight for a healthier environment.”



Peter Arnold

Toxic catch: Fish from America’s rivers are often contaminated with mercury.

about deregulation and eliminating environmental safeguards and we came under incredible attacks from the Hill.”

Now it's the 112th Congress, and the only difference is that the attacks have grown more fierce. “EPA employees exist right now in a state of siege,” says Elizabeth Thompson, EDF's director of congressional affairs. “Their leaders are being called on the carpet by House committees, many of whose members don't believe that government has any business helping people when it comes to things like clean air and water.”

EPA awakened

EPA has angered these politicians because, after a decade of relative inactivity, the agency under the Obama administration is again using sound science to carry out its legal responsibilities. The reaction among those who preferred the old, quiescent agency is nicely summed up by House member Louie Gohmert (R-TX), who said,

“Let the EPA go the way of the dinosaurs that became fossil fuels.”

It's politicians like that who have mobilized to stop EPA's Cross-State Air Pollution Rule, which was adopted last July. The rule requires 28 states to cut power plant emissions of sulfur dioxide and nitrogen oxides that cross state lines and cause acid rain, smog and soot in the eastern United States.

EPA estimates the rule will generate \$120 to \$280 billion in annual health and environmental benefits in 2014, compared to annual costs of just \$800 million. Those benefits include avoiding 13,000 to 34,000 premature deaths and 15,000 nonfatal heart attacks every year.

As with the mercury standards—which Senators James Inhofe (R-OK) and Mike Johanns (R-NE) vowed to kill even before the rules were finalized—the “Dirty Air Gang” has gone after the Cross-State rule in Congress and in court.

“There were 19 different stay motions filed by some of the biggest polluters and states whose politicians support them,” says David Lifland, the newest member of EDF's legal team. “The most active petitioners have been those companies that have been the slowest to clean up their coal plants, like Genon, which owns the dirtiest fleet in the nation, and EME/Homer City, a Pennsylvania power plant that was, as of 2010, the largest single emitter of sulfur dioxide in the country.”

The high court rules

The pressure on EPA to shirk its responsibilities is possibly even greater when it comes to global warming.

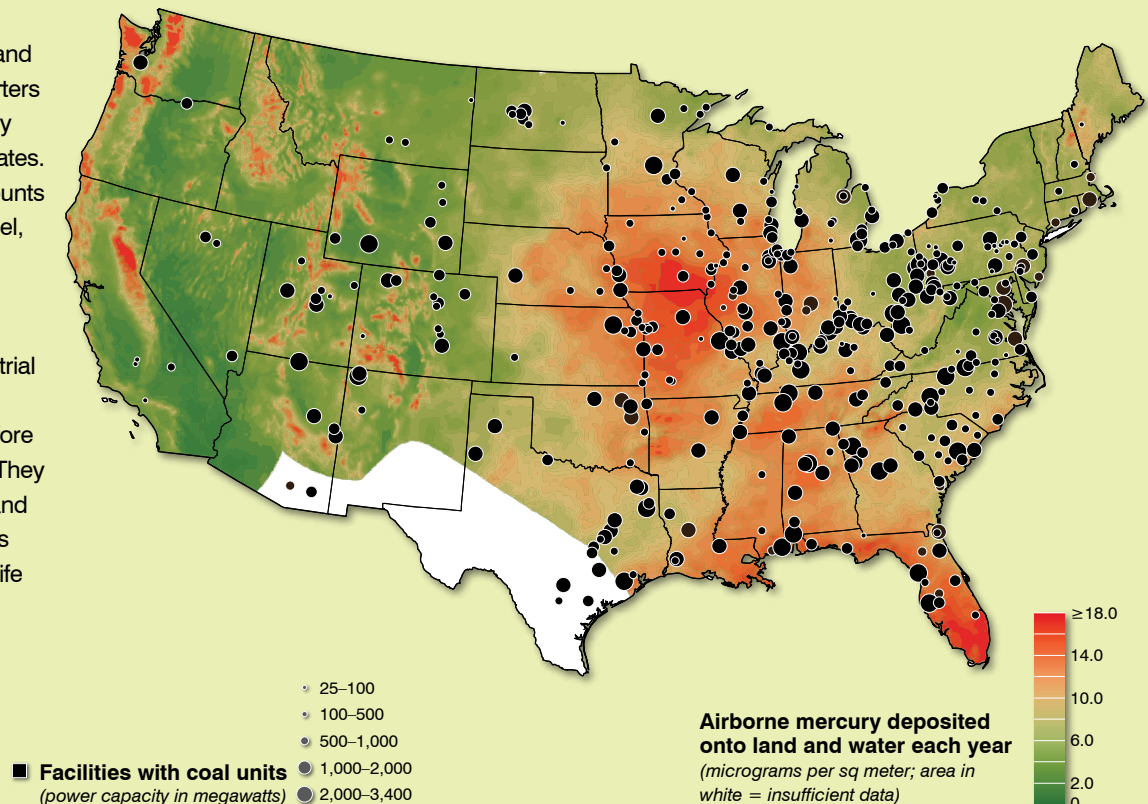
EPA efforts on greenhouse gases (GHGs) are the result of a 2007 Supreme Court decision, *Massachusetts v. EPA*, which EDF helped win. The court held that EPA had the authority, as well as the responsibility, to regulate warming gases

