THIS IS NOT A CIGARETTE
ELECTRONIC CIGARETTES
COULD SAVE LIVES—OR HOOK
A NEW GENERATION ON NICOTINE

BY ELIZA GRAY
The e-cigarette market has grown from $300 million in retail sales in the U.S. last year to an estimated $1.8 billion in 2013, according to Bonnie Herzog, senior analyst at Wells Fargo. E-cigarettes are sold at Walmart, vaped by Katherine Heigl and Leonardo DiCaprio and advertised during the Super Bowl and the Oscars and on the hoods of NASCAR race cars. But much of their early success comes thanks to their near complete freedom from regulation, which has allowed dozens of small players to flourish.

That is about to change. The tobacco giants Lorillard, Reynolds American, Altria and British American Tobacco have just entered the market. And the Food and Drug Administration says it intends to assert control over e-cigs in October—kicking off a rules-writing process that could regulate everything from manufacturing to the nicotine content to whether or not electronic cigarettes can be flavored, sold online, sold to kids or marketed on television.

At the same time, cities and states across the country are considering laws like sales taxes and bans in public places.

The challenge for regulators is this: e-cigarettes offer the first realistic chance of escape from the most exquisite and deadly delivery device for nicotine ever invented, the combustible cigarette, which kills more Americans annually than AIDS, car accidents, illegal drugs, murders and suicides combined. But we know little about the health effects of e-cigarettes, and there is a real fear of unintended consequences. Public-health experts have spent years stigmatizing smoking and making it as inconvenient as possible, scrubbing it from popular culture and public places. E-cigarettes, with their sexy marketing and aura of safety, might re glamorize smoking, discouraging smokers from quitting and, worse, enticing nonsmokers to start. The coming regulations are likely to consolidate the market, weeding out small players and favoring big companies that can afford to comply. The ones that survive might actually transform the way the world smokes.

After losing his father to lung cancer, Hon Lik, a Chinese pharmacist—who, like more than 50% of the men in his country, smokes—wanted to invent a safer way to get his nicotine. It took a couple of years, but in 2003 he won the first patent for the electronic cigarette—a device that heated and vaporized a liquid made of pure nicotine, water, flavoring and propylene glycol, the chemical used to make stage fog. Today his company, Ruyan, has sold more than a million electronic cigarettes, and China is the biggest producer of electronic cigarettes and liquid in the world. But key competitors have emerged in the U.S. as demand grows for American-made e-cigarette liquid.

A few years later and across the world, a 35-year-old Apple Store manager near Milwaukee by the name of Christian Berkey learned about electronic cigarettes from a news story. A 2½-pack-a-day smoker and something of a tech nerd, he ordered one online. He was delighted by how closely using the electronic cigarette resembled smoking—the soothing hand-to-mouth motion, the familiar tingling sensation at the back of his throat as he exhaled the vapor and the plume of “smoke” that appeared when he exhaled.

There was only one problem: it tasted awful. At the time, he says, all e-liquid tasted like chemicals and came from China in plastic bottles with sketchy markings. Determined to make a liquid he could actually use, Berkey began hoarding cigarette, cigar and pipe tobacco from wherever he could get it. Every minute that he wasn’t working at the Apple Store, he was in his kitchen experimenting. He tried using a double boiler to warm the tobacco into a paste and lining up five coffeemakers on his kitchen counter to brew a “tobacco re-heats a tiny metal coil, which then vaporizes the nicotine liquid. If a customer balks at the $38 price for the refillable electronic cigarette, which includes an atomizer, a rechargeable battery and a charger, she reminds them that it’s a savings. An 88 bottle of liquid lasts a pack-a-day smoker about a week. In New York City, a vaper on Spike’s product would spend $40 to $50 a month on liquid and replacement parts, much less than a pack-a-day cigarette smoker, who’d spend that amount in four days.

**ELECTRONIC-CIGARETTE SALES HAVE GROWN FROM $300 MILLION LAST YEAR TO AN ESTIMATED $1.8 BILLION IN 2013**
protective coveralls, who mix smoke juice in a lab in the basement of the company's 42,000-sq.-ft. headquarters in Hartland, Wis. The techs walk through two cleansing air curtains into a 65°F room with hospital-grade tile on the ceiling and air that circulates several times an hour. Inside, they mix batches of propylene glycol, nicotine, citric acid and flavoring in drums and jugs of varying sizes. The largest holds 1,000 L of the brew they make for Lorillard's brand, Blu, one of the two top-selling e-cigarettes on the market. The hallway outside smells like the flavor they are brewing that day—chocolate, tobacco or sinus-clearing menthol.

