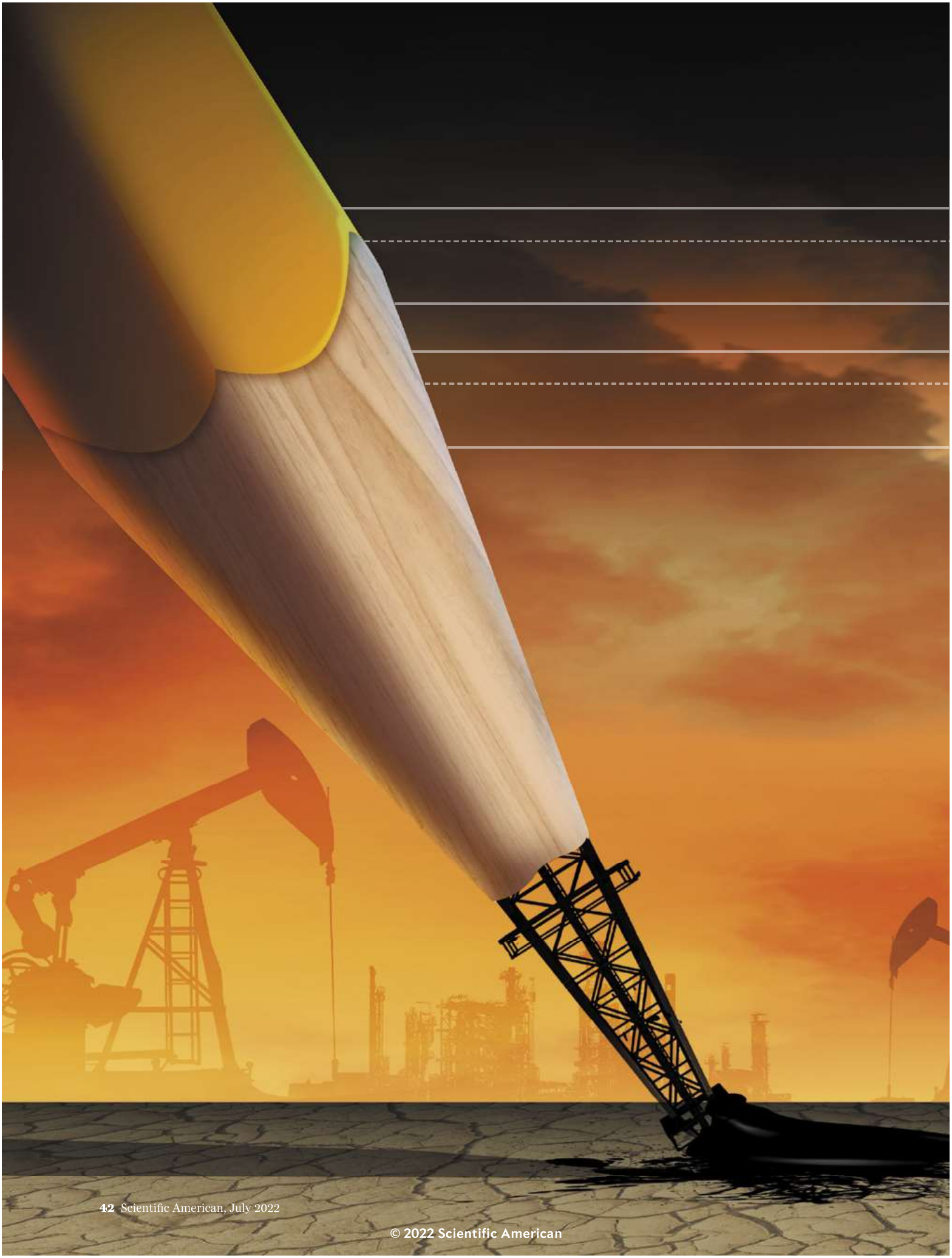


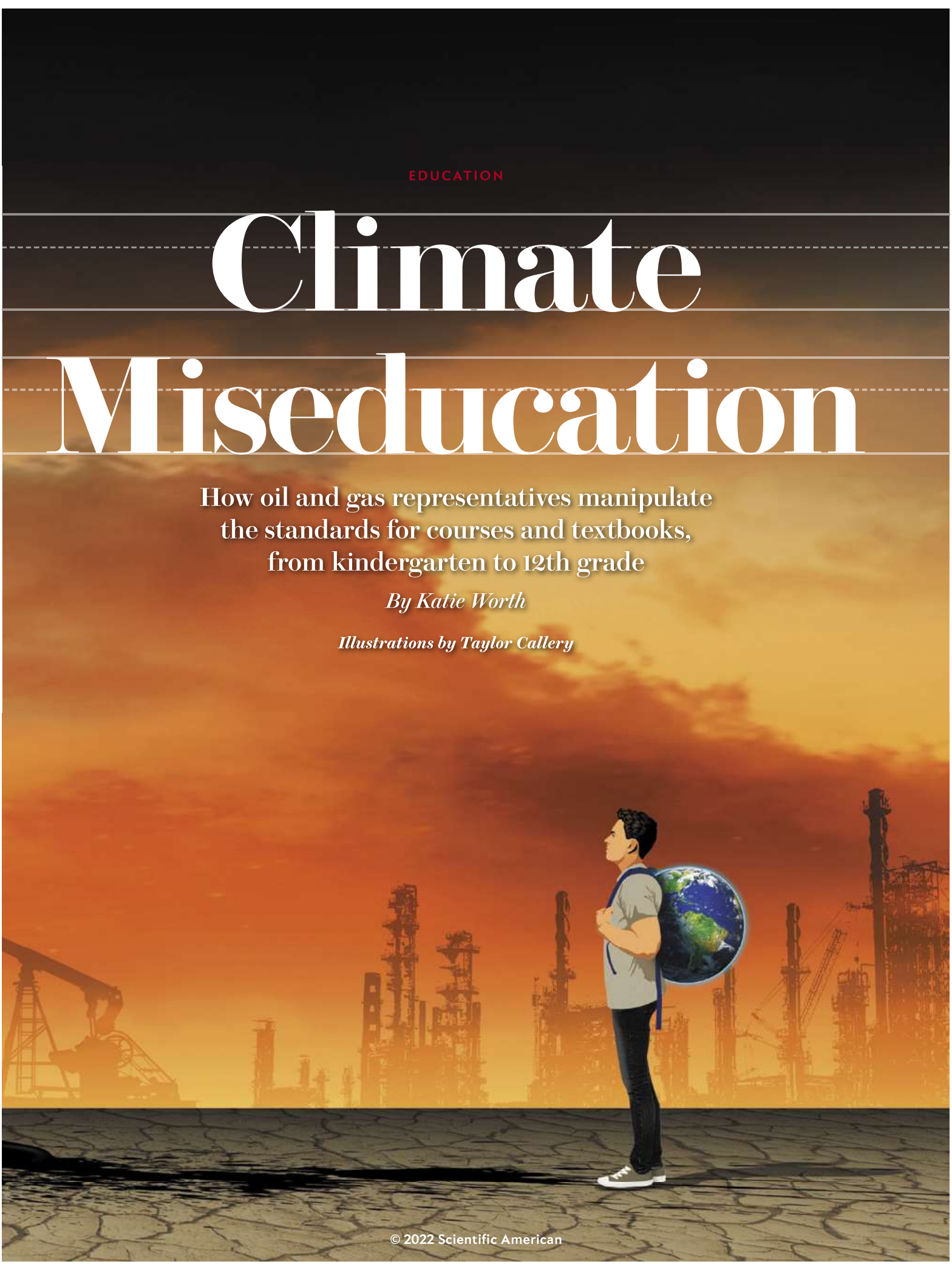
EDUCATION

Climate Miseducation

How oil and gas representatives manipulate the standards for courses and textbooks, from kindergarten to 12th grade

By Katie Worth

Illustrations by Taylor Callery



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IN A DRAB HEARING ROOM IN AUSTIN, TEX., MEMBERS OF THE STATE BOARD OF EDUCATION, seated at small desks arranged in a broad, socially distanced circle, debated whether eighth grade science students should be required to "describe efforts to mitigate climate change." One board member, a longtime public school science teacher, argued in favor of the proposed new requirement. Another, an in-house attorney for Shell Oil Company, argued to kill it.

