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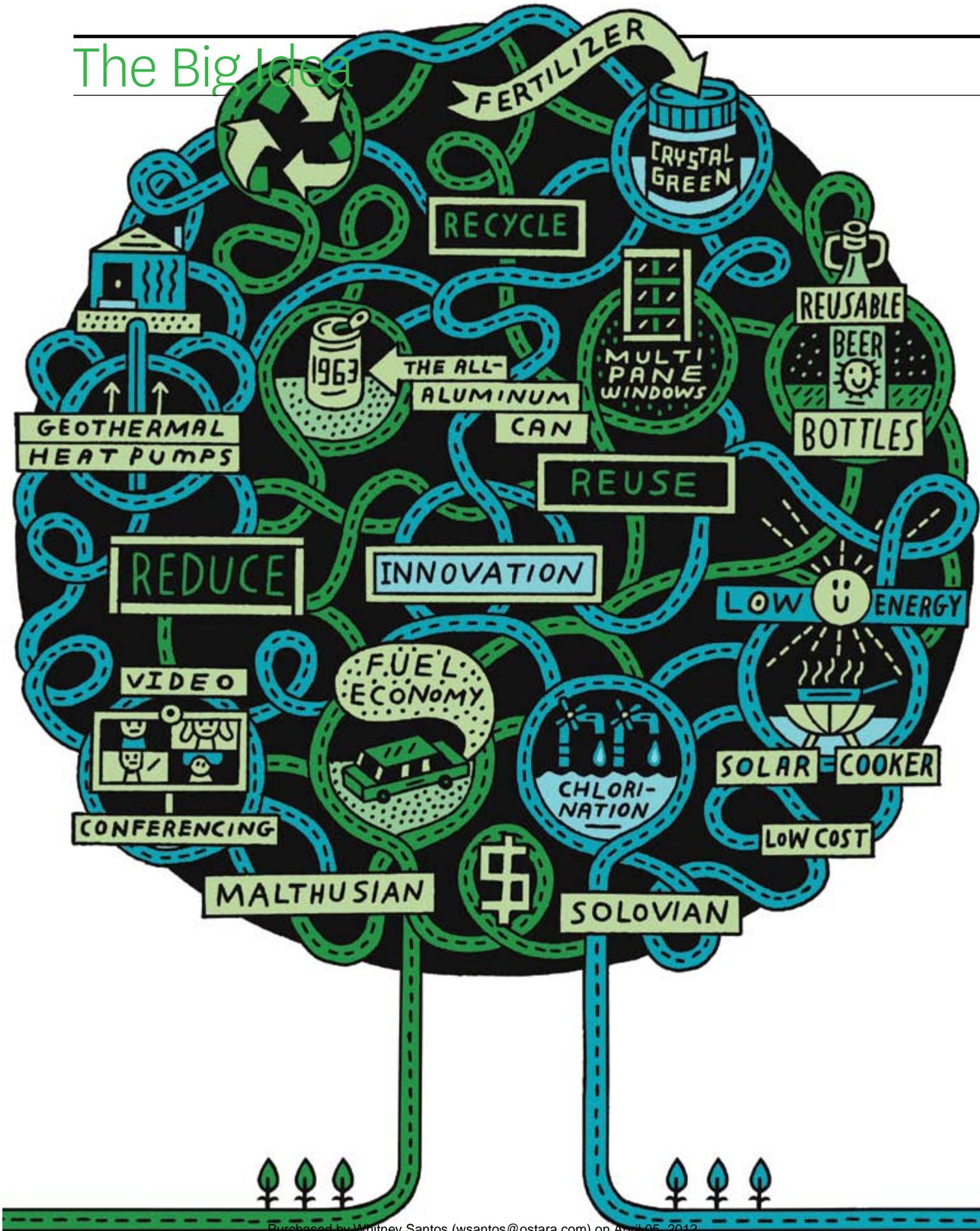
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**THE BIG IDEA**

# Saving The Planet: A Tale of Two Strategies

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# A Tale Of Two Strategies

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ILLUSTRATION: SERGE SEIDLITZ

**B**usinesses clearly have a major role to play in any strategy for saving the planet. They are the engines of the developed economies that devour a disproportionate share of the world's nonrenewable resources and produce a disproportionate share of its emissions. They also generate innovations that reduce resource use and lessen pollution. As both a cause of and a solution to environmental degradation, they are inevitably at the center of sustainability debates.

