America cannot be an ostrich with its head in the sand.

PRESIDENT WOODROW WILSON, 1916, on the eve of U.S. entry into World War I

CHINA, AFRICA, AND US—

A DISCUSSION ABOUT ENERGY AND THE WILL TO GO GREEN

On November 8, 2007, a search of CNN.com for the words "peak oil" returned 384 results. "Oil crisis" produced 1,721. And "alternative energy" turned up 735 unique articles referencing the term. The country is thinking, and on our minds is one nagging point: What do we do next? Unfortunately, there are a galaxy of possible answers—and even more questions. Do we continue to look to our neighbors to support us, as we do now? Do we instead find answers within our own borders? Or do we take things even further, search closer, within meters of our own doors? Think big or think small? Interestingly, the answer may lie in the examples of two integral, yet developing places that are also considering a collective "what now?"

ONE: THINK BIG

"THE CHINA EXPERIMENT" BY MARA HVISTENDAHL
PUBLISHED IN SEED MAGAZINE, MAY 2007
EXCERPTED BY PERMISSION OF THE AUTHOR

Linxia is not the sort of place that figures large in accounts of China's economic miracle. A town of 140,000 people in the mountains of western Gansu, China's second poorest province, its dusty streets teem with people hawking vegetables, grains, and live animals for slaughter from the backs of carts. Like much of western China, it is remarkably diverse: Hui Muslims gather at pagoda-trimmed mosques, Han businesspeople preside over small shops, and Tibetan nomads barrel through town on motorcycles. But vibrant street commerce has not brought economic progress to the area, where annual income is below 1,100 yuan ($142), less than a third of the national rural average. Talk to any townsperson at length, and he will apologize for Linxia's lack of development.

What Linxia has in abundance, however, is sunlight—and, in ways that might seem incongruous with the area's economic conditions, people are putting it to good use…Solar generators, heaters, and cookers have become so popular in parts of rural Gansu that families have started giving them as dowry.

It's a sign that, along with a quickly growing need for energy, an environmental consciousness is building here.

The stakes couldn't be higher.

The litany of environmental challenges that China faces is shocking, even by the enormous proportions of all things Chinese. The International Energy Agency predicts that China will surpass the United States as the world's No. 1 producer of greenhouse gases by the end of 2008. As 14,000 new cars take to the road every day and a new coal-fired plant opens every week, China's CO_2 emissions are on course to triple by 2050; and the country's newest coal plants alone will cancel out the global emissions reductions sought by the Kyoto Protocol in the next five years.

So far, though, China has been unwilling to take a proactive stance on the global environment. During deliberations over an Intergovernmental Panel on Climate Change (IPCC) report last year, the Chinese delegation staged long filibusters aimed at toning down the report's language, voting with Saudi Arabia to soften the report's assertion that climate change was "very likely" caused by human activities. When the report was released in February 2007, China's official reaction was to blame the West, with its foreign ministry spokeswoman maintaining that "developed countries bear an unshirkable responsibility" for climate change. When the National People's Congress convened just weeks later, Chinese Academy of the Sciences scholar Huo Yuping appeared before the body to assert that after conducting extensive research on climate change, he had concluded that it is not caused by humans.

But while they play international politics with climate change, China's leaders have enacted an ambitious law requiring that renewable sources account for 15 percent of the nation's power by 2020—up from 7 percent now.

If China fails, the implications for the rest of the world could be grave. Sulfur dioxide and carbon dioxide from China already travel across the Pacific, causing acid rain in North America and Europe. In

The U.S. EPA releases its list of Energy Star–rated corporate headquarters. Only one U.S.

Japan, two city governments recently issued formal warnings about pollution from the country's western neighbor…Chinese scientists have predicted that the Yangtze River will die by 2011, and with two-thirds of other rivers polluted, more than 340 million Chinese lack access to clean drinking water… China is unveiling forward-thinking policies and pushing alternative energy because it has no other choice.

Much as Americans did in the 1970s, the Chinese are waking up to issues of pollution, the environment, and the role of grassroots action.