The attorney won. In the end, the board voted to require that eighth grade science students "describe the carbon cycle" instead.

Over the past two years school board meetings around the country have erupted into shout fests over face masks, reading lists and whether to ban education about structural racism in classrooms. In Texas, a quieter political agenda played out during the lightly attended process to set science education standards—guidelines for what students should learn in each subject and grade level. For the first time, the state board considered requiring that students learn something about human-caused climate change. That requirement came under tense dispute between industry representatives interested in encouraging positive goodwill about fossil fuels and education advocates who think students should learn the science underlying the climate crisis unfolding around them.

Standards adoptions are an exercise in bureaucracy, but the results wield great power over what is taught in classrooms. Publishers consult them as they write textbooks. State education officials use them as the basis of standardized tests. School districts call on them as they shape curricula. Teachers refer to them as they devise lesson plans. Every state adopts its own standards, but Texas adoptions have long had influence far beyond the state's borders.

In 2020 two major education advocacy groups—the National Center for Science Education and the Texas Freedom Network—hired experts to grade the science standards of all 50 states and Washington, D.C., based on how they covered the climate crisis. Thirty states and D.C. made As or Bs. Texas was one of six states that made an F. But because Texas is one of the largest textbook purchasers in the nation—and because its elected 15-member State Board of Education has a history of applying a conservative political lens to those textbooks—publishers pay close attention to Texas standards as they create materials they then sell to schools across America. As a former science textbook editor once told me, "I never heard anyone explicitly say, 'We can't talk about environmentalism because of Texas.' But we all kind of knew. Everybody kind of knows." In this way, the proceedings in an Austin boardroom influence what millions of children nationwide are taught.

Most Americans favor teaching kids about the climate crisis. A 2019 nationwide poll by NPR/Ipsos found that nearly four in five respondents—including two of three Republicans—thought schoolchildren should be taught about climate change. When the Texas Education Agency surveyed science educators across the state about what should be added to the standards, one in four wrote in asking for climate change or something adjacent, such as alternative energy. No one asked for more content on fossil fuels.

And yet, as I learned when I watched 40 hours of live and archived board hearings, reviewed scores of public records and interviewed 15 people involved in the standard-setting process, members of the fossil-fuel industry participated in each stage of the Texas science

standards adoption process, working to influence what children learn in the industry's favor. Texas education officials convened teams of volunteers to rewrite the existing standards, and industry members volunteered for those writing teams and shaped the language around energy and climate. Industry members rallied to testify each time proposals to revise standards got a public hearing. When the board considered the rewritten standards for final approval, the industry appealed to members to advance their favored amendments, ensuring that the seemingly local drama in Austin will have outsized consequences.

For at least a decade the fossil-fuel industry has tried to green its public image. The Texas proceedings show that its actions do not always reflect that image. In little-watched venues, the industry continues to downplay the crisis it has wrought, impeding efforts to provide clear science about that crisis to a young generation whose world will be defined by it.

THE LAST TIME the board overhauled the Texas Essential Knowledge and Skills (TEKS) for Science, in 2009, it was chaired by Don McLeroy, a dentist from east-central Texas. McLeroy made his views on science education clear when he declared at one meeting, "Somebody's got to stand up to experts!" The board spent much of that adoption cycle clashing over evolution, but it also required that high school environmental science students debate something scientists hadn't debated for a long time: whether global warming is happening. McLeroy told a reporter he was pleased because "conservatives like me think the evidence is a bunch of hooey."

At the end of 2019, when it was time to begin another overhaul, McLeroy was gone. The board made it clear to the 85 volunteers recruited by the Texas Education Agency to draft the new standards that it hoped there would not be a fight over evolution again. It soon became clear the group would fight about climate science instead.

To start the process, board members carved the standards into three tranches that they would consider one at a time: first, high school core sciences, then high school elective sciences and finally grades K–8 sciences. The board would give each tranche to writing teams composed of volunteers. Professional content advisers, most nominated by board members, would provide feedback to the board on proposed changes.