But how, exactly, can businesses contribute? According to one line of reasoning, rescuing the environment involves restraint and responsibility: Consumers and companies must do more with the resources they consume, recycle and process their waste more efficiently, and curb their appetite for consumption. In short, resources are finite and need to be carefully husbanded—an argument that appeals directly to the traditional virtue of moderation. This worldview achieved perhaps its clearest expression in the works of the 19th-century economist Thomas Malthus, who feared that at prevailing population growth rates the planet would eventually be unable to feed itself.

Although the Malthusian view exercises a powerful influence on voters and politicians alike, it is by no means uncontested. Another line of reasoning, which flows from the work of the 20th-century economist and Nobel Prize winner Robert Solow, is that environmental and other problems can always be resolved through the exercise of human ingenuity. This view appeals to our natural optimism and underlies much advocacy for deregulation and the promotion of growth.

It's not hard to see why these two philosophies make uneasy bedfellows. Yet if we are to achieve real progress in solving the world's environmental problems, we will have to apply both of them.

**“Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio.”**

—Thomas Malthus



**THOMAS MALTHUS (1766–1834)**

Anglican clergyman, political economist

One of the most influential thinkers of all time, Malthus was concerned with the relationship between human population and scarcity. Because he sought to constrain the former and reduce the latter, he was active in public policy in early 19th-century Britain, supporting high tariffs on grain and opposing the Poor Laws, which he felt increased population pressures. He had a profound influence on such luminaries as Charles Darwin, John Maynard Keynes, and Mao Zedong.

**The World According to Malthus**

In the original Malthusian argument, if the world's population grows faster than the planet's ability to produce food and other necessities, the cost of those necessities will rise while wages fall because more people will be available to work. At a certain point we will no longer be able to afford children and as a result will stop having them, leading to a sudden population collapse.

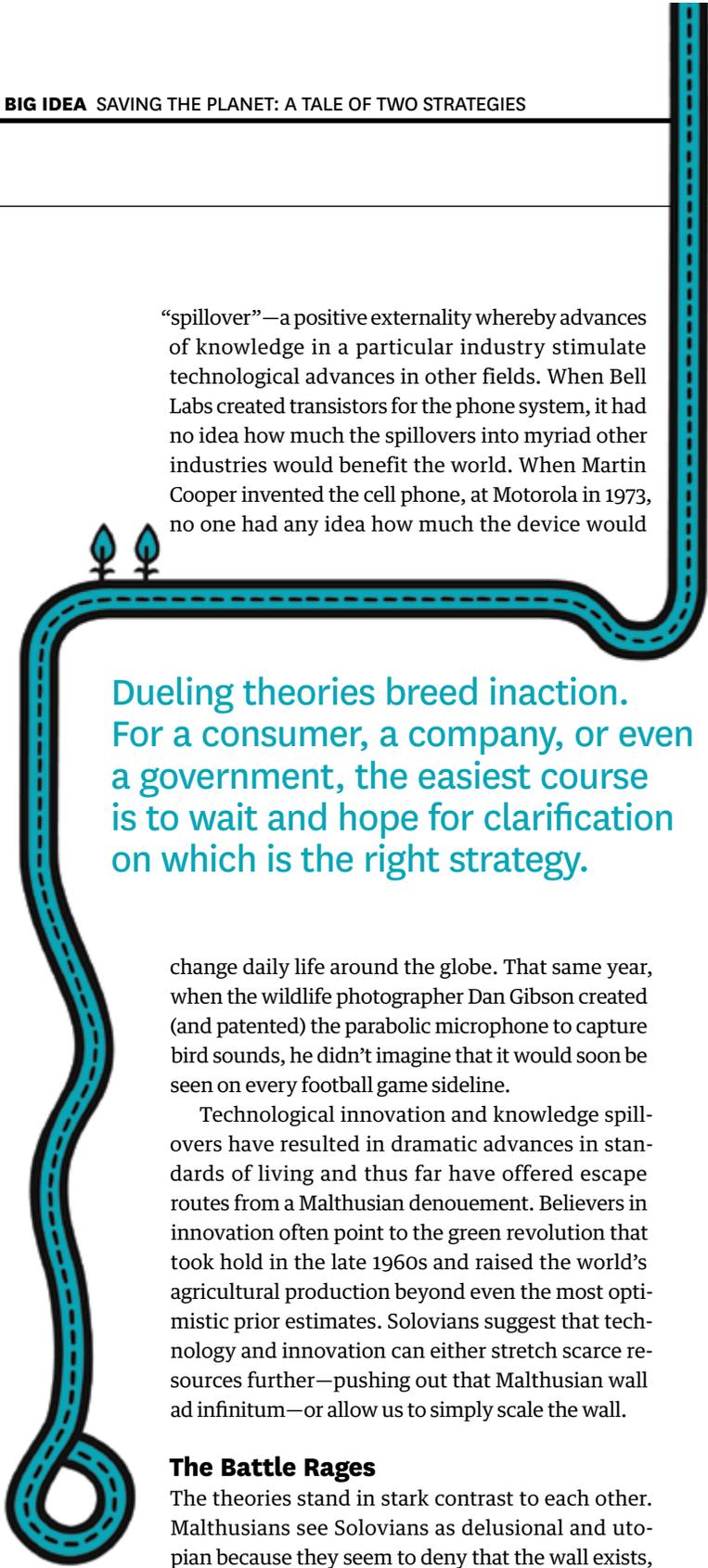
When he laid out this apocalyptic theory 200 years ago, Malthus was the center of intellectual attention. His dire view provoked strong arguments in support and in opposition. Among other things, it helped shape the Corn Laws, British tariffs designed to limit the availability of cheap foreign imports. Malthus was known to be one of Charles Darwin's many sources of inspiration.