AN EMPIRE OF COAL

The high cost, in mercury and other poisons, of using coal for electricity

Coal fired power plants blanket the United States and produce almost three quarters of the atmospheric mercury emissions in the United States. They also spew huge amounts of arsenic, chromium, nickel, soot and other deadly pollutants into our air.

Some of the biggest industrial polluters are committed to killing the mercury rule before it ever gets implemented. They are working in the courts and with their allies in Congress to stop this cost-effective, life saving measure.



unless it found that they did no harm.

EPA, responding to the court, published its Endangerment Finding in 2009. It stated that greenhouse gases were a threat to the “public health and welfare of current and future generations.”

Since then, EDF and its allies have worked with, and sometimes sued, the agency to get it to carry out the law. This has included the development of emissions standards for the biggest sources of GHGs, including cars, which will be required to average of 54.5 miles per gallon by 2025, thanks to new federal rules that were supported by EDF.

New standards are also being developed for truck and power plant emissions, and EPA’s GHG reporting rule is providing public access to emissions data from some 10,000 sources (ghgdata.epa.gov/ghap/main.do). EPA will also propose new GHG limits on new fossil fuel power plants, oil and gas wells and pipelines.

NEW RULE WILL SAVE LIVES

EPA’s mercury rule will cut mercury pollution by some 90% and save at least \$37 billion in annual health costs. Every year, the rule will result in:

4,000 – 11,000
premature deaths avoided

2,800
fewer cases of chronic bronchitis

4,700
fewer heart attacks

130,000
fewer asthma attacks

5,700
fewer hospital and emergency room visits

540,000
days of missed work or sick days avoided



Christian Lagerey/Shutterstock

CLEAN AIR AND GOOD JOBS

Opponents of clean air laws say they cost jobs, but a recent independent, nonpartisan study shows that the new Mercury and Air Toxics Standards will actually create **117,000 new jobs** by 2015, including **80,500** from investments in pollution abatement and control.

The polluters fight back

So far, every major global warming action EPA has taken has been challenged in court. Dozens of lawsuits have been filed by states, industry groups and others.

Both the environmental community and the opposition are now focused on the U.S. Court of Appeals in Washington, DC, which has already begun to hear all the major GHG challenges. The court is expected to issue a set of historic rulings on these foundational protections—the Endangerment Finding first among them.

“Our defense of the Endangerment Finding is essential,” says Megan Ceronsky, a chaplain’s daughter from Minnesota and a member of the EDF legal team. “This case involves allegations that misrepresent the immense and rigorous body of science about the causes of climate change and its effects. Our job is to help the court understand the scientific record and make a rock-solid defense of the finding that climate change is a threat to the health and welfare of Americans.”