Over the summer of 2020 one team took on the first tranche, the high school core subjects: biology, chemistry, physics, and an integrated chemistry and physics class. The core science standards were important for two reasons. The classes had sky-high enrollment; every year nearly half a million students took biology alone. And what happened with these classes would set the tone for the high school electives and for K–8. To the climate education advocates' dismay, when the Texas Education Agency posted the writing groups' results on its Web site in July 2020, the draft standards didn't contain a single reference to modern-day climate change. But there was still a chance to fix that omission. The state board would present the draft standards for public testimony, hearings and amendments.

The first major hearing took place in September 2020, held in person and virtually on Zoom because of the COVID pandemic. More than 30 teachers, parents and other education advocates showed up to testify that the climate crisis has biological, chemical and physical aspects that make it relevant to all the core classes.

After hours of testimony, Robert Unger appeared to represent the Texas Energy Council, and he had some suggestions.

Three and a half hours into that meeting, however, someone with a different message appeared on the Zoom screen: Robert Unger, a silver-haired engineer from Dallas who had worked for the oil and gas industry for more than 45 years. He was representing the Texas Energy Council, and he had some suggestions.

The Texas Energy Council is a coalition of about 35 industry organizations, predominantly from the oil and gas sector, collectively made up of more than 5,000 members. Some months earlier the council had begun recruiting volunteers to participate in the standards adoption process. "The earth sciences and the oil/gas industry in particular have suffered significant degradation in the K–12 curriculum over time," a page on the council's Web site said. In hopes of reversing that trend, the council enlisted 17 people—geoscientists, petroleum engineers, professors, attorneys and other fossil-fuel careerists—who, the site said, "shared its vision of ensuring that oil/gas is portrayed in a balanced fashion as a critical contribution to the Texas, U.S. and worldwide energy mix." Unger had helped organize the volunteers. (Several members of the organization, including Unger, declined to be interviewed for this story. In an e-mail exchange, Michael Cooper, president of the council, took issue with some of this article's findings but said he would be unable to provide a comprehensive response without reviewing a complete draft.)

Unger asked the board to remove a line in the introductory material for each of the high school core classes that discussed social justice and ethics, terms he said "do not belong in the course material." Instead, he said, the standards should include the concept of cost-benefit analysis.

Most board members had expressed little reaction to the many people testifying in favor of climate educa-

tion, but Unger's testimony got their attention. Longtime Republican member Barbara Cargill, a former biology teacher from north of Houston serving her last few months on the board, asked Unger how cost-benefit analysis might be incorporated into the science TEKS. He gave an example: The main benefit of fossil fuels is the energy they produce, and the costs are "environmental issues that our industry is already regulating." But oil and gas aren't the only fuels with a cost, Unger said. Take solar: "It seems like the benefits are wonderful, but the costs, in fact, are the mining of rare minerals to create batteries," he said. "Wind equally has cost and benefit to it." A science teacher could weigh these things with students, he noted, "and not get into the ambiguities of social injustice and social ethics." Cargill promised to consider Unger's proposal.

All sources of energy come with costs. But a fixation on "cost-benefit analysis" is a plank in a raft of arguments supporting what climate scientist Michael Mann has called "inactivism"—a tactic that doesn't deny human-caused climate change but downplays it, deflects blame for it and seeks to delay action on it. Sure, this brand of thinking goes, fossil fuels have their ills. But what form of energy doesn't? Mann and others have criticized such arguments for their false equivalencies: the environmental and health costs of rare earth minerals for certain renewable energy sources are small compared with those of fossil fuels.

The next day, when the board met to consider amendments to the standards, Cargill delivered. She proposed removing social justice from the standards and adding cost-benefit analysis. Fellow Republican Pat Hardy, a retired history teacher and curriculum developer representing suburbs near Dallas–Fort Worth, eagerly supported the addition. "People talk about electric cars like they're saving the universe," Hardy said, captured on a video of the meeting. "And the answer is no, they are not." The board voted to accept the changes. It was the Texas Energy Council's first major victory.

The climate education advocates did get a win on the final day of the hearings. Marisa Pérez-Díaz, a Democratic board member from San Antonio and the youngest Latina to ever be elected to any state's education board, had heard their pleas. She proposed adding the words "and global climate change" to the end of a standard that asked students to examine a variety of human impacts on the environment. Remarkably, the board approved the motion. It wasn't a big win; the wording applied to just one standard, for the integrated physics and chemistry course, which is taken by a fifth of the students who take biology. But for the advocates it was a hopeful sign—certainly a step up from "a bunch of hooey."