Demand for Johnson Creek's product is huge, and revenue jumped from $2.6 million in 2011 to $7.8 million in 2012. It is expected to reach $13.2 million by the end of the year. That isn't unique. Wells Fargo's Herzog estimates e-cigarettes' retail sales in the U.S. could exceed $10 billion by 2017 and operating margins could reach the mid-40s, higher than the roughly 40% margins for conventional cigarettes today. The potential market is huge. In the most recent report from the Federal Trade Commission in 2011, the number of traditional cigarettes sold to wholesalers and retailers in the U.S. was 273.6 billion.

Berkey says he is prepared for regulation. But like others, his business may suffer depending on what the FDA decides. If the FDA bans Internet sales, a strong possibility, that would affect 31% of his revenue: a key selling point for Johnson Creek is that if a customer orders by 9 a.m., the company will process and ship the order the same day. "We sell a product that for the most part contains nicotine," explains Johnson Creek's COO, Heidi Braun. "People want it, and they want it quickly."

Almost nothing, not even heroin or cocaine, is more addictive than nicotine. While other drugs impair, nicotine enables. When you are sleepy, it wakes you; when you are anxious, it relaxes you; when you are hungry, it takes your hunger away. Heroin withdrawal causes unbearable flu-like symptoms, but they eventually pass. People who've used both say it is harder to quit smoking. For quitting smokers, withdrawal is psychologically damaging; they feel anxious, depressed, irritable, bored and unable to focus. Perhaps that is why nicotine-replacement therapies, like the patch, the gum and the inhaler, effective in clinical trials, don't seem to work well in the real world. Even though half of smokers will die a slow and painful death from smoking, the 69% of smokers who say they want to quit know the odds are against them.

Electronic-cigarette companies are not allowed to promise that their product can help smokers quit, called a "cessation claim" in the industry. But though there is not enough scientific evidence to support the claim, a vocal group of evangelists say e-cigarettes saved their lives by helping them quit traditional cigarettes. When legislatures in Hawaii and Utah sought to regulate electronic cigarettes, they ignited protests. When the Italian government
We didn’t realize research costs $150,000," she says. Realizing she needed more, she organized to stop it. They failed, but introduced a ban on e-cigarette smoking in public places, she and a club of vapers she organized lobbied to dissuade children. Babaian is in favor of a flavor ban—she says of her stores’ sales are

tried to levy a hefty tax on electronic cigarettes, protesters went on hunger strike.

Babaian, the owner of the Vape stores in New York, is one of these evangelists. Electronic cigarettes cured her two-pack-a-day habit, so when her county on Long Island introduced a ban on e-cigarette smoking in public places, she and a club of vapers she organized lobbied to stop it. They failed, but their efforts continued. The club met in diners to vape and talk and pool together a few bucks to fund research on e-cigarette safety. "We didn’t realize research costs $150,000," she says. Realizing she needed more, she took the movement national, starting an annual conference called Vapefest. The money was raised, and the study was completed in October 2012. Now Babaian is focusing on the New York City council’s regulations, which could include a flavor ban designed to dissuade children. Babaian is in favor of FDA testing of flavoring and believes some can be dangerous, but an outright flavor ban—she says 63% of her stores’ sales are flavors—could destroy her business.

On the day I visited her Manhattan store, a young man handed Babaian his ID. He had only just turned 18, and Babaian looked up at him. "Do you smoke cigarettes?" she asked. He told her he smoked only electronic cigarettes, the disposable ones (easily purchased at a corner store), and now he wanted to try one of hers. In between helping other customers, she tried to dissuade him. Why not try the patch or the gum? It would be better if he didn’t become dependent on the hand-to-mouth motion, she said. Finally, he offered that he sometimes smoked mini-cigars, and she agreed to sell him an e-cigarette without nicotine. She implored me not to write about the kid. It was rare to get someone so young in the store, she said, and she doesn’t sell to minors anyway. As he left, she told him to act like an adult. Don’t goad people or show off the e-cig to teachers, she said, or "you are going to get this banned and people are going to die."