Pulling together

In the end, the battle over greenhouse gases is just part of a larger struggle.

“There are people who have never accepted the concept of federal

environmental safeguards, and they are on the offensive,” says Howard Fox, former managing attorney at Earthjustice, a nonprofit law firm, who is helping EDF defend EPA. “They’re pretty bold in their efforts to achieve their goals, and it requires something comparable on our side to say, ‘No, these safeguards are here for a reason.’”

Our opponents have virtually unlimited resources, says Lifland. “They have more money and more lawyers,” he says. “But we have the law and the facts on our side.”

Despite, or maybe because of, the long hours and high pressure, EDF’s lawyers are thriving. “The places we love are changing because of climate change,” says Pamela Campos, who came to EDF in 2009 after serving as deputy counsel in the Colorado governor’s office. “We each have a duty to do something about it.”

Her view is echoed by Ceronsky. “EDF allows me to do the work that I care about more than anything,” she says. “It’s an amazing opportunity.”

It may take several years to resolve the challenges to EPA’s authority, and the outcome cannot be taken for granted. “We can’t ever let down our guard,” says Patton. “But I’m optimistic. We’re on the right side, defending everyone’s right to clean air and clean water.”

BEYOND GENETICS: EXAMINING SCIENCE'S NEXT FRONTIER



New research on how everyday chemicals affect genes offers tantalizing clues for fighting our worst diseases.

Your mother died of Alzheimer's disease, but your father, at the age of 80, still trounces you at chess. What are your chances of getting Alzheimer's? And what about your kids?

No one knows. Not yet. But new science is leading to a new understanding of the origins of disease—from Alzheimer's to breast cancer, diabetes to asthma—and may help us treat and even prevent such conditions.

Until recently, many scientists believed that mapping the human genome was the key to understanding and curing disease. But, having mapped all 23,000 human genes, scientists now recognize that the genome is only one piece of the disease puzzle.

In fact, most illnesses arise from complex interactions between our genes and the environment, including our exposure to certain common chemicals. The emerging field of epigenetics—literally “beyond genetics”—is exploring these gene-environment interactions.

Genetics concerns the sequence of DNA in our genes. Epigenetics looks at “marks” placed on that DNA. These marks control the expression of our genes, determining which ones are turned on or

off, and when. Think of epigenetic marks as the software that runs our genetic hardware, governing the process by which our bodies create more than 200 cell types from a single fertilized egg.

EDF recently convened a symposium of leading epigenetics researchers to review the field's latest findings and explore its future. Already, it's clear, epigenetics is transforming how we look at the origins of disease.

Birth of the obesogen

Almost 70% of Americans are overweight, double the worldwide average. Half of us are clinically obese. And obesity, which is associated with diabetes, cardiovascular disease and high blood pressure, is the fastest-growing cause of disease and death in the nation.

Sure, Americans eat too much and exercise too little. But there's a real problem when even American newborns are getting fatter. Among otherwise healthy, milk-fed babies, nine months old or younger, one-third are

either obese or at risk of obesity. Why?

One answer may be obesogens, a word coined by Dr. Bruce Blumberg at the University of California, Irvine, for chemicals that increase the risk of obesity by disrupting normal metabolism. Such chemicals can be transferred from a pregnant mother to her developing fetus. For example, in one experiment, Dr. Blumberg fed tributyltin (TBT), a paint and plastics additive, to pregnant mice; the chemical caused the stem cells of the fetuses to become fat cells rather than bone cells.

Research has also identified other potential obesogens. In mice, pre- and post-natal exposure to bisphenol A (BPA), a chemical used in food can linings, plastics and paper receipts, can increase



The environment in the womb can affect health later in life.

body weight. Fetal exposure of mice to PFOA, a chemical present in grease and stain repellents, alters metabolic hormone levels, leading to excess weight gain. And in human studies, early-life exposure to some phthalates, a class of chemicals used in everything from shower curtains to flooring, paints, lubricants and nail polish, has also been linked to obesity.

These chemicals are among the very few that have been tested for their obesogenic potential. No one knows how many others are out there.