In the following months, as the board considered the next two tranches—the high school electives and the K–8 standards—Texas Energy Council volunteers showed up at meeting after meeting. Sometimes they pursued changes that the climate education advocates found reasonable, such as requiring that students learn the laws of geology and encouraging the use of resources such as museums and mentors. But they kept a relentless focus on adding cost-benefit analysis to the standards, and they added new petitions. They insisted on removing the terms "renewable" and "nonrenewable" to describe different energy sources; they preferred to describe all the options as "natural resources." And they frequently brought up energy poverty—the lack of access to affordable electricity. "Energy poverty is one of the gravest but least talked-about dangers facing humanity," testified Jason Isaac, director of an energy initiative for a conservative think tank, at one meeting. He suggested just one solution: "Right here in Texas the key to ending global energy poverty lies under our feet."

The climate education advocates on the board expected to lose some of these battles. But they hoped the Texas Energy Council volunteers would stand down when it came to including clear information about the science of the climate crisis. During the next set of deliberations, it became evident that would not be the case.

In January 2021 the board held the first hearings for high school electives: environmental science, aquatic science, earth science and astronomy. Far fewer students take the electives than take biology, chemistry or physics, but the earth science and environmental science course standards were the only ones that already mentioned climate change.

In the months leading up to the hearings, the 23 people on the electives writing teams had met about every two weeks to draft the new standards. The old standards for the earth science course had asked students to "analyze the empirical relationship between the emissions of carbon dioxide, atmospheric carbon dioxide levels, and the average global temperature trends over the past 150 years," a reference to the period since industrialization, during which atmospheric carbon dioxide levels have soared. That language didn't sit well with William J. Moulton, a longtime geophysicist for the petroleum industry. Encouraged by the Texas Energy Council, he and several other industry representatives had applied to the Texas Education Agency for a seat on a writing group and had been placed. Moulton was on the team rewriting the earth science and astronomy courses.

Moulton agreed that climate change should be mentioned in some way because students would hear about it anyway. But he felt students should not be led to believe the science is settled. He argued that the phrase "the past 150 years" should be removed. The group agreed to that change and to several of Moulton's other language tweaks. When those already diluted standards came before the board in January, four other Texas Energy Council volunteers appeared on Zoom, all recommending amendments. One person said the standards should focus on the dangers of rare earth minerals. Another said it was important for children to learn that the inception of the fossil-fuel indus-

try stopped the practice of whaling for blubber that could be turned into fuel. "Oil and gas literally saved the whales," she said.

The industry also had a new champion on the board: Will Hickman, who had just been elected in November 2020 for a district outside of Houston. Hickman's experience in education included serving on parent groups at his kids' schools, coaching community sports and teaching Sunday school. He'd held the same day job since 2004: senior legal counsel at Shell Oil.

In the January hearing, Hickman's first, his opening question was where in the proposed standards he could find the advantages and disadvantages of various forms of energy. The next day he offered an example that might be raised in class: "Everyone thinks renewable power's a great idea, and Germany adopted it on a large scale," he said. "But the cost-benefit—it ended up raising their power prices to about 2.5 times our power prices."

The writing committees had already included a reference to cost-benefit analysis in the "scientific and engineering practices" section of each of the elective courses, and the standard for the environmental science course had a second mention. But at the next board hearings, in April, Hickman pressed for more. Another member, Rebecca Bell-Metereau, a professor of English and film at Texas State University, who had just been elected to represent Austin, pressed back: "The very phrase 'costs and benefits' places the primary emphasis on money, not on society or well-being or human health." The board nonetheless approved a motion by Hickman to add another mention of costs and benefits, to aquatic sciences.

Moulton began showing up at the board hearings with additional proposed changes. His colleagues on the writing group had accepted some of his suggestions but not all of them, so he wanted the board to consider adding them as amendments. In the final hearing in June, board member Hardy asked Moulton if he'd heard the "newest stuff that's been coming out on climate," which, she said, was that the climate crisis was not unfolding as scientists had predicted. Moulton suggested that the consensus about warming had been exaggerated by scientists in pursuit of grant money.

