Marin County, CA*
Monterey, CA
Pasadena, CA
Santa Cruz County, CA
Santa Clara County, CA
Sunnyvale, CA
Aspen, CO
Portland, OR
Bellingham, WA
Seattle, WA

2012

State of Hawaii (first statewide ban)
Alameda County, CA*
Carmel-by-the-Sea, CA*
Carpenteria, CA
Dana Point, CA*
Fort Bragg, CA
Laguna Beach, CA*
Los Angeles (city)*
Mendocino County, CA
Millbrae, CA
Ojai, CA*
San Luis Obispo, CA*
San Francisco Part II—extended to include all retailers and takeout food
Santa Cruz (city), CA*
Solana Beach, CA*
Ukiah, CA
Watsonville, CA*
West Hollywood, CA
Corvalis, OR

At least 55 other communities had bans pending or under study by the end of 2012.

11 GREEN CITIES AND GARBAGE DEATH RAYS

THERE'S ONE CITY IN AMERICA THAT CONSISTENTLY rates at or near the top of every list and survey of sustainability, green buildings, recycling rates, clean transportation, energy efficiency and eco businesses. This city pioneered smart growth policies back in the 1970s and kept them in place through the deregulation fervor of the 1980s. This required considerable upstream swimming. The Reaganesque mantra had taken root elsewhere: *Government's the problem, not the solution.* In most communities, that philosophy had led to an era of unprecedented private exploitation of public lands, of endless strip mall construction, of minimal

oversight and of widespread hostility to the environmental protections set in place a decade earlier.

But as a result of its contrarian leaders and citizenry, this city ended up with ample green space, the largest wilderness park within city limits in America, walkable neighborhoods and a rich web of local farms that supply a famously locavore restaurant and farmers' market scene. Yet it still has an urban core sufficiently prosperous that financial analysts have called it the "comeback city" for its job growth even during the recession.

This same city is so obsessed with green and zero-emissions transportation that some businesses offer more parking for bikes than cars, bicycle lanes are everywhere, many city intersections have green zones that allow bikes to cut in front of car traffic, and it's a major destination for the increasingly popular "car-free vacation." Fitness clubs use exercise bicycles and their own members to generate green power. The city's public transit doesn't stop with trolleys, trains and buses but also includes an aerial tramway that looks like it was beamed in from an Alpine chalet—a cable car that brings commuters up from the new south waterfront downtown development to a hilltop university campus and medical center, the city's largest employer. It carried a million passengers by its tenth month in service, in a town with fewer than six hundred thousand residents. This city even adopted a climate change plan in 1993, five years before the famous Kyoto Protocols, and was the first (and only) American city to meet the Kyoto goals years ahead of schedule by reducing its greenhouse gas emissions below 1990 levels beginning in 2008. It did this despite growing at a faster rate than most other cities in the country, providing a counterpoint to the conventional wisdom that communities can have strong environmental protection or economic growth, but not both.

In fact, prosperous Portland, Oregon, does so many green things right that its greener-than-thou sensibilities have spawned a sardonic cable TV show, *Portlandia*, which features such gems as a mayor who bicycles directly into his office at City Hall and dismounts onto a giant inflated ball that doubles as his desk chair. Of course, the real mayor, Sam Adams, who appears on the TV show as the fictional mayor's aide, isn't so different. Out in the real world, he has sung on the radio, "Bring your bag, bring your bag, bring your bag, bag, bag . . ." to the tune of the *William Tell Overture*—as a reminder to Portlanders to bring their reusable shopping bags to the grocery store.

There's just one area where sustainable Portland lags, the big challenge any community with green aspirations must wrestle and beat: its trash.

They make a lot of it in Portland—a shade more trash even than the average American's 7.1 pounds a day, and a half pound more than the average Oregonian. The last time per capita waste statistics were released, residents of the Greater Portland Metropolitan Area—just "Metro," as it's referred to locally—generated more than 1.3 tons of trash a year. That's 7.14 pounds a day per Portlander.