But Malthus wrote at a time before agricultural mechanization, when 90% of Americans, for example, worked on farms. The linear growth in agricultural production that was central to his thesis turned dramatically geometric as the Americas, New Zealand, and Australia opened up to farming and then mechanized. Staggering productivity growth in manufacturing as well as agriculture followed. Malthus seemed to have entirely missed the mark, while Alfred Marshall, the dominant British economist of his time, explained to the world that productivity growth was now a centrally important feature of economic performance, spurring generations of economists to study it.

Malthus's ideas reentered the mainstream for a brief period 40 years ago, when Paul Erlich (*The Population Bomb*, 1968), the Club of Rome (*The Limits to Growth*, 1972), and William D. Nordhaus and James Tobin (*Is Growth Obsolete?*, 1972) all warned in vivid and uncompromising terms that conventional economic growth was on the verge of ruining the world. Once again events suggested that the warnings were



“spillover”—a positive externality whereby advances of knowledge in a particular industry stimulate technological advances in other fields. When Bell Labs created transistors for the phone system, it had no idea how much the spillovers into myriad other industries would benefit the world. When Martin Cooper invented the cell phone, at Motorola in 1973, no one had any idea how much the device would



**Dueling theories breed inaction. For a consumer, a company, or even a government, the easiest course is to wait and hope for clarification on which is the right strategy.**

change daily life around the globe. That same year, when the wildlife photographer Dan Gibson created (and patented) the parabolic microphone to capture bird sounds, he didn’t imagine that it would soon be seen on every football game sideline.

Technological innovation and knowledge spillovers have resulted in dramatic advances in standards of living and thus far have offered escape routes from a Malthusian denouement. Believers in innovation often point to the green revolution that took hold in the late 1960s and raised the world’s agricultural production beyond even the most optimistic prior estimates. Solovians suggest that technology and innovation can either stretch scarce resources further—pushing out that Malthusian wall ad infinitum—or allow us to simply scale the wall.

### The Battle Rages

The theories stand in stark contrast to each other. Malthusians see Solovians as delusional and utopian because they seem to deny that the wall exists, much less that it is getting dangerously close. Malthusians believe that limits to growth are imposed by nature and cannot be overcome by man. Innovation is terrific, they argue, but not the panacea that Solovians think it is. Malthusians worry that by arguing that technological innovation will provide a solution, Solovians risk lulling the public into failing to reduce, reuse, and recycle as much as is required.