Paradigm shifts in toxicology

Until recently, most scientists held to the old saying that “the dose makes the poison.” That is, toxic chemicals cause disease by overwhelming our body’s normal defense mechanisms. But emerging science is turning that paradigm on its

A glimpse of how we may one day avoid catastrophic diseases

head. By mimicking our hormones, even minute amounts of some chemicals appear to be able to interfere with the normal biological processes of our bodies. And *when* exposure occurs may be as important as the amount. The early stages of life, when all of our systems are developing—in utero and during childhood and puberty—are especially vulnerable.

Exposure to some chemicals can affect multiple generations. For example, we learned too late that diethylstilbestrol (DES), once widely prescribed to prevent miscarriage, led to higher rates of breast cancer among the pregnant women who took it. But, even scarier, it turns out the daughters of those women also have higher rates of vaginal and cervical cancers and infertility.

More recent research raises the possibility that chemical exposures may leave an epigenetic “signature” that can be passed down to future generations. Animal research, for example, suggests that a single exposure of a pregnant mother to vinclozolin, a common fungicide,

By mimicking our hormones, even minute amounts of chemicals can interfere with normal biological processes.

may cause epigenetically induced abnormalities in her great-grandchildren.

Prevention and reversibility

“We’re at a new frontier,” Dr. Shuk-mei Ho, a researcher at the University of Cincinnati, said at the EDF symposium. “We’re beginning to glimpse how we might be able to take control of important aspects of our own health.”

Dr. Ho believes that such control can often come from simply removing the triggers that lead to disease. So does Dr. Frederica Perera, a Columbia University researcher who directs a long-term study of asthma in Harlem.

“Given what we know, it would make sense to make prevention of exposures during pregnancy, childhood and puberty a major focus,” Perera said.

Epigenetics research may also lead to new forms of treatment—as suggested by the research of Dr. Randy Jirtle, an oncologist at Duke University. Working with a specific strain of mice, Dr. Jirtle found that the expression of a specific gene—the Agouti gene—is epigenetically regulated. When the gene is turned off, the

mice have brown coats and are lean. When it’s turned on, the mice have bright yellow coats and are obese.

When Dr. Jirtle fed pregnant mice BPA, their pups were significantly more likely to have yellow coats and be obese in adulthood than the offspring of mice not fed BPA. BPA turned on the Agouti gene. But when Dr. Jirtle fed pregnant obese yellow mice a diet rich in B vitamins (folic acid and vitamin B12), they gave birth to brown pups of normal weight. The vitamins reversed the initial epigenetic effect of BPA without changing the DNA sequence.

“We need more research to understand how ‘good things’ like physical exercise counteract ‘bad things’ like exposure to toxic chemicals,” Dr. Richard Woychik of the National Institute of Environmental Health Sciences said at the symposium.

First, let’s clean up the chemicals!

The growing evidence linking common chemicals to disease lends increasing urgency to efforts to reform America’s ineffective Toxic Substances Control Act (TSCA). When it was enacted in 1976, ➤



Identical twins have identical genes. But later in life, epigenetic changes due to their different environmental experiences may, for example, make one twin more vulnerable to disease.

TSCA didn't require any safety evidence for the 60,000 chemicals then in use. Nor has it changed in 36 years. Today, there are over 80,000 chemicals on EPA's chemical inventory. But less than 2% of them have been tested.

In fact, TSCA is so weak that it hasn't even allowed asbestos to be banned. Consumers are in the dark about most chemicals to which we're exposed—even as evidence mounts that conditions such as obesity, infertility and Alzheimer's are linked to such exposures.

For over a decade, EDF has worked to reform U.S. chemical policy. Congress is now finally moving on this issue and is likely to soon take up legislation that will help—the Safe Chemicals Act. The new law would reform TSCA and force



John Rhee

Dr. Richard Denison leads EDF's efforts to reform the nation's main chemical law.

chemical manufacturers to provide basic safety data on chemicals already on the market. It would also require that the safety of newly developed chemicals be

demonstrated before they are allowed into the products we buy.