They do a good job of diverting much of that trash from the landfill—with about 59 percent recycled, composted or burned for energy in 2010 (that's for the entire three-county, 2.3-million-person Metro area; within the city limits, the 586,000 urban residents of Portland do even better, hitting 67 percent). That's still behind San Francisco's official 77 percent rate, but well ahead of the national average of 24 percent. Yet even with all that landfill diversion, Metro Portland still sends sixty massive trucks every day laden with garbage to the Columbia Ridge Landfill in Arlington, on the border with Washington. That's a truck of trash every twenty-

four minutes, setting out on a 360-mile round-trip to the landfill and back. For a town so proud of its fleet of LEED-certified (Leadership in Energy and Environmental Design) sustainable buildings, and with a Port of Portland headquarters that is also a living water and waste treatment plant—a kind of man-made wetlands inside an office building—the trash issue is a painful shortcoming. Diesel trucks hauling garbage long distances, then depositing the trash in landfills—a major source of greenhouse gases—is a model Portland leaders want to change, which is why they began debating in 2011 what the future of trash would look like in 2020, the year current contracts for waste hauling and disposal lapse.

Future Portland may feature ramped-up composting plants, or generate electricity through anaerobic digesters—vats that speed up the decomposition of garbage, then use the resulting methane to make electricity or vehicle fuel. The trash futurists are also anticipating greater recycling rates and reductions in disposable plastic and paper consumption, perhaps by pushing for product stewardship rules under which manufacturers would have to take responsibility for the waste their products leave behind. This is a nascent movement at present, but some companies—Patagonia, the clothing and outdoor equipment maker, has been a leader in this—tell customers to send their purchases back for reuse or recycling when they are done with them, no questions asked. The question is, can a community encourage such a business model? Mandate it? If anyone would be willing to give it a go, it's Portland.

Meanwhile, at the other end of the waste-management spectrum, a test facility is coming online at Portland's primary landfill destination in Arlington to study the effectiveness of the experimental waste-treatment process known as plasma gasification—a technology that vaporizes garbage with arcs of electrical energy

that heat matter inside their beam to 25,000 degrees. This is not burning trash. Indeed, the process takes place in the absence of oxygen, and so many of the normal, noxious byproducts of combustion are not produced. The process yields a synthetic gaseous fuel and a lump of shiny rock, not unlike volcanic glass, with toxins locked up inside in relative safety. This garbage death ray reduces trash volume by 99 percent, not even leaving ash behind. Just a hunk of obsidian, about twenty pounds' worth for every ton of trash disintegrated.

Scaled up, if such a technology proves cost-effective, it could make big landfills obsolete. But it is the longest of long shots, and not just because the technology at the moment is prohibitively expensive. Getting energy from trash remains exceedingly unpopular among American environmentalists. It has a long and dirty history, marked by the heated sorts of battles that upended California's big plans for a landfill-free future in the 1980s. New York City remains scarred by similar battles. Although the technology and its pollution controls have advanced since then, old objections and distrust remain. The Sierra Club, among other groups, adamantly opposes attempts to ramp up trash-to-energy projects, and that carries weight, especially in Portland.

There is also the question of reducing waste that none of these end-game strategies address—all the burning, landfilling, recycling and composting does is redirect our 102-ton legacy. How does a town like Portland stop making so much garbage in the first place? Like so many communities across America, Portland is not yet sure what magic mix of technology, technique, inducements, prohibitions and exhortations to consumers to change their behavior should be attempted in the hope of actually reducing the 102 tons we are destined to leave behind, rather than merely shuffling it to some

other form of treatment. But uncertainty or not, the deadline to decide is approaching.

"We will have the next evolution in waste in place before 2020," says Matt Korot, Metro's director of resource conservation and recycling. "We know we can't wait until the last minute. We're just not sure yet what that's going to look like."

NOW CONSIDER another city. It, too, is routinely listed as one of the greenest cities on the planet, and also one of the most livable. Its parks are legendary, rich with history and plentiful, and they're being aggressively expanded so that, by 2015, every resident will be within a fifteen-minute walk of park or beach. A world-beating 40 percent of workers commute each day by bicycle, from bankers in business suits to factory workers in hard hats. Workplace culture puts the CEO and the mailroom clerk and everyone in between on a first-name basis, allowing bonds and unity within companies that can be tough to match elsewhere in the world. This city's central river and canals, once polluted, are now safe for swimming, a feat that earned a prestigious international environmental award in 2000. It is also the organic food capital of the world—45 percent of food purchased there is natural and chemical free. It is closing in on a goal of 90 percent organic food served in school cafeterias and retirement homes.