CRAIG WEISS, THE CEO OF NJOY, IS NOT about to let that happen. The youngest of seven children born to a patent attorney and a federal judge, Weiss has the confidence of a man who has never failed. He won his first patent, for an apparatus to keep tennis balls from flying off the court, when he was 13. After graduating from the University of Pennsylvania, he co-authored a book, while at law school at Arizona State, about American soldiers who fought in Israel’s war of independence. Benjamin Netanyahu wrote the foreword. After stints as a patent attorney and a hedge-fund manager, Weiss became the CEO of NJOY in 2010. (The company was started by his brother Mark in 2006 after he encountered an electronic cigar in China.)

Weiss says his goal is to make combustible cigarettes obsolete. To achieve that, NJOY is trying to craft an analogue so similar to the real thing that smokers won’t be able to tell the difference. They may be getting close. In December 2012, NJOY released the King, a disposable e-cigarette that is white, with a little foil-like gold line at one end and a gray tip that lights up yellow and makes a crackling sound when you take a drag. Unlike the other mass-market brands sold at convenience stores, including Lorillard’s Blu and Reynolds American’s Vuse, the King isn’t a hard piece of metal. It is spongy, simulating the give of tobacco rolled in paper. Its hard plastic case combines the classic American glamour of Marlboro with a top that snaps open and clicks shut with a satisfying feel that evokes a Zippo lighter. NJOY is already the market leader, and as of February the King represented 65% of the growth in the entire electronic-cigarette category last year, according to Weiss. Thanks to $75 million in new funding from investors, including Napster co-founder Sean Parker, NJOY is expanding into the European market, which has three times as many smokers as

THE ECONOMICS OF VAPING

E-cigarettes typically cost more than traditional ones. But because many are reusable—and even disposables offer more puffs than a single tobacco cigarette—the total cost of vaping over time can be far less than for smoking.

### MARLBORO

$5.78/PACK Traditional cigarette offers 8 to 16 puffs. (Price per pack is national average.)

### VAMO

$129.99 This refillable model has a battery good for 24 hours and lets you adjust the heat of the vapor.

### EGO CE4

$34.99 Battery in this disposable lasts 15 hours; 10 ml of nicotine liquid is similar to about six packs of tobacco cigarettes.

### VEA

$59.95 Refillable with 24 flavors. Recharges with USB cord, like many smartphones.

### KING

$9.99 A top-selling disposable with 30 or 45 mg of nicotine, roughly equivalent to two packs.

### BLU

$9.99 Disposable is good for 400 puffs, or about a pack and a half of cigarettes.

### THE ECONOMICS OF VAPING

E-cigarettes typically cost more than traditional ones. But because many are reusable—and even disposables offer more puffs than a single tobacco cigarette—the total cost of vaping over time can be far less than for smoking.
the U.S. "The incredible sort of revolution happening in the United States with electronic cigarettes," Weiss quips, "is not because of devices that look like light sabers." But as much as the King looks and handles like a cigarette, it doesn't yet replicate the sweet sensation of smoking. The disposable e-cigs sold in convenience stores—like King and even Blu, with its blue light at the tip—are not as dorky as the magic wands Babaian sells, but they also can't do what her rechargeable cigarettes can. They don't replicate the heat, the amount of nicotine or the throat hit—that tingling sensation in the back of the smoker's throat right when the nicotine is about to hit the brain. No one quits on "cig-a-likes," Babaian says, pointing to a green cup by the register where she keeps them, labeled CRAP CUP. They aren't for converts, she explains, but for young people looking for novelty or a way to smoke inside when they are at a bar.

Weiss admits that most of his customers use both, a fact NJOY acknowledges by leaving space in King's case for real cigarettes. That's a pattern that public-health experts fear, but Weiss says it's temporary until the technology improves. Comparing NJOY to David and Big Tobacco to Goliath, Weiss sees e-cigarettes as a disruptive technology that can eliminate tobacco smoking and change the world.

"There is going to be a Nobel Prize in this for somebody, and it is going to be one of my scientists," he told me. "He is going to save more lives than Jonas Salk," the inventor of the polio vaccine. Weiss was referring to Josh Rabinowitz, a professor of chemistry and integrative genomics at Princeton, who has been consulting with NJOY.