Solovians see Malthusians as dreary and depressive—modern Luddites. They fear that Malthusians will resist the possibilities contained in innovation and thereby hobble attempts to improve the quality of our lives. They perceive that the benefits of technological development have transformed society without creating upward pressures on population: Better health care and pharmaceuticals have lowered birth rates as countries develop, because parents feel that their children’s survival is more secure. Solovians fear that if we focus on restraint, we may delay our collision with the Malthusian wall but we will never innovate our way over it—and thus the Malthusian prescription ensures the fate we are desperate to avoid.

Dueling theories breed inaction. It is hard for either a corporation or a government to choose a direction when it is presented with two such fundamentally different choices. For the individual consumer, company, or even government, the easiest—and often apparently most prudent—course is to wait and hope for clarification on which is the right strategy. Companies reduce the immediate risk to their investors with this approach, which may explain the behavior of U.S. automakers with respect to fuel efficiency over most of the past four decades. Unable to decide between making smaller, more fuel-efficient cars and investing in electrical and hydrogen-powered engines, they settled on continuing to build pickup trucks and SUVs—which almost certainly contributed to the industry’s near collapse in 2008.

Of course, the world is not black-and-white, and the extremes of both philosophies are just plain wrong. If the hard-core Malthusians were right, progress would have stopped long ago and humanity would already be in decline if not extinct. If the hard-core Solovians were right, we wouldn’t be reaching dangerously high levels of carbon in our atmosphere and Australians would enjoy the protection of a robust ozone layer above their heads.

But both worldviews are also partly right. Each provides compelling explanations and predictions. Unfortunately, attempts to combine the two have so far resulted in confusion and dysfunction. The Kyoto Protocol provides a cautionary tale. Its framers, using an implicitly Malthusian conceptual structure, hoped that measuring and pricing carbon emissions would encourage incremental reductions. But they also hoped that gradually increasing the cost and decreasing the amount of emissions allowed would generate Solovian innovation in alternative energy

systems and products along with carbon trading. Kyoto has produced little of either.

Instead we have created expensive new industries devoted to auditing emissions, assessing the ability of tropical forests to absorb carbon, and burying liquid CO<sub>2</sub> in abandoned mines. Our economies are still locked into burning fossil fuels, and the concentration of CO<sub>2</sub> in the atmosphere continues to rise. The world's leading environmental economist, William Nordhaus, has termed Kyoto's mechanisms "inefficient and ineffective" and urged their replacement with a global carbon tax that would force consumers and companies, not governments, to innovate.

So what went wrong?

The problem, we believe, is that reconciling the two theories is treated as an exercise in compromise: I will give a nod to restraint if you give one to growth, and we'll hope to get a bit of each. Many policy makers implicitly recognize that we need approaches derived from both theories to deal with the environmental crisis. But few have actually gone beyond that assumption when making policy or strategy.

Go beyond it we must. For if both theories are valid—if they provide a compelling description of the world and have predictive power—then other factors must exist that determine when each best applies. As consumers, companies, or governments, we have some power to influence those factors, and thus a choice about whether a Malthusian or a Solovian dynamic will play out. But first we need more-precise information about what warrants which strategy.

### How to Make Innovation the Answer

The most obvious requirement for radical, technologically disruptive innovation is access to risk capital for relatively unspecified investment. Alta Devices, a classic Silicon Valley start-up, believed that gallium arsenide could increase the efficiency of photovoltaic cells by about 30% over the upper limit of silicon technology. To find out whether and how this could be done at a commercially feasible price, it needed to invest \$72 million in speculative R&D. Investment of this kind on this scale is typically provided by venture capitalists or the corporate venturing arms of large corporations. But before parting with large amounts of capital for such a project, investors have to believe that solving the problem will generate high and sustained revenues in the future. The most productive context for Solovian innova-

### EXAMPLES OF MALTHUSIAN RESTRAINT



The CAFE regulations enacted by Congress in 1975 were intended to double the average fuel economy of cars and light trucks and included stiff penalties for manufacturers that failed to meet the standard.