This city has led its entire country from foreign oil dependence to energy independence over the past three decades. It is on course to use zero fossil fuels by 2050. Since 1980, it has reduced energy consumption (and global warming emissions, though that was not the initial goal) while doubling its economy and offering a standard of living, health care (free to all), education (ditto) and amenities that match or exceed the best the U.S. has to offer. On the downside,

taxes and energy costs are higher than in even the most expensive U.S. city. Yet polls of residents show a majority feels these burdens are more than offset by the absence of medical, insurance and tuition bills; by a more conservation-conscious culture when it comes to purchases, energy and fuel; and by the far lower incidence of crime, hunger and poverty than U.S. citizens experience. That's worth some extra taxes, Peter Bach, a civil engineer for the national energy department, told the *Wall Street Journal*, echoing the sentiments of a majority of his countrymen. The *Journal* found itself writing admiringly[1] about this country's energy independence and conservation-embedded lifestyle, despite the fact that its success at achieving what has eluded America essentially defies every principle Wall Street holds dear. "You can't just sit back and wait for markets to do this for you," Bach told the financial newspaper.

On the garbage front, this city is so far ahead of its American counterparts that it's like comparing laser surgery to leech craft. This city recycles trash at twice the U.S. average, its residents create less than half the household waste per capita, and the community philosophy holds that dealing with and solving the problem of trash must be a local concern, even a neighborhood concern. When it comes to waste, NIMBY (Not in My Backyard) is not a factor, as shipping trash off to some distant landfill—making it disappear for others to manage—is considered wasteful, costly and immoral. Not that such out-of-sight, out-of-mind garbage treatment is much of a consideration here: only 3 to 4 percent of this city's waste ends up in landfills, compared to the U.S. average of 69 percent.

This is not some Shangri-la of past or future. It is the Copenhagen, Denmark, of today. And the secret sauce for that city and the entire nation of Denmark, at least on the waste disposal front, is its mastery of turning trash into a renewable energy source.

"They are the model, along with Japan and a number of other countries in Europe," says Nickolas Themelis of Columbia University, America's engineer-apostle of the untapped power of garbage. "They put these waste-to-energy plants right in their neighborhoods. They become part of the fabric of the community. There's none of the fear and misinformation about waste energy that we have in the U.S. They are clean and efficient, and many of them are quite attractive. The people are *proud* of them."

Denmark's strategy has been to build trash-burning, power-generating plants on a relatively small scale. No behemoths burning 2,000, 5,000 or 10,000 tons of garbage a day, such as those proposed for Los Angeles in the seventies and eighties, only to be shot down by concerns over pollution and neighborhood impact. Instead, the Danes built a network of community-based plants that average in the 400- to 500-ton-a-day range throughout their small nation of 5.5 million inhabitants. The largest handles about 1,000 tons a day—the Amagerforbrænding plant on the outskirts of Copenhagen, dating back to the 1970s (and upgraded many times since, primarily with added layers of emission controls). Urban neighborhoods, suburban enclaves, upscale areas and working-class housing all are served by these plants. Keeping them local eliminates the cost and the emissions of having to haul trash long distances across the city or countryside, as often occurs in the U.S., where trash travels millions of miles every year just to get from municipal transfer stations (like The Pit in San Francisco) to landfills. Another benefit of the local Danish plants: They not only generate electricity in place of coal-fired power, they also pump heat through a vast network of underground pipes to keep houses and businesses warm, thereby doubling the efficiency of the plants while taking the place of less efficient home furnaces. Some American city centers use this type

of heating, often called cogeneration or "district heating"—New York and Denver among them, where the systems date back to the 1880s—as do a number of large university campuses (notably the University of New Hampshire uses landfill gas to make all of its heat and energy). But Denmark has expanded the concept to the point where more than six out of ten Danish homes are heated this way. The system is credited for half of Denmark's energy savings in the past quarter century. The larger of these waste-to-energy plants can generate up to 25 megawatts of electricity (enough for fifty thousand households) and district heating for 120,000 or more homes.[2]

The push to build such plants, along with a heightened commitment to bicycle-friendly policies and an advanced public transit system, began with the oil crisis of the 1970s, when Arab oil-producing nations embargoed countries that supported Israel. Gas lines, rationing, economic upheaval and inflation resulted. Like many nations at the time, Denmark launched initiatives to develop renewable power and energy independence so it could never again be blackmailed or coaxed to take sides by foreign oil suppliers. When the political situation changed and the oil started flowing freely again, most countries, none more than the U.S., quickly abandoned government stimulus for renewable energy and aggressive mandates for conservation and auto fuel efficiency. But a few countries, Japan and Denmark chief among them, decided it would serve multiple purposes—national security, economic stability and environmental protection—to stay the course on key elements of those programs. The climate, the global economy and the politics of energy would be in a very different and certainly less dire place today if Denmark's approach had been the majority view rather than the minority's.