The words "environmental protection" and "green" ("huanbao" and "lüse" in Mandarin) are now buzzwords appearing on advertisements for everything from housing to food. Newspapers like the China Green Times have helped focus media attention on environmental issues.

If more Chinese see their local pollution and environmental action as part of a national and even international environmental movement, it could become imperative for the Chinese government to implement wide-reaching green strategies across its rapidly expanding economy. It has amended policy on major science issues like this before.

It's possible that now that February's IPCC report has hammered home that climate change is a fact, and China is seen as increasingly culpable, we will see the government address climate change the same way.

Seven hundred miles northeast of Linxia is Bailingmiao, an arid and remote swath of land near the Mongolian border. Save for a handful of hardy Mongolians wearing thick brocade jackets to insulate against the wind, it's desolate. Even the sheep that furnish the locals with meat and wool are scarce out here. But by the end of this year, this wild, expansive vista will be transformed into a wind power plant, providing energy for several cities in Inner Mongolia. China has identified its remote northern region as a source of renewable energy and is ramping up production of wind power, building hulking turbines over these vast grasslands. China currently ranks sixth in the world in total wind power production, trailing behind renewables powerhouses like Germany and Denmark. But by 2020 it aims to increase its share by 1,200 percent, to 30,000 megawatts of power—a target the government upped last year, from 20,000 megawatts, after realizing that it was reaching its goals faster than anticipated.

Authoritarian power can, at certain times, and with specific regard to environmental issues, seem like a boon.

"The Chinese advantage is that when they decide something, they can do very dramatic things," says energy analyst Jim Brock.

Of the sixteen candidates running for U.S. President as of November 21, 2007, nine voted "yes" on some measure of the Energy Policy Act of 2005—a statute that authorized subsidies for alternative energy production, created a $50 million dollar biomass grant program, and offers tax breaks to citizens making energy consumption improvements to their homes. Of the other candidates, all mention energy and environmental concerns to some degree on their websites and formal releases. Certainly the U.S. government is involved in the energy consumption of the average citizen in some small way—from tax breaks for solar panels to continued demands for gas mileage improvement in domestic cars. But sweeping energy reform seems to have eluded the country at large. Unless you live in Vermont, where more money is spent per person on energy efficiency initiatives than in any other state. Or in Oregon, where there are more sustainable buildings per capita than anywhere else in the U.S. Or in Rock Port, Missouri—the nation's first fully wind-powered city. ¶ The successful greening of these places is perhaps owed to like-minded souls that can more reasonably be called "neighbors" than residents of Arizona can call Floridians the guys next door. Perhaps it's simply easier to reach a decision by committee (or votes or lobbying) when the committee is fewer than 301 million people. Nobody knows, really. But these examples make it seem possible that beyond a centralized, government-led charge toward energy efficiency, there is another option.

TWO: THINK SMALL

"THIRST FOR POWER" BY G. PASCHAL ZACHARY
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In the gorgeous Ruwenzori Mountains of western Uganda, on a ridge above a fast-moving creek, a young man leans against a mango tree, a machete dangling from his arm. It is his job to guard one of the funkiest, tiniest dams in the world.

It's a hunk of concrete, about four meters across, that interrupts a natural waterfall, diverting water into a large reservoir. That pool drains into a rusted steel pipe that runs along the creek and then drops sharply into a white stucco-covered bungalow the size of a walk-in closet. Inside the bungalow, a turbine generator capable of producing 60 kilowatts churns out electricity, which is carried via underground wires to the Kagando Christian Hospital, three kilometers away.

The zany contraption is the hospital's chief source of electricity, and it is incredibly reliable—five years have gone by since a turbine blade needed

China's Guangdong Province opens the Daya Wan Nuclear Power Base—the country's largest nuclear power plant—to tourists.

replacing. The entire system cost less than U.S. $15,000.

"The government has promised and promised to bring electricity to this village and never has," says Sabuni Seezi, who maintains the hospital's microhydro. "So we did it ourselves."