"It's time for a law that reflects our modern scientific understanding of how exposure to toxic chemicals can affect our health," says EDF biochemist Dr. Richard Denison. "We have a once-in-a-generation opportunity to right a wrong that has led to exposures of millions of people to dangerous or untested chemicals. The Safe Chemicals Act will provide the information we need to prevent such exposures and the serious diseases to which they are linked."

> WHAT YOU CAN DO: Urge your Senators to support the Safe Chemicals Act at edf.org/SafeChemicalsNow

UNLOCKING THE BREAST CANCER PUZZLE

One out of every eight American women will be diagnosed with breast cancer. Of these, one in five will die from the disease. Yet 70% of breast cancers are not associated with any known breast cancer risk factors. Why?

New research in epigenetics (*see story above*), which focuses on the interactions between our genes and the environment, may someday provide the answers.

Scientists now know that chemicals

called endocrine disruptors are able to mimic the hormones our bodies produce. These chemicals can disrupt normal biological processes. For women, they may play a role in the development of breast cancer.

"Research is pointing to endocrine disruptors as a heretofore-unrecognized risk factor for breast cancer," says EDF scientist Dr. Jennifer McPartland.

Unfortunately, endocrine disruptors are everywhere—in detergents, antibacterial soaps, plastic containers, air freshener sprays and flame-resistant furniture. We take in these chemicals through our skin, the air we breathe, the food we eat. One of them, bisphenol A (BPA), is present in the bodies of some 90% of Americans, according to the Centers for Disease Control.

Another class

of chemicals, called phthalates, is used in everything from shower curtains to paints, intravenous tubing and blood bags. Several of them are known endocrine disruptors, linked to premature puberty and breast development in girls. These are risk factors for development of breast cancer later in life.

Prenatal and early childhood exposures can cause lifelong problems. Developing fetuses are especially vulnerable to endocrine disruptors. In studies on mice, prenatal and pubescent exposure to BPA led to harmful effects that persisted over a lifetime. Such increased sensitivity may elevate the risk of developing breast cancer.

For women who already have breast cancer, toxic chemicals can do further damage. For example, BPA and a number of alkylphenols—chemicals found in detergents and cleaners—have been shown to stimulate faster division and growth of breast cancer cells. BPA may also confer "chemoresistance" on breast cancer cells, reducing the efficacy of anti-cancer drugs.

> Learn what EDF is doing on chemical safety: edf.org/health/chemicals



Buccina Studios/Getty Images

Can doing the laundry be hazardous to your health?

HOPE FOR GULF REEF FISH

New program helps ensure safe, reliable seafood



Ryan Orto

After the BP oil disaster struck the Gulf of Mexico in April 2010, consumer confidence in Gulf seafood plummeted. Fishermen and coastal communities wondered if the area would ever recover.

Responding to the crisis, EDF and the Gulf of Mexico Reef Fish Shareholders' Alliance, a group of conservation-minded fishermen, launched Gulf Wild seafood last year. The program is designed to ensure that fish are responsibly caught and tested for oil-based contaminants.

Each Gulf Wild fish is tagged with a unique number. Consumers can enter it at MyGulfWild.com to learn about the captain who caught their fish and the 10-square-mile capture location. More than 150,000 Gulf Wild red snapper and grouper have been sold in fish markets

and restaurants around the country, assuring seafood lovers that their Gulf reef fish is sustainably caught in U.S. waters.

"I hope this will become a prototype for managing fisheries in the future," says chef Rick Moonen, who serves Gulf Wild red snapper in his Las Vegas restaurant RM Seafood.

So far, Gulf Wild fishermen have tested hundreds of grouper and red snapper. To date, no detectable levels of oil contaminants or dispersants have been found. And Gulf Wild fishermen—numbering 100 and growing—pledge to follow strict conservation practices.

An end to mislabeled fish

The Gulf Wild label is also a guarantee of authenticity in the fight against fish fraud.

Recent investigations, including one from *Consumer Reports*, indicate that as much as a third of seafood sold in the United States may be mislabeled.