Widespread use of multipane windows beginning in the early 1970s reduced the energy required for home heating and cooling.



Refillable beer bottles play a role in 70% of beer sales in Canada. Return rates are nearly 100%, and most of these bottles are reused 15 to 20 times before being recycled.



The all-aluminum can introduced in 1963 by Reynolds Metals led to a huge increase in recycling because of the ease and profitability of recycling it.



Leadership in Energy and Environmental Design (LEED) standards promote reducing, reusing, and recycling.

tion features a stable, high price for either the problematic resource or its substitute.

Failure to recognize these preconditions explains what went wrong with the U.S. government's policy on ethanol. After the oil crisis of the 1970s, Congress passed a tax credit for the production of ethanol, which remains in place to this day. After a new spike in oil prices, President George W. Bush reinforced its effect by signing the Energy Policy Act of 2005, which mandates the blending of renewable fuels into gasoline and precipitated a major investment in ethanol production capacity. The idea, of course, was and is to reduce reliance on a nonrenewable fuel (gasoline) by replacing it with a renewable one (ethanol) and to reduce dependency on Middle Eastern oil. In addition, the government slapped a tariff on ethanol imported from Brazilian producers in order to promote domestic production. Naturally, U.S. ethanol production capacity increased.

Setting aside the pros and cons of ethanol as a fuel, the policy was doomed from the start because the government could not deliver stable, high gasoline prices. They have, in fact, been extremely volatile—tracking the international oil price—and often very low, and the profitability of and level of investment in ethanol production have been equally variable as a result, putting Solovian innovation out of reach. The expansion of production capacity with existing technologies has driven up domestic corn prices and thus increased food prices. As the failure of the policy becomes evident, the government has signaled that it may reverse itself, but that would mean writing off the investments already made in ethanol production—and suggesting to investors that the federal government will not be a reliable partner when it comes to other green technologies.

Consider, in contrast, the German government's solar energy policy. Germany's Renewable Energy Act was adopted in 2000 with the aim of encouraging investment in solar energy. The problem was that a serious, large-scale investment in delivering solar power required that producers get high prices for the power they generated.

Consequently, the government required grid operators to purchase solar at five times the cost of conventional power—a price that would decline only slowly over time, in a carefully planned way—creating an environment that simulated a very high price for fossil fuel used to generate power. This policy meant that investors could justify the high capital cost of investing in solar power technology.

As a result, Germany had installed nearly twice the expected solar capacity by 2010. This fast-growing capability was leveraged by German companies, which started to sell turnkey photovoltaic production facilities to Chinese companies. The Chinese, in turn, scaled up production and dramatically reduced the price of solar arrays.

From 1998 to 2011, the period during which Germany managed its prices, the cost per installed watt for solar energy dropped from about \$11 to about \$3. It is expected to halve or better by 2020. The price stability offered by the government allowed investors to rely on reasonable returns on investment in solar technology and to fund the innovation in solar panel technology and production scale that has pushed the costs of solar below the all-in costs of fossil fuel alternatives. The sector has achieved a scale and technological maturity such that it no longer needs the price protection.

What the German experience teaches us is that because the price of oil provides a reference point for every other kind of energy, the best thing the world could do to spur broader Solovian innovation in the energy sector would be to declare and enforce a floor oil price—either directly, or indirectly through price supports on oil-substitution technologies, like Germany’s feed-in tariff for solar power. The biggest challenge for innovation in energy is that substantial

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vacillation in the price of oil, which discourages large-scale investment in substitutes. The carbon offset pricing featured in cap-and-trade programs, which does nothing to dampen profitability swings for alternative technologies, is therefore not the answer. Far preferable would be a variable gap-filling carbon tax to preserve a floor price for a barrel of oil.

Corporations are clearly well placed to influence that kind of decision. Many already collaborate to encourage enforcement of high prices on non-

renewable resources to spur their own innovation. The European Automobile Manufacturers’ Association has advocated that “CO<sub>2</sub> should be the key criterion for taxation to provide incentives to buy lower CO<sub>2</sub> emitting cars.” At a minimum, corporations can help by not fighting governmental attempts to create such a context. U.S. automakers resisted the 1975 Corporate Average Fuel Economy (CAFE) standards for years, trying to circumvent them by producing vehicles that could be classified as light trucks rather than focusing on Solovian innovation.