And what works for Uganda has enormous promise all over sub-Saharan Africa, the most energy-poor region in the world. Excluding highly developed South Africa, the region has only about 30 gigawatts of installed capacity, about the same amount as Poland.

Big dams still dominate Africa's electricity scene. They have been at the center of infrastructure development on the continent for 50 years, ever since Egypt built the 2.1-gigawatt Aswan Dam on the Nile and Ghana built the 768-megawatt Akosombo Dam on the Volta River. Now in addition to its main dam on the Nile at Owen Falls near Jinja, the Ugandan government is planning to build two more large dams on different points of the Nile at an estimated cost of $750 million.

Because large dams are so expensive, they carry great risks, especially in drought-prone areas, and require capable management by government. Microhydro systems such as the one at the Kagando hospital are appealing because they cost less, reach places far outside the national grid, and give local communities a direct stake in their power systems. They also don't require the involvement of national government agencies—which, in Africa, are often corrupt, incompetent, or both.

According to the Uganda Ministry of Energy, the country has three working microhydros, and a dozen more are in various stages of planning. "These microhydros are worth building in large numbers," says Philippe Simonis, a German energy expert who works for the Ugandan government. He has advised the government to consider a crash program to spread microhydro projects all over the country. "It is possible to have hundreds, even thousands of them in Uganda alone, and tens of thousands around Africa," he says.

Uganda's main dam at Owen Falls is rated at 200 MW. Even in the best of times, the dam supplies electricity to just five percent of Uganda's 28 million people. And these are hardly the best of times. Because of a drought in East Africa, the dam is producing half its normal output, blacking out huge swaths of Uganda's neighborhoods and industrial centers.

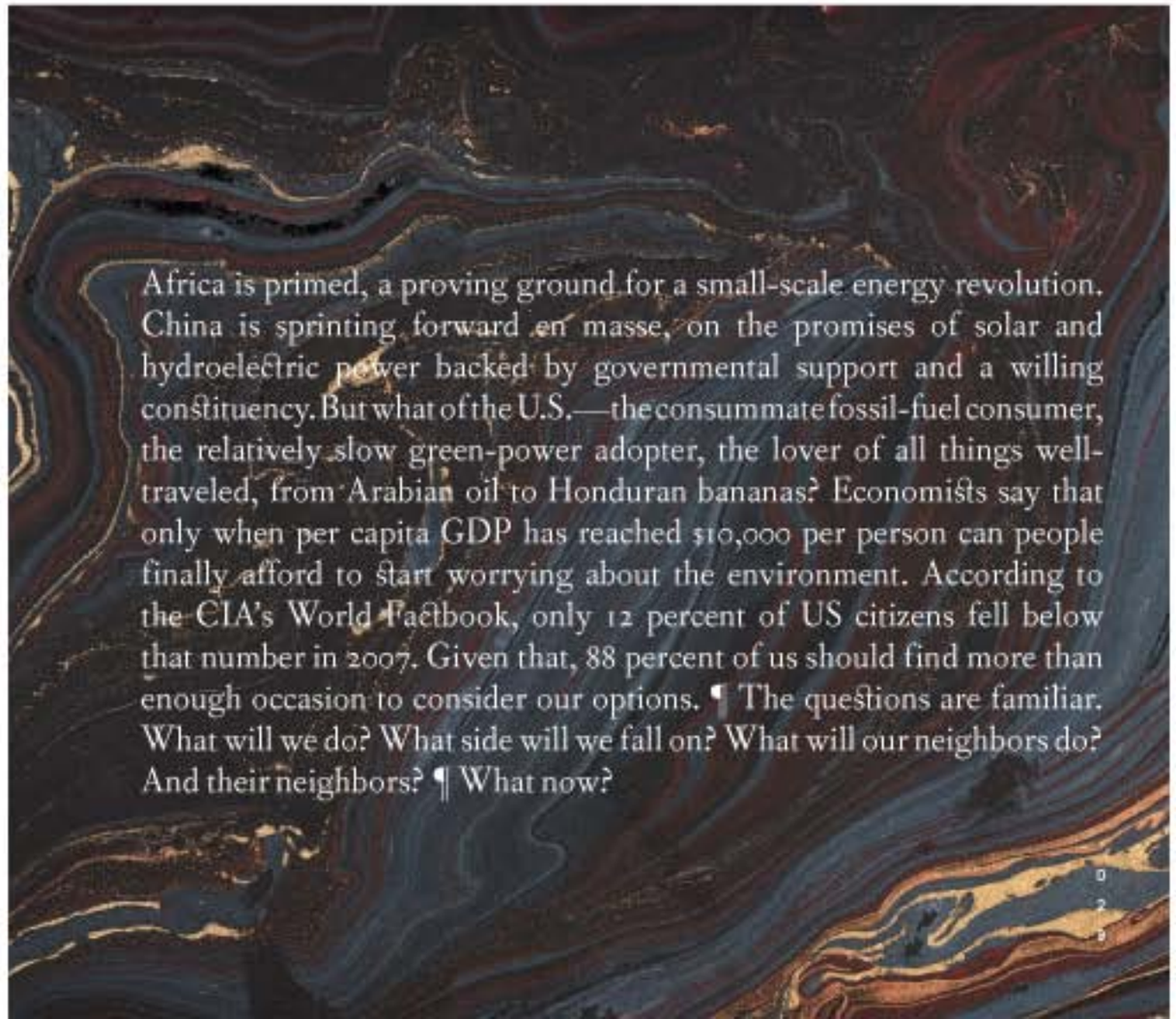
That's a shame, many analysts say. The emphasis on large dams reinforces centralized power and invites corruption, because large dams bring big money into the hands of a few government officials and technocrats. By contrast, small dams capable of generating up to 15 MW are relatively inexpensive and require the hands-on involvement of villages and communities, thus potentially serving as a tool for local empowerment