Since that time, twenty-nine waste-to-energy plants were constructed in Denmark; as of 2011, ten more were in the works, planned or already under construction. The subterranean heating systems required a massive public works undertaking, with extensive and disruptive excavations that took years. But when it was done and the hot air started blowing, home heating bills in the cold Scandinavian climate dropped to a fifth of what they had been. Rebates and tax incentives accompanied a government mandate for developers, homeowners and businesses to thoroughly insulate buildings to avoid wasting this new heating energy; a similar set of incentives led to the mass purchases of energy-efficient appliances, with adoption rates reaching 90 percent.

At the time of the seventies oil crisis, Denmark depended on foreign fossil fuel supplies for 90 percent of its energy. Now it is energy independent and a net oil exporter from its modest offshore drilling operations.

One of the largest wind power installations in the world was constructed on the coast, and Denmark became a world leader in wind energy with the rise of its homegrown company Vestas, maker of state-of-the-art wind turbines. The industry was jump-started in the seventies with major investments of research dollars, loan guarantees and subsidies from the government; now little Denmark owns a third of the multibillion-dollar global wind turbine business. This is a business America initially dominated before the post-oil-crisis renewable energy incentives were killed.

Nineteen percent of Denmark's power is generated by wind, the highest in the world. An even greater amount of the country's energy supply is derived from trash.

In a country where electricity is generated by nonprofit electrical cooperatives in which the ratepayers are also the plant owners,

attitudes about utilities and energy are very different from those in America. In Denmark, polls consistently show that a majority of Danes are willing to pay a higher rate if the electricity is clean and produced with domestic fuels.

The waste-to-energy system as it exists in Denmark today uses a tried-and-true technology called "mass burn," which aptly describes how the facility operates. Trash trucks deliver garbage to the plants, with recyclables already separated out. The garbage is then pushed into furnaces by a series of moving grates. The burning trash heats boilers to create high-pressure steam. A flue gas cleaning system and banks of filters remove pollutants so thoroughly that the very tall smokestacks that used to be the main feature of such plants—so pollution would be dispersed far above neighborhoods—are no longer necessary. The output of the most harmful byproducts of incineration, including the main environmental showstopper in the U.S., dioxins, has been reduced to levels that represent a mere fraction of what the average home fireplace or backyard barbecue puts out. These plants are now so clean that they exceed European pollution standards (generally stricter than in the U.S.) by a factor of ten, and the trash-based power is considered a form of renewable energy. The plants not only emit less greenhouse gases than coal plants, they are also superior to landfills in that respect, where even the most advanced methane capture systems (such as Puente Hills's landfill gas power station) still allow 50 percent of the climate-busting methane to bleed into the atmosphere. Methane has twenty-three times the global-warming punch as the carbon dioxide produced by combustion. The Denmark waste-to-energy plants scour and sift the solid residue of the incineration process, called "slag," removing metals for recycling as well as other useful chemical byproducts. What's left is sold to con-

struction companies to use for concrete and road building. Nothing is wasted.

Denmark and other countries in Europe, where there are more than four hundred waste-to-energy plants in service, have made many of the structures architecturally attractive, incorporating art, sculpture and novel design. Some are community centers, some anchor parks. The Spittelau plant in Vienna, with its brightly colored design and illuminated globe perched atop a tower, has become a tourist destination. A garbage power plant was built in Paris that burns 1,260 tons of trash a day less than three miles from the Eiffel Tower; surrounded by trees and topped with a grassy, living roof, it is all but invisible. A new state-of-the-art plant is now under construction in Copenhagen to replace the original aged Amagerforbrænding plant by 2016. The new facility will double as a community ski park, the tall incinerator building serving as the anchor for three separate slopes of varying difficulty while, beneath the snow, the trash from five municipalities will be burned to make power and heat for 140,000 homes. The Danish architect Bjarke Ingels has designed the facility with a chimney that will blow smoke rings each time it accumulates a quarter ton of carbon dioxide from the burning trash. The idea is to be playful while also reminding people that their consumption has consequences, that trash power still exacts a price on the environment, and that the best strategy for dealing with waste is to waste less.