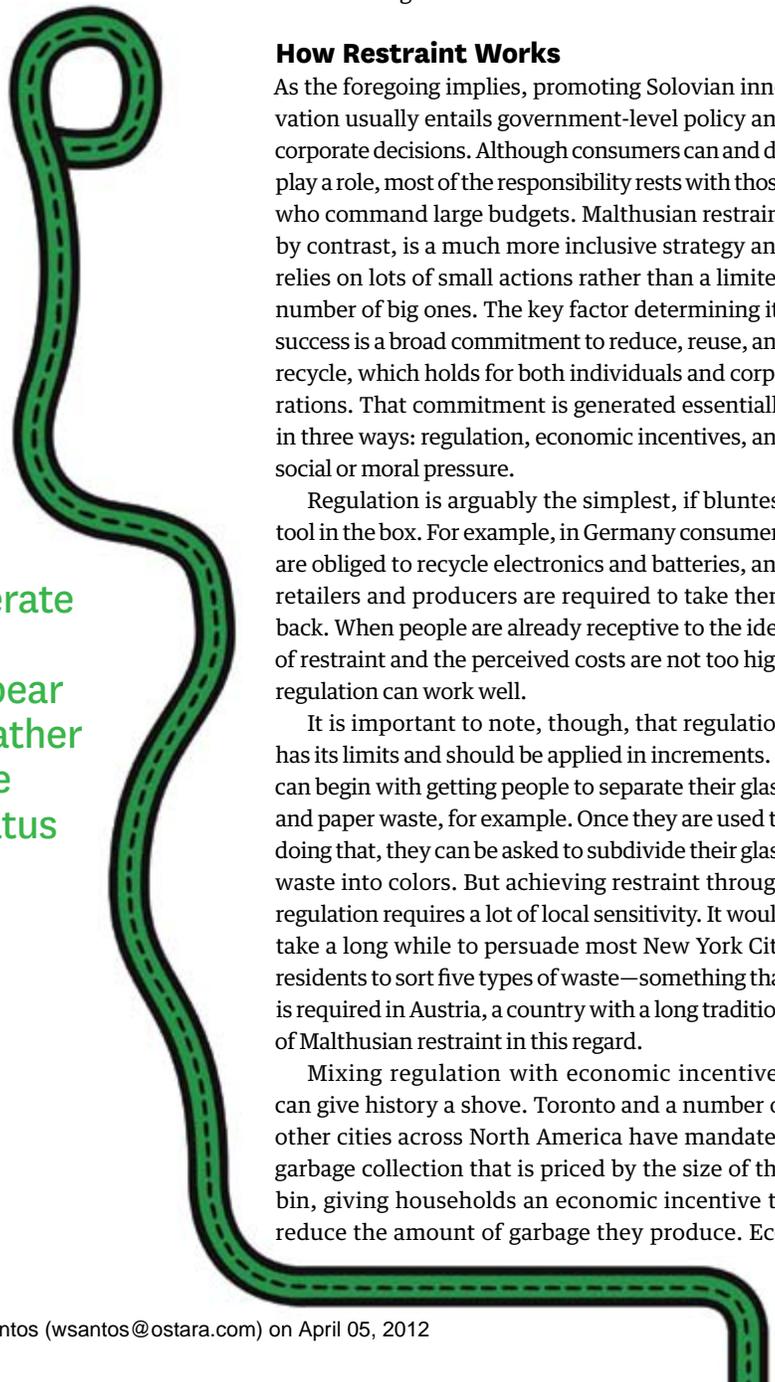
### How Restraint Works

As the foregoing implies, promoting Solovian innovation usually entails government-level policy and corporate decisions. Although consumers can and do play a role, most of the responsibility rests with those who command large budgets. Malthusian restraint, by contrast, is a much more inclusive strategy and relies on lots of small actions rather than a limited number of big ones. The key factor determining its success is a broad commitment to reduce, reuse, and recycle, which holds for both individuals and corporations. That commitment is generated essentially in three ways: regulation, economic incentives, and social or moral pressure.