One of the great advantages of microhydros is that they can electrify remote communities far from the grid relatively quickly and economically. That's a huge potential benefit, because today in Africa the grid typically reaches less than ten percent of the population. Half of black Africa's population will still be living without grid-supplied electricity some 25 years from now, according to a United Nations forecast. Many African countries are so large that plans to extend the grid beyond major cities might remain too costly for generations.

In Africa, the first microhydros were built in the 1920s by European settlers. The oldest system in Malawi, for instance, powers a tea-processing factory in the foothills of the spectacular Mulanje Mountains, a major destination for tourists to southern Africa. The Mulanje microhydro has been running continuously for nearly 80 years, using the three original impulse turbines, which combined are capable of producing 600 kW. "Our maintenance has actually been nearly zero for a decade," says Jim Melrose, managing director of Lujeri Tea Estates, Malawi's second-largest tea producer. And yet, oddly enough, the tea company is said to be the only enterprise in Malawi that relies on microhydro technology.

Melrose is contemplating building a second microhydro to power sprinkler heads and water pumps in new tea fields. "I feel like we're moving back to the future," he says. "We're embracing a forgotten technology that has obvious economic advantages today.

"There's no way we can depend on the government or a big electricity company to satisfy our needs. Microhydro lets us control our own destiny."



Africa is primed, a proving ground for a small-scale energy revolution. China is sprinting forward en masse, on the promises of solar and hydroelectric power backed by governmental support and a willing constituency. But what of the U.S.—the consummate fossil-fuel consumer, the relatively slow green-power adopter, the lover of all things well-traveled, from Arabian oil to Honduran bananas? Economists say that only when per capita GDP has reached $10,000 per person can people finally afford to start worrying about the environment. According to the CIA's World Factbook, only 12 percent of US citizens fell below that number in 2007. Given that, 88 percent of us should find more than enough occasion to consider our options. ¶ The questions are familiar. What will we do? What side will we fall on? What will our neighbors do? And their neighbors? ¶ What now?

California startup BioEnergy Solutions agrees to supply three billion cubic feet of bovine biogas to Pacific Gas & Electric—enough to light up 50,000 homes.