"They are so far ahead of us," Themelis says. "Our behavior in the U.S. in this area is really quite irrational. And it's irresponsible. We are throwing energy and money away every day, burying it in the ground."

Themelis has been researching and advocating trash energy for decades now, building an international network of experts and engineers by founding the Waste-to-Energy Research and Technology Council, with branches in the U.S., Greece, Germany, Japan, India, Brazil, Mexico and China, where the government has been on a waste-to-energy building spree since the turn of the century. A native of Athens, Greece, Themelis directs the Earth Engineering Center at Columbia's Fu Foundation School of Engineering and Applied Science. A chemical engineer by training, his initial work was in the private sector, where he developed a more efficient method of copper smelting that drastically reduced sulfur emissions in the mining industry. When he came to Columbia University in 1980, he arrived at what was then called the Henry Krumb School of Mines, where he says the historical emphasis was the "three Ms"—mining, materials and metallurgy.

Eventually Themelis helped lead a group of faculty members who shifted the emphasis to the "three Es"—earth, environment and engineering—which led to renaming the school the Earth Engineering Center. Waste-energy research has dominated his career ever since. He says the current system of burying waste in landfills amounts to burying a billion barrels of oil a year that could be used for much needed energy.

Themelis frets that the same arguments against waste-to-energy used in the eighties are still being used to keep the technology limited in the United States, which has eighty-seven waste-to-energy plants, almost all of them dating back to the early 1990s or before. Even though the emissions controls have advanced and more than satisfied tough European environmental standards, fear over dioxins and other pollution remains great and these are often still cited by opponents. Yet a 2009 study concluded that harmful emissions from landfills were greater than those from modern waste-to-energy plants.[3]

"There's just a great deal of fear about it," says Themelis. "It's like some isolated tribe who has never seen an airplane before, and is frightened of it. They just close their eyes to it."

Aside from concerns over emissions, which proponents (as well as European environmental agencies) assert have been solved by new technology, a principal argument against ramping up waste-to-energy in the U.S. lies in its poor energy and economic bottom line when compared to recycling. The plants really are expensive—with large-scale facilities costing in the $600 million range and up—and trash is not a very good fuel, so the power output per dollar spent on boilers and generators is less than in a conventional power plant. Recycling trash, on the other hand, has a lower environmental impact and, pound for pound, can save more energy than burning the same trash produces. Recycling aluminum cans, for instance, saves a whopping 96 percent of the energy needed to produce aluminum from bauxite ore. Recycling glass jars and bottles saves 21 percent of the energy needed to make new glass, recycling newsprint saves 45 percent, and recycling plastic beverage bottles saves 76 percent (other plastic types differ in the percentages, but the energy savings are there, too). More recycling, then, is a better strategy than waste-to-energy, Themelis's detractors say. Critics of the technology also fear that adding trash-burning plants to the mix will discourage recycling because expensive plants will demand more trash in order to pay off their hefty costs.

Themelis says that recycling's energy advantage is real and that it often is the better alternative, but not always. There is a flaw in the recycling case: After a certain point, the energy gains are more theoretical than practical for many types of trash. Those theoretical energy savings are often not realized because recycling some materials still costs more than using new raw materials. Recycling

plastic grocery bags, for example, costs four to five times what the raw materials are worth. Transportation costs, manpower for sorting recyclables from garbage and contamination problems make recycling a lot of common items of trash too costly or too difficult or both, despite the energy savings. This is why recycling rates, outside of a few highly committed U.S. cities, are far lower than the amount of recyclable material in the American waste stream. And it's why even America's recycling leader, San Francisco, still sends trash to the landfill in which two-thirds of the material is theoretically recyclable. This is why the king of trash says he's got ten billion dollars in value locked up in the trash he hauls to the landfill, if only he could tap into it. He would if he could. But that capability has eluded us.

Themelis argues that material, then, should be used to make energy, not garbage mountains. This would not hurt recycling, he suggests, but would augment it.