Regulation is arguably the simplest, if bluntest, tool in the box. For example, in Germany consumers are obliged to recycle electronics and batteries, and retailers and producers are required to take them back. When people are already receptive to the idea of restraint and the perceived costs are not too high, regulation can work well.

It is important to note, though, that regulation has its limits and should be applied in increments. It can begin with getting people to separate their glass and paper waste, for example. Once they are used to doing that, they can be asked to subdivide their glass waste into colors. But achieving restraint through regulation requires a lot of local sensitivity. It would take a long while to persuade most New York City residents to sort five types of waste—something that is required in Austria, a country with a long tradition of Malthusian restraint in this regard.

Mixing regulation with economic incentives can give history a shove. Toronto and a number of other cities across North America have mandated garbage collection that is priced by the size of the bin, giving households an economic incentive to reduce the amount of garbage they produce. Eco-



conomic incentives are not, of course, infallible; human beings are adept at exploiting them, often with perverse consequences. Pricing garbage by volume without restricting the use of garbage disposals, for instance, has generated new forms of waste that are more expensive to process. A strategy of restraint that's overreliant on money, therefore, is unlikely to succeed.

An enabling infrastructure is absolutely essential to effective regulation and incentives. A commitment to recycling, for example, requires a widespread, viable recycling infrastructure. A reduction in usage requires a measurement infrastructure: Households will have limited interest in reducing their water use if it isn't measured and reflected in their bills. Government at the local and national levels often provides that infrastructure, but it can be supplied by corporations and other organizations as well.

The most powerful but most difficult way to generate commitment is through social pressure. It was a desire to appear environmentally responsible, rather than the cost of fuel, that drove the Hummer, once a potent status symbol, out of existence. Similarly, the Prius is probably more successful than the hybrid Camry because the former brand is unambiguously a hybrid, whereas the latter has a conventional sibling, making its driver less obviously a hybrid owner. Social pressure influences corporate decisions as well as consumer decisions. Intense social pressure on Walmart drove it to create a leading green purchasing initiative. Coca-Cola felt sufficient pressure regarding its use of clean water to establish ambitious water-stewardship goals: a commitment to watershed protection projects and to increasing supplies of clean drinking water.

It is impossible to dictate social pressure, but we can do much to amplify and direct it. In the case of environmental responsibility, NGOs set standards and offer certification and recognition for improvements in energy efficiency or waste recycling. For instance, McDonald's can demonstrate its commitment to conserving global fish stocks because the Marine Stewardship Council certifies that the fish in its Filet-O-Fish sandwiches comes from sustainable fisheries. Walmart contributes to rain-forest preservation by getting its lumber certified by the Forest Stewardship Council. Of course, social media have hugely multiplied opportunities to apply social pressure.

Working together, citizens, companies, and governments can make great strides. For a larger-scale example of conservation, consider the city of San

## EXAMPLES OF SOLOVIAN INNOVATION



Chlorination, developed by the U.S. Army in 1910, enables the human use of otherwise unsafe water.



Geothermal or ground-source heat pumps, developed in the 1940s, provide a completely renewable energy source.



In 2005 Donald Mavinic, of the University of British Columbia, and colleagues created a technology to convert phosphorus in wastewater to a high-quality, slow-release fertilizer called Crystal Green.



Low-cost, low-technology solar cookers dramatically reduce pollution, deforestation, and desertification in poor countries and save rural women from spending many hours searching for firewood.



Videoconferencing promises a marked reduction in business travel.

Francisco, which surpassed its goal of 75% waste reduction two years earlier than planned, and on that basis has targeted zero waste by 2020.

Talk of reducing, reusing, and recycling can give the impression that the changes involved aren't radical, but that's a mistake. The luxury clothier Loro Piana provides a case in point. The company was a major buyer of ultra-high-end wool from vicuñas, llama-like wild animals that live in the Andes. For centuries Inca villagers slaughtered vicuñas and sold their wool. As demand for vicuña wool grew, the animal's numbers declined. When Loro Piana learned that fewer than 6,000 vicuñas were left in Peru, it submitted a proposal to the Peruvian government to work with mountain communities on developing a vicuña reserve and a process of shearing rather than slaughtering the animals. The change was Malthusian in that it involved reusing a resource, yet it radically altered both a business model and a way of life.