Somewhere along the curve of recent history, the word *green* moved from being the word that means *the color of leaves*, to the word that means *the liberation of leaves*. The Oxford English Corpus* confirms it—today more green *belts*, green *spaces*, green *fuels*, and green *revolutions* pass the lips of English speakers than green *salads*, *foliage*, and *pastures*. But the ordinary person probably doesn't need a linguistic study to know something has shifted. We can all feel it. Green has changed us. We are, as a species of thinkers, buyers and doers, different now than we were even 365 days ago.

Resource consumption is no longer something you think about only if you live in a modified school bus or have ever gone to San Francisco wearing flowers in your hair. In 2007, water crises plagued not only the places where cacti grow, but those that support Spanish moss as well. This year the U.S. drafted, revised, and re-revised the nation's most significant energy bill in decades. (It's a start.) But perhaps most impressive is that conservation has become not only a governmental endeavor, but one that is swiftly rising—from the bottom up. Wal-Mart, the largest retailer in the U.S., began to carry its own line of organic produce in 2007. The Home Depot also started selling thousands of green-certified products. And the word *sustainability* entered the English lexicon with force—then milled around and promptly lost much of its definition as it was co-opted by nearly every company making products, everywhere. But regardless of what it's termed, most of us get the point now. Green has gone global, and we are ubiquitously tuned to a pressing need to alter our consumptive behaviors.

Fortunately, beyond the bandwagoneering, real efforts are being made to curb energy consumption—or, at the very least, to mitigate its most damaging effects. The city of Chicago has decided to retrofit more than 2000 miles of alleyways with recycled substrate that will cut heating and cooling costs in neighboring buildings and return filtered water to Lake Michigan. Abu Dhabi (capital of the United Arab Emirates, the world's fourth largest oil producer) dedicated hundreds of millions of dollars toward sun, wind, and hydrogen technology—and a stake in the possible post peak-oil marketplace. And on May 16, 2007, Airtricity, an Irish wind turbine manufacturer, announced the construction of its largest project to date—a 209MW, 30,000 acre wind farm that will place hundreds of turbines into sweeping, whooshing motion over one American state's rolling farmland. That state—Texas. Oil-producing, greenhouse-gas-emitting, everything's-bigger-in-Texas, Texas.

Consumption may be the topic of our daily chatter, but innovation is everywhere. In this section of the magazine we look into the eye of the energy quandary; into our cities where old buildings gain new lives after green makeovers; into the past, where long-forgotten building methods could breed new sustainable technologies; inward and upward, where our skies may soon be full of foods that won't drain oil reserves through their journeys to our plates; and importantly, within our own walls at Cooper Carry and on our project sites, where green-minded change happens every day.

*The Oxford English Corpus is a living dictionary—a 2-billion word collection of text from novels, textbooks, parliamentary proceedings, blogs, chats, emails, and journalistic articles compiled by the Oxford University Press's Language Research Programme to quantify ever-changing patterns of word usage in everyday English.

Kermit the Frog once said "It's not easy being green," a lament that might have made sense in a Muppet-fuzzy 70s haze, but today, would certainly be looked upon as at best lazy, and at worst a reproach to all that is good and holy in our souped-up, sustainability-conscious world. A 2007 Kermit might better say "It's not cheap being green," and then open his wallet to recycling and remediation of Oscar's trash heap. The truth is, ever-ubiquitous green living is both high-conscience and high-fashion these days, as a burgeoning eco-industry continues to roll out some of the cleanest, greenest products ever conceived. Which is arguably wonderful. But, is it attainable? Like always, revolution has its price. ¶ It is strange to imagine technology that uses less could cost so much more, but, indeed it does, and $98,000 AC-powered roadsters and multi million-dollar sustainable vacation homes are proof that eco-consciousness is the newest status symbol designed to entice the fat of wallet and of carbon footprint. Wouldn't simply not owning a second or third home, or a fifth or sixth car—regardless of how "sustainable" it is—be infinitely more energy-friendly, you may ask? The answer is probably "yes," but that response would ignore one redeeming fact about the nature of early adoption. ¶ The "ultra-haves" are always the first to rush the front lines of the new, improved, and initially pricey. Whether because they really want to make a difference, or really just because they can, the wealthy green crowd often serves as both test-market and full-color, paparazzi-style advertisement for the newest gadgets and hottest toys. ¶ The September 24, 2007 issue of The New Yorker profiles one such piece of eco-bling. Writer Henry Alford took three weeks to try out Italian fashion-house Ermenegildo Zegna's new Sport Solar JKT—outerwear that powers iPods, cell phones and PDAs with no AC-plugging required. To say the jacket changed Alford's life is probably overstatement, but it certainly changed his mindset. Which is arguably wonderful. Here's to the thought that behind the solar glass of smugly-superior hydrogen converted Hummers and off-the-grid sustainable mansions, a similar, less expensive, revelation is working its way toward the rest of us.