Furthermore, Themelis says, no recycling process is 100 percent. There is always 10 to 15 percent residue left behind that can't be recycled. No one ever counts that or subtracts it from the total amount recycled in those cities with such high recycling numbers, Themelis points out. All that material is counted as "diverted," then the leftover muck just gets quietly carted to the landfill. But that residue also would be perfect fuel for a waste-to-energy plant.

The final argument against waste-to-energy—that it will reverse gains in recycling—is belied by the history of the technology, Themelis points out. The cities and nations that have made trash burning a key part of their energy and waste strategies—Denmark, Germany, Austria, Japan, the Netherlands—all have robust recycling programs that not only recycle as much as or more than the amount of trash that is burned, but they all also recycle at a much

higher percentage than the U.S. has been able to accomplish. It's the landfilling that diminishes when waste-to-energy becomes a strong option, not recycling. Germany, for instance, burns 34 percent of its municipal waste and it recycles the rest, an impressive 66 percent. That's not just one super-green city, like San Francisco, but an entire country of 82 million people, the powerhouse economy of Europe. Almost none of its municipal waste gets landfilled.

Waste-to-energy opponents also base their negative views on the assumption that the only choice for garbage power lies in very large, expensive, utility-scale trash power plants—which, in fairness, is the only type seriously attempted in the U.S. But the most successful use of the waste-to-energy technology right now has been the smaller, less costly, community-based plants that Denmark and other European nations favor—a more distributed power generation system rather than the central utility style used in the States.

In an odd parallel, this same focus on utility-scale power plants, with their huge upfront costs and requirements for immense transmission lines, has similarly handicapped solar power development in the U.S. Other countries have focused on distributed, rooftop solar power, which does not require huge capital investment or immense transmission line upgrades. All it takes is a law compelling utilities to pay a market rate for home-brewed solar power. Germany has used this approach—called a "feed-in tariff"—to become a world leader in solar power generation, even though it has far less overall sunshine than the U.S. landscape. American utilities, meanwhile, have successfully lobbied against many such measures to boost home-based and small-scale solar, even as they cut deals based on government incentives, such as access to cheap federal

land in the California desert, for large-scale solar projects that have yet to make a dent in our coal-and-oil-dependent economy.

Waste-to-energy advocates argue in favor of embracing a more distributed model for trash power in the U.S., which could work just as well in American cities as in Denmark. Steven Cohen, director of Columbia University's Earth Institute, has suggested New York City try such an approach, with fifty-nine small plants, one for each community district in the city. These plants could combine waste-to-energy with recycling and anaerobic digestion for composting organic waste. It would be a far better investment, he says, than spending $300 million a year to truck garbage out of state—an investment that has nothing to show for it at the end of a year other than an immense legacy of diesel emissions. But New York politicians have been burned so many times by trash burning that no one wants to even talk about it anymore.

Although it has garnered little attention nationally, it turns out the U.S. actually has a couple of mini-Denmarks of its own already. Lee County, Florida, where the city of Fort Myers is located, in 2007 added 50 percent more capacity to an existing garbage power plant, then closed down its last landfill. The county now recycles or composts half its trash, and burns the rest to make enough electricity to power thirty-six thousand homes.

Even more impressive is the state of Connecticut, America's garbage power leader with six waste-to-energy plants, most built in the 1980s. They handle 62 percent of the state's trash, supplying about 10 percent of the state's electricity needs. Twenty-six percent of Connecticut's waste is recycled, with about 12 percent sent to landfills, the lowest of any state. (Connecticut residents also make less trash than the national average—about five and a half pounds a day each—a lifetime trash legacy of 78 tons.)

The Connecticut program has been so successful that the state is scheduled to close its last active landfill by 2015. The plants have paid for themselves many times over.

And yet the head of the Connecticut Resource Recovery Authority says that, such success notwithstanding, they could never get another such plant built in today's political and economic climate.

For all his advocacy for waste-to-energy, Nickolas Themelis believes that the most intelligent, most-likely-to-succeed, long-term solution to waste is far simpler than any giant trash-burning generator, and far less costly, yet so much more difficult to achieve: a changed culture.