"I don't want people selling farmed tilapia in place of my grouper," says Jason DeLaCruz, a fisherman out of Seminole, FL.


Populations rebound

All Gulf Wild fishermen are also part of the Gulf's innovative catch share management program, which EDF helped design. The program works to conserve 19 species of reef fish. The catch share for Gulf red snapper has been in place since 2007 with good results. Red snapper populations have rebounded significantly since then.

"When I started out commercial fishing five years ago, we did not have red snapper in this area," says DeLaCruz, who initially opposed catch shares. "Now a fisherman can catch 500 pounds of red snapper a day without any trouble. Those numbers are unprecedented since I've been fishing."

Early results for the grouper catch share, in effect since 2010, are promising. "Catch shares helped save the fishery from an economic disaster," says Glen Brooks, a grouper fisherman on the board of the Alliance.

EDF's Seafood Selector once listed red and black grouper as overfished, but thanks in part to the catch share program and Gulf Wild, we've upgraded them to fish that can be eaten in moderation.

 Choose fish wisely with EDF's Seafood Selector, at edf.org/seafood

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The tale of Peter Rabbit, part II

Imagine if Peter Rabbit were actually invited to gather blackberries in Mr. McGregor's garden. Wouldn't that be a nice story for Easter?

Well, something similar has happened in Eliot, ME, where Spectra Energy and Maritimes & Northeast Pipeline have teamed up with EDF, the U.S. Fish and Wildlife Service and others to restore habitat for the New England cottontail.

Cottontail populations have plummeted by more than 80% in the last half century, largely due to habitat loss resulting from development and forest succession.

EDF helped create a landowner's



The imperiled New England cottontail (*Sylvilagus transitionalis*).

guide for cottontail habitat management, and a broad range of landowners—including farmers, corporations and towns—are already restoring habitat. Spectra Energy, for example, planted quick-growing shrubs such as common elderberry, bayberry and silky dogwood along a natural gas pipeline.

By managing part of their property as shrublands, landowners can provide cottontails with the food and cover they need to survive harsh winters and avoid predators. If enough lands are enrolled, the New England cottontail might be kept off the federal endangered species list.

“Many people are surprised when they learn that rabbits of all things are in decline,” says EDF consultant Kelly Boland. “The old-timers notice they're gone, but the younger generation never knew they were here. We're out to change that.”

That's good news for Flopsy, Mopsy, Cottontail and Peter. Other threatened wildlife such as pollinating bees, eastern towhees and golden-winged warblers also stand to benefit.

Getting to zero



Nicholay Stamer/Shutterstock

California sets the pace for clean cars.

In January, California passed a set of rules that will dramatically boost sales of zero emission vehicles like electric cars.

EDF helped pave the way for the regulations through our vigorous support of the 2002 California Clean Cars law, the first in the nation to address greenhouse gas emissions from tailpipes.

The new rules require that 15% of new cars sold in California must be zero- or near-zero emission vehicles by 2025. That means they must be electric, plug-in hybrid or hydrogen-powered vehicles. These regulations will slash smog-producing pollutants by 75% and greenhouse gas emissions by 50% in conventional cars.

“These new rules will mean cleaner and healthier air, less global warming pollution and lower transportation costs for hard-pressed families,” said Erica Morehouse, EDF policy and legal analyst, who testified in support of the regulations.

California is the country's longtime trendsetter in fighting vehicle pollution. The new rules will likely be adopted by many other states, and perhaps the federal government, in the future.

And the winners are...

In January, EDF was awarded \$500,000 for our work to modernize America's power grid. The 2012 Zayed Future Energy Prize, an international competition which seeks to encourage a sustainable energy future, is presented annually in Abu Dhabi, capital of the United Arab Emirates.

Cooling their jets

A clash over greenhouse gas emissions has pitted two U.S. airlines, American and United/Continental, against the European Union (EU) and several environmental groups, including EDF. A new EU law requires all flights that use European airports to limit their overall carbon pollution.