Hardy began proposing amendments word for word from Moulton's suggestions. This elicited an outcry from Bell-Metereau. "Do you not think that if someone's area of work is in fossil fuels that they might have some bias on this issue?" she asked Hardy. "It might be that *I* have a bias for the fossil-fuel industry," Hardy answered.

Bell-Metereau and others on the board threatened to delay the entire adoption if Hardy insisted on moving the changes forward. Ultimately Hardy dropped the proposals. But Moulton and the council had already succeeded in important ways: The new electives standards had multiple references to cost-benefit analysis. The terms "renewable energy" and "nonrenewable energy" were removed in several places. The single mention of the effects of burning fossil fuels in the old standards was gone, and the strongest description of climate change had been weakened.

THE CLIMATE EDUCATION ADVOCATES had failed to install a robust presentation of the science surrounding the climate crisis in any of the high school core or elective classes, as they had watched the Texas Energy Council volunteers achieve one goal after another. But they held out hope for the K–8 standards. Nearly every middle schooler takes the same sciences, and the classes cover weather and climate systems, an obvious and effective place to discuss the crisis for a generation of students that would have to live with its consequences.

"Inactivism" doesn't deny human-caused climate change but downplays it, deflects blame for it and seeks to delay action on it.

On a 96-degree day at the end of August 2021, the board held a public hearing on the K–8 standards, in person and virtually. The writing groups had labored over the drafts, adding a single passage mentioning climate change. Eighth grade science students, the draft declared, would be expected to "use scientific evidence to describe how human activities can influence climate, such as the release of greenhouse gases." One writing group, which included the executive director of a natural gas foundation, had also appended a note stating it had not been able to reach consensus on a proposal to add another line: "Research and describe the costs and benefits of reducing greenhouse gas emissions versus global energy poverty."

At the hearing, two of the professional content advisers who had reviewed the standards gave the board radically different opinions. Ron Wetherington, a retired anthropology professor from Southern Methodist University nominated by Pérez-Díaz, argued that the climate standards needed significant strengthening. Among other things, he advocated that the word "can" be dropped from the phrase "describe how human activities can influence climate." "Can" implies that something is a possibility, but an abundance of evidence shows that the influence is already taking place. He also asked the board to add an expectation that students explore efforts to mitigate the crisis. Because students would learn that it's happening, he posited, they should learn what people are doing to fix it.

Gloria Chatelain, a longtime educator and CEO of her own consulting firm called Simple Science Solutions, who had been nominated by Hardy and Cargill, stood in absolute opposition. She began her testimony by praising the "absolutely amazing job" the Texas Energy Council had already done in improving the

standards. She also said human-caused climate change should be treated very lightly in middle school, if at all. "Our goal is not to produce angry children but children who love science. We're challenging them to go solve some of these exciting problems but not turn them into Gretas," she said, referring to the teenage climate activist Greta Thunberg of Sweden. Instead, she contended, the board should add an expectation that students "research and describe the role of energy in improving the quality of life in reducing malnutrition and global poverty," language the council had suggested. "I think it needs to go in, guys. It's very, very important that we address it," Chatelain said.

For three days that week the board considered the K–8 language. Over the protests of Democrats, Hardy moved to add "cost-effectiveness" to each middle school class. She and Hickman persuaded the conservative board majority to change multiple references to renewable and nonrenewable energy to "natural resources" in the elementary standards.

On the second day climate education advocates landed two unexpected victories. Pérez-Díaz proposed rewording the climate standard to "describe how human activities over the past 150 years, including the release of greenhouse gases, influence climate." Then she proposed adding a separate line: "Describe efforts to mitigate climate change, including a reduction in greenhouse gas emissions." The amendments both carried. But on the third day the board axed the reference to the past 150 years and added the word "can" back in. The details of recent climate change, Hardy argued, would simply be too hard for eighth graders to grasp.

Aicha Davis, a board member from Dallas who spent 11 years teaching science before pursuing her Ph.D. in education leadership and policy, spoke up. "With all respect to my colleague, you've never taught eighth grade science," she said, her voice tinged with forbearance. "We absolutely can't let the oil and gas industry dictate what our kids need to learn when it comes to science. It shouldn't be about the Texas Energy Council. It should be about what's best for our students." Neither scientists nor educators had voiced concern about teaching climate change to eighth graders, she noted. "So let's call this what it is. At this point we're only making votes based on what oil and gas wants us to do."