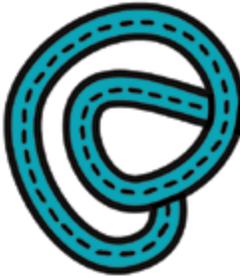
For Malthusian conservation to work, consumers, companies, and governments must share a sense of urgency about the resource. Prices can be a two-edged sword: High energy prices, for example, do encourage restraint by users within the range of their elasticity of demand. But high prices for rhino horns have encouraged poachers to drive the species to the brink of extinction because, as with oil and coal producers, their costs have not risen as quickly as their potential revenues. The promise of sustained high prices for vicuña wool encouraged the farmers involved to accept short-term pain (the expense of domesticating the animals and shearing them infrequently to aid their survival in a harsh climate) in exchange for a lasting increase in their standard of living (far more animals to shear).

Often, action of this sort requires a powerful sense of moral purpose. South Africa has made great strides toward solving what looked like an intractable litter problem, largely owing to the personal intervention of the country's revered former president Nelson Mandela, who launched a campaign to encourage environmental stewardship. The most productive Malthusian conservation comes, in the end, from a combination of the three tools—regulation, economic incentives, and social or moral pressure.

## Making the Choice

After analyzing the successes of each of the two strategies, we've developed a few clear guidelines for determining when one strategy should dominate.

## Responsible energy consumption need not imply long-term restraint in economic growth. Government should create pricing conditions that reward innovation.



Solovian innovation is patently a longer-term strategy, because new technologies take time to mature. Thus, if the resource in question is depleting rapidly with little or no potential for an immediate substitute, this is not the strategy to pursue. When we realized that hydrochlorofluorocarbons were destroying the ozone layer, we had to ban their use. When we recognized that the market for caviar would make sturgeon extinct in the Caspian and Black Seas, we included all sturgeon products in the Convention on International Trade in Endangered Species, bringing them under some of the tightest regulation available—and subsequently triggering the development of sustainable substitutes. In situations like these, consumers, corporations, and governments all need to move in the same Malthusian direction.

But if the crisis point is still some time away, an opportunity for Solovian innovation arises. For example, responsible energy consumption need not imply long-term restraint in economic growth. Rather, government should intervene to create pricing

conditions that reward companies for innovation. That is what the German government did with solar energy. If governments pour their resources into regulation and subsidies in an effort to change behavior rather than to stimulate new technologies, society may be worse off. Similarly, if corporations are motivated to make existing technologies more efficient only in small increments, they will miss out on the quantum leap in productivity that disruptive innovation can bring.

But prioritizing a Solovian strategy doesn't have to mean abandoning Malthusian restraint. This is not an either-or choice, and corporations and governments should continue developing ways to measure resource consumption and reward conservation. Malthusian restraint can buy time for Solovian innovation.

What we need is better framing to spur more-productive action on our environmental crisis. As if in a Hollywood western, the Malthusian framing has business playing the villain, government the sheriff, and citizens the pawns in their struggle. In the Solovian framing, business rides into town on a white horse and saves the day (with technology), while government (the sheriff) simply gets out of the way and citizens sit drinking in the saloon. Setting these perspectives in opposition means that we either argue, obfuscate, and delay or default to choosing one over the other. Blending them means we can inspire and empower all, which is what is required for this fight. Governments can regulate according to the desired outcome. Citizens can commit to a behavioral change or adopt a new technology. Business can do what it does best—innovate and create—to help save our planet. ♡

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“So I go, ‘Sir, with all due respect, perhaps you do have some unresolved control issues, because, um, you’re making me wear a bell.’”

 **Roger Martin** is the dean of the University of Toronto's Rotman School of Management, the director of the Michael Lee-Chin Family Institute for Corporate Citizenship, and the author of *Fixing the Game: Bubbles, Crashes, and What Capitalism Can Learn from the NFL* (Harvard Business Review Press, 2011). **Alison Kemper** is a PhD candidate at the Rotman School, a faculty member at York University in Toronto, and the Lee-Chin Institute's senior researcher.