Bananas VARIETY: Cavendish. BENEFIT: Short gestation period, big fruit. Banana waste can be used to make paper 300x stronger than pulp paper. Carrots VARIETY: Nantes half-long, Danvers half-long, Pioneer, Spartan Bonus, Little Finger. BENEFIT: Rich in Beta-Carotene. YIELD: 185,139 sq ft @ 2336 tons/yr Cucumbers VARIETY: Conquest/Littleleaf (for pickling), and Jazzer, Superset and Marketmore (for slicing/salad). BENEFIT: Cucumbers have a successful history of urban greenhouse growth. YIELD: 107,639 sq ft, 911 tons/yr Eggplant VARIETY: Any. YIELD: 592,015 sq ft @1495 tons/yr Green Beans VARIETY: Any. BENEFIT: one of the most popular vegetables consumed worldwide. Lettuce VARIETY: Any. BENEFIT: All types of lettuce are well suited to hydroponic growth. YIELD: 130,243 sq ft @ 1003 tons a year. Peppers VARIETY: All colors—green, red, yellow, orange, purple, brown, black. YIELD: 223,889 sq ft @1368 tons/yr. Soybeans VARIETY: Hoyt. BENEFIT: High yield crop rich in vitamin A, carbs, iron and protein. Already grown in non-traditional environments, including on the International Space Station. YIELD: 2,314,241 @ 3285 tons/yr Spinach VARIETY: Any. BENEFIT: Iron-rich and traditionally successfully grown hydroponically. YIELD: 2,906,256 sq ft @3285 tons/yr Strawberries VARIETY: Nearly any. BENEFIT: Grown nearly exclusively via hydroponics in the US already, and are high in vitamin C, folic acid and water-soluble B. YIELD: 1,808,337 square feet @1514 tons/yr Tomatoes VARIETY: Nearly any. BENEFIT: Grow and yield very well hydroponically. YIELD: 392,883 sq ft @ 2737 tons/yr Wheat VARIETY: U.S.U.-Apogee "Super Dwarf". BENEFIT: Quick growth and non-edible chaff valuable to methane composting and power-generating. YIELD: 1,000,000 sq ft planted/yr Potatoes VARIETY: Nearly any. BENEFIT: Universally cultivated, very high in nutrients and carbohydrates. YIELD: 1,000,000 sq ft planted/yr Chicken VARIETY: Leghorn, Australorp, Dominique. BENEFIT: Efficient option for protein, as offspring yield is high each year. DOUBLE-BENEFIT: layers (for eggs) and broilers (for eating). YIELD: 95,232 sq ft to be tended. Fish VARIETY: Tilapia. BENEFIT: Hearty, fast-growing, tolerant to low dissolved oxygen levels and high turbidity. YIELD: 60,894 sq ft to be cultivated.

Food is energy. We feel this fact inherently, our bodies hinting to us every moment that what goes in is in some way related to what comes out—movement or cognition, action or ambition. But food also embodies energy in other ways: in the power transferred between sun and soil and seedling; in the context of activity expended to produce it—muscle pushing plow, combustion turning pistons; and perhaps most relevantly these days, in the energy spent in mass production, seasonless cultivation and endless transport.