Hickman, the Shell attorney, turned on his micro-

phone. "A few thoughts and reactions," he said. "One is I think our permanent school fund is generally funded by oil and gas," referring to a major source of education funding maintained in part by proceeds from fossil fuels reaped from public lands. "All of us are probably going to get home using oil and gas.... If all of this is true—greenhouse gases are evil—what do we do? Do we ban gasoline and stop using gasoline-powered cars? Do we ban diesel for trucks? How do we get our Amazon and Walmart purchases?" The board chair suggested they table the issue until the final round of hearings, scheduled for November 2021.

As they waited for the last round, the National Center for Science Education and the Texas Freedom Network organized. They recruited 67 Texan climate scientists to join a letter asking, among other things, that the word "can" be dropped from the climate passage and that the mitigation language stay put not only because it consisted of "basic knowledge" that every citizen should have but because it would provide students with a sense of hope.

Nevertheless, the final round of deliberations in November was a slaughter. Climate change had been added in a limited way to the standards, and the conservative majority supported that. But it rejected a motion to strike the word "can." It blocked a motion to remove cost-benefit analysis from the middle school sciences. It approved new language about "the critical role of energy resources" to modern life. It inserted a reference to rare earth elements. It introduced the concept of global energy poverty.

Last, Hickman moved to drop the climate mitigation standard that Pérez-Díaz had managed to add in September, arguing that the subject was more appropriate for social studies than for science and that it "just seems above and beyond for an eighth grade student and teacher." The board Democrats fought the change, but they were outnumbered. The board replaced the mitigation standard with the line "Describe the carbon cycle."

The Texas Energy Council and two allied organizations issued a press release praising the State Board of Education for adopting standards that "emphasize the critical role of energy in modern life." The Texas Freedom Network hit a more ambivalent note in its year-end report. "The State Board of Education could have—and should have—done much better. But our campaign resulted in new science standards that for the first time make clear to Texas public school students that climate change is real and that human activity is the cause."

The fossil-fuel industry, like some others, has worked for decades to get its messages in front of schoolchildren. I have found examples across the U.S. Petroleum companies regularly fund teacher trainings incentivized by free classroom supplies. Industry organizations have spent millions of dollars producing and distributing energy lesson plans. I witnessed an oil and gas industry employee give a PowerPoint presentation radically downplaying the climate crisis to a class of seventh graders.

Even with abundant online educational materials, just 9 percent of high school science teachers say they never use a textbook. The nation's most popular middle school science textbooks are replete with language that conveys doubt about climate change, subtly or otherwise. In one textbook that, as of 2018, was in a quarter of the nation's middle schools, students read that "some scientists propose that global warming is due to natural climate cycles." In fact, the number of climate scientists who support that idea is effectively zero.

"Let's call this what it is," Aicha Davis said. "At this point we're only making votes based on what oil and gas wants us to do."

Texas isn't the only major buyer of textbooks. Other large states such as California have adopted standards that embrace the science of climate change, leading to a divide. Textbook publishers create one set of products to sell in Texas and states that lean the same way and a second set of products for states aligned with California. This poses an equity problem: the education a child receives on an issue central to the modern world depends on what state they happen to live in.

In April 2022 the Texas Education Agency issued a call for textbooks based on the new standards. Publishers have a year to submit materials to the agency. Review panels, made up of educators, will search the textbooks for errors and rate how closely they follow the standards. Then the materials go before the state board for approval or rejection. Texas school districts have the option of establishing their own textbook adoption process but still must choose books that comply with the standards. Most just defer to the board's choices. The new science textbooks should be on classroom shelves starting in the fall of 2024.

The Texas Energy Council's Moulton told me he found the standards adoption process energizing, and he hopes to stay involved. As soon as he gets the chance, he said, he'll start reviewing the new textbooks and will head back to the board to give them his thoughts. SA

FROM OUR ARCHIVES

A New Vision for Teaching Science. J. Randy McGinnis and Deborah Roberts-Harris; *Scientific American Mind*, September/October 2009.

scientificamerican.com/magazine/sa