The U.S. airlines challenged the rule, arguing that the EU cannot regulate U.S. carriers. In December, the EU's highest court, the Court of Justice of the European Union, upheld the law, with EDF intervening in its support.



Photos.com

Aviation accounts for 3% of the world's yearly carbon emissions, a share expected to grow in coming decades.

A win for salmon in federal court



Jeff T. Green/Getty Images

Alone among the world's salmon, California's run year-round.

After hatching in rivers like the American, the Sacramento and the Stanislaus, California salmon spend up to five years at sea before returning to the same streams to spawn. EDF's legal battle to protect the salmon has lasted even longer, but in March we scored a major court win.

California's great salmon runs have been decimated over the past 50 years, in part because an enormous water project in the Central Valley has diverted water

from the rivers for irrigation.

As a result, coastal fishing communities have been devastated, with thousands of jobs lost. California has lost about 80% of its salmon fishing boats since the early 1980s. To restore salmon populations, Congress passed a law in 1992, with backing from EDF, that guarantees enough water will remain in the rivers after diversion for agriculture.

But growers in the Central

Valley never stopped fighting the law. They won a decision in federal district court in 2002, but their arguments were finally rejected in early March by the Ninth Circuit Court of Appeals. EDF sided with the federal government against the growers, and prevailed on all arguments.

"The decision was a complete vindication," says EDF attorney Cynthia Koehler. Now there's new hope that some of California's wild salmon runs will revive.

Walmart goes solar

Back in 2008, an agreement with EDF sparked renewed interest by Walmart in solar technology, leading to a doubling of solar installations at the company's facilities. Now Walmart is putting photovoltaic panels on more than 130 of its stores in California. These solar installations will generate enough power for 5,400 homes, while reducing carbon emissions by an amount equal to taking 4,100 cars off the road.

"By leading on solar, Walmart is setting a powerful example for the retail industry," says EDF project manager Jenny Ahlen.



Walmart Corp.

Putting Walmart's rooftops to work.

China gets serious on climate with EDF's help

Just two years ago, China refused to even talk about a cap on carbon pollution, earning it a reputation as a climate pariah. Now, Beijing is squarely at the table, taking notable steps towards addressing its pollution.

That's important for a nation that burns as much coal each year as the rest of the world combined. China is already the world's largest emitter of greenhouse gases, and its appetite for energy is projected to more than double over the next 20 years.

China's leaders acknowledge that the nation's current environmental trajectory is unsustainable. In December, the State Council approved a plan for greenhouse gas reductions during the 12th five-year plan (2011–2015), outlining 19 new initiatives.

"This is unprecedented progress," says Dr. Dan Dudek, the director of EDF's China program, who helped lay the foundation for the plan. "China's actions challenge the

assumption in some quarters in the United States that China is unwilling to control its enormous carbon footprint."

As co-chair of an advisory task force, Dudek met with Premier Wen Jiabao and his likely successor, Vice Premier Li Keqiang, and made recommendations on what policies China needs

to put in place to hit its ambitious targets. Many of our recommendations were adopted, including establishment of a pilot emissions reduction trading system.

"Now, we have the once unimaginable scenario of China taking active steps towards cap and trade, while the United States has failed

to move nationally," says Dudek.

EDF also launched Cool China, a program in which we work with schools and communities to cut carbon emissions. The campaign's educational roadshow has visited ten cities and five provinces promoting Cool China initiatives.



Tim Connor

As China's middle class grows, so does concern about pollution.

Oil spills happen. What if one happened here?



A massive rig—70 miles from Key West. As of January, Cuba has begun drilling for oil in deep water. And directly down current are the white beaches, pristine waters and coral reefs of both Cuba and Florida.

How can we avoid an incident that could devastate Florida's \$60 billion tourism and fishing industries? Since the safety precautions are not yet adequate, the Obama administration is—at EDF's urging—engaging with Cuba, allowing some U.S. companies to help with spill prevention and containment. But we advocate a more comprehensive policy, so that an accident doesn't become a disaster. To learn more about our continuing efforts, visit edf.org/Cuba.