He believes there must be a shift to a culture that wastes less, one that demands products that are less wasteful, and that embraces products designed to "close the loop"—to be reborn and remanufactured, rather than thrown away or burned. Call it "cradle to cradle," architect and environmentalist William McDonough's catchphrase. Call it zero waste. Call it conservation. Call it liberal, progressive or conservative, to Themelis it doesn't matter. The point is, he says, there needs to be a change. And someday, that change will come—not out of choice, he says rather gloomily, but out of necessity.

"But then there's what can be done now. Today. And the reality today is that we have to work with what we have, and with where we are *now*. And right now, we're burying treasure instead of using it to power our homes. And that's shameful."

Could a Portland emulate Copenhagen on trash, much as it did years ago when exploring ways to make itself more bicycle friendly? Should it try? Should it even consider the waste-to-energy question, or continue to pursue ever-more recycling in the hope of

achieving something close to zero waste—the goal San Francisco has set for itself? And is that goal even possible?

Themelis says no. For that matter, so does Andy Keller of ChicoBag, who sees recycling as a crutch to allow Americans to feel better about overconsumption of disposable things. How does a Denmark, with a robust economy and a standard of living at least as good as America's, manage to make half as much trash per person as the U.S.? Keller suggests that consumers anywhere can make a culture shift all on their own, by looking at the kind of things being purchased and asking: *Is this thing I'm buying going to be in the trash in a year or two? Or is that going to be useful and treasured for many years to come?*

"If you're buying something and thinking it could be an heirloom someday," Keller says, "then you're on the right track."

These men who made a study of waste central to their very different careers ended up focusing on the same solution in the end: a societal shift from the culture of disposable abundance to a more measured consumption, a focus on quality over quantity, on more carefully chosen treasures. It sounds great in theory. Getting there is another story. A hint of what that future might look like may be in Denmark, which has shifted more toward sustainability than the United States. But even some communities in America have made inroads of their own. Plastic bag bans—removing a wasteful object, rather than redirecting it to some new destination—has become the first baby step toward lowering the 102-ton legacy in a growing number of American cities.

Metro Portland's waste and recycling czar, Matt Korot, says all of these ideas could find their way to the table as one of America's greenest cities plots the future of waste. Given the long commute Portland's trash currently takes, a Denmark-style shift to trash heat

and power would seem to be an attractive alternative. So far, it's not been discussed beyond the small plasma gasification experiment out at Portland's remote landfill, a far riskier, more exotic and unproven technology compared to the tried-and-true mass burn trash reactors now in place all over Europe and in Connecticut.

For now, it's clear the momentum and the desire in green cities such as Portland are with recycling and composting. And even that can be a tough sell. In 2011 Portland adopted a San Francisco–style plastic grocery bag ban that brought complaints from all sides. There were those who missed having the bags for trash and dog poop-scooping. Others saw so many loopholes to the ban that it seemed next to useless, as exemptions included bags for produce, meat and bulk food at groceries, as well as vendors at the popular Portland Farmers Market.

Then there's the new food scraps pickup process, in which Portland hopes to catch up with San Francisco. After a year-long pilot study, Portland launched its household food waste collection service to shrink the landfill loads and divert the food part to composting. Every home received an official pail with a lid for the kitchen counter to hold smelly food wastes in until they could be dumped into the curbside bin.

The well-thought-out plan had a rub, however: The new weekly food scraps collection meant other trash services had to be cut. Regular garbage would be picked up every two weeks instead of weekly. Considerable civic grumbling ensued. People were upset about having to keep out pails in the kitchen and overflowing trash bins in the yard.

"What's easier," the mayor quipped in a newspaper column, clearly irritated with his normally green constituency, "cutting gasoline use by three million gallons a year or getting Portlanders to

toss pizza crusts into a pail on the counter? If Portland food scraps stay out of landfill where they produce greenhouse gases as they decompose, then we can keep up to thirty thousand tons of carbon-equivalent emissions out of the atmosphere in a year."

Given these difficulties, plans to expand the food waste pickups beyond the city limits to the entire Portland Metro area may take years as residents debate that balance between convenience and environment. If selling composting is so difficult in Portland, waste-to-energy might be a nonstarter. And if it can't fly in Portland, where can it fly?

"We need recycling, as much of it as we can do," Themelis says. "And for now we need landfills. But the missing part of the puzzle is waste-to-energy. Hopefully, we'll wake up . . . We can't wait until the whole culture changes to a less wasteful one. We must act now."