Weiss has also recruited a former Surgeon General as well as a former head of the tobacco research arm of the National Cancer Institute, Scott Leischow, to do a study in which 16% of e-cigarette smokers quit by the end of the study period and 89% reduced smoking consumption. Meanwhile, researchers at the Harvard School of Public Health and the University of Massachusetts at Boston found last year that smokers who used nicotine-replacement therapy, including nicotine gum and the patch, were just as likely to relapse as those who used nothing at all. Referring to a Morgan Stanley estimate, Weiss argues that 2.4 billion fewer cigarettes are smoked every year because of electronic cigarettes. That's a point of pride at NJOY. A flyer circulated internally among employees says, "300 million cigarettes not smoked and counting," with this tagline: "Cigarettes. You've met your f---ing match."

Weiss's emphasis on the health of the product is daring. NJOY helped convince a federal appeals court that the FDA shouldn't be allowed to regulate electronic cigarettes as a medicine—regulations that would have involved expensive clinical trials—so long as the companies selling them didn't claim they could help you quit. Here NJOY has to walk a fine line between making explicit cessation claims and implying health benefits to encourage new users and stave off local regulations. He says indoor-smoking bans—like, for example, the one already passed in Boston—are "not in the public health's best interest," and he calls fears that kids might start using the product a "boogeyman."

But some scientists who are not on Weiss's staff—even those who are optimistic about the promise of e-cigarettes—are not so quick to dismiss the dangers. The public-health community has PTSD from the two times in history the tobacco industry promised its products were healthier—light and filtered cigarettes, both of which turned out to be just as deadly. No one really thinks electronic cigarettes are more of the same. There are more than 7,000 chemicals in a combustible cigarette and no more than a handful in e-cigs. But even the most supportive doctors say indoor bans make sense. Nonsmokers have a right to breathe air that doesn't contain nicotine, they say, and there is not enough information on the effects of breathing in propylene glycol or the fine particles e-cigarettes put into the air.

"The studies the e-cigarette people point out, claiming these things are harmless, are really, really, really crappy," says Stanton Glantz, a professor at the University of California, San Francisco, medical school and a leading expert on the effects of secondhand tobacco smoke. "It is probably about 10% to 20% of what a cigarette puts out, so looked at that way, they are really nice. On the other hand, if you look at absolute levels of risk, they are pretty bad, because a cigarette is just ridiculously toxic and ridiculously polluting. If you go into a bar or casino where there is a lot of smoking, the only way to get the air that polluted outdoors is to be downwind from a large forest fire. If you say an electronic cigarette is only 10% to 20% less polluting than a massive forest fire, that's not so good." Weiss's Princeton scientist, Rabinowitz, counters that the level of pollution an NJOY emits is 100 to 1,000 times lower than OSHA's indoor-pollution standards.

The CDC's tobacco expert, Dr. Tim McAfee, who approaches e-cigarettes with cautious optimism, is excited about the prospect that they might make it easier to eliminate tobacco cigarettes altogether, but he points out that CDC surveys about usage have also produced troubling results. The number of former smokers who had successfully quit and picked up electronic cigarettes more than doubled from 2010 to 2011, according to the CDC's latest survey. The percentage of high school students who had ever used an electronic cigarette more than doubled, from 4.7% in 2011 to 10.9% in 2012, and in 2012, 1.78 million middle and high school students in the U.S. had tried e-cigarettes, according to the CDC. It hasn't been long enough to see whether this means those kids will eventually switch to cigarettes, but a 2001 study published in *Nicotine and Tobacco Research*, for example, showed that males ages 11 to 19 who used snuff and chewing tobacco were more than three times as likely as nonusers to have become smokers four years later.

While they wait for regulators to weigh the pros and cons, e-cigarette makers are expanding their marketing efforts. In the first quarter of 2013, according to Kantar Media, e-cigarette spending on advertising rose to $15.7 million in the U.S., up from $2 million in the same period last year. Advertising from Kantar shows placements by NJOY and Blu throughout mainstream media, on cable stations—e-cigarettes, unlike regular cigarettes, can advertise on TV—as well as in magazines (including *Time*). Some ads emphasize the rebellious nature of e-smoking and feature celebrities like Stephen Dorff and Jenny McCarthy, the spokespeople for Lorillard's Blu, re-creating the glamour of smoking that public-health advocates most fear. "It's time smoking changed forever," says a distant voice in what looks like a promotional video for space travel but is really an advertisement for Reynolds American's new e-cigarette brand, Vuse. "Welcome to tomorrow."