"The Living Tower" by Pietro Sartirana

Energy that creates wonders like coast-hopping Georgian peaches and world-traveling Honduran bananas, and that brings us blueberries in the dead of winter, watermelon in the desert. ¶ Such is the dinner table of today—far-flung fruits and vegetables shipped by diesel barge, rolled cross-country from port to heartland in trucks, and flown in from far away cushioned on a trail of jet fuel. There are many things to be said about why farming, distributing, and eating food this way is a bad idea, long-term. But one of the most pressing, it seems, has to do with not just how we live, but where. ¶ In the next 50 years, it is expected that more than 80 percent of the world's population will live in or near a major urban center. This leaves less than 20 percent of us left to tend the farm—and feed us all. According to the Food and Agriculture Organization of the United Nations, in 2004, approximately 800 million hectares of land were used for food production worldwide, amounting to about 85 percent of all usable agricultural land. In addition, human population is expected to rise to somewhere between 8.5 and 10 billion in the next half-century. Add all of that up, and you get more mouths gaping in the world's concrete jungles, less crop-producing land available to fill those mouths, and even less willing bodies working longer and harder to grow anything at all. ¶ Just as the advent

of agriculture irrevocably changed the texture of human life, so will its eventual demise. Farming in the traditional sense is necessarily a horizontal endeavor—crop next to crop, stretching out over seemingly endless fertile ground. But now that that ground is waning (and population waxing), the need for more food to be produced, and for that production to happen closer to home is becoming urgent. Fortunately, a new breed of farmers are entreating us to literally "think higher" when it comes to the future of agriculture. ¶ The answer, as some see it, is vertical farming. One square city block, built 30 stories high—a skyscraper with the capacity to grow enough food to comfortably accommodate the needs of 10,000 people. ¶ The Vertical Farm is a project conceived by Dr. Dickson Despommier, Ph.D., professor of Environmental Health Sciences at Columbia University, and researched by several years-worth of students. It is a dissertation on urban environmentalism—detailed, deep-reaching, and the closest realization of a Jetsons-esque "World of Tomorrow" since the opening of Epcot Center. ¶ To understand, picture your typical caricature farmer. He is overall-clad, suntanned, John Deere cap cocked forward to blot out glare. He has sweat on his brow, a hayseed wedged squarely 'tween tobaccaced teeth. He is a sepia-toned vision of our rural, food-bearing past. And he is for the most part already long gone from our fields, replaced by the machinery and corner offices of agribusiness. ¶ Now picture a new kind of farmer. He is clean cut and white coat-clad, an RFID scanner in hand, standing high above the city skyline, measuring humidity, temperature and Ph-levels in a luminous, glass-encircled grow room where strawberries hang like drying tobacco from hydroponic ceiling pods. He is the cultivator of the future—part scientist, part rainmaker, part high-yield container gardener—and his field looms just along our city skylines, close to home. ¶ At the core of the vertical farm idea is a back to basics mantra: do as nature does—just do it with a little technological goosing. Natural ecosystems are wonders of efficiency; closed structures where everything that is produced is used and eventually recycled to perpetuate the process of growth, usefulness, and death over and over. The vertical farm purports to mimic nature in a number of ways, but perhaps most significantly, it is designed to be a zero-loss, zero-emission wonder. ¶ If built, a vertical farm will be supremely energy efficient: utilizing wind, water or geothermal power (depending on location) and reap biomass fuel (methane) from the composting of its own organic waste. It will give back to the communities it lives in: not just in food products, but by natural remediation of black water, a process that uses non-edible "cleaner" plants like duckweed and cattail to recycle waste into potable H_2O. It will be inordinately efficient: yielding year-round crop production independent of climate restrictions or inclement weather. It will be socially leveling: putting abundant food nearer populations increasingly bereft of resources. And it will be connective: bringing a long-absent pride of place to food, something now lost in the virtually faceless, mass-harvested world of industrialized farming. In the world of the Vertical Farm, your food will be your neighbor, your farmer someone you could conceivably walk down the street and meet, and, if you are so motivated, you might even apply for a place along the food chain yourself, working within the structure. ¶ These things are of no insignificant value, as Despommier illustrates in the hundreds of pages of research available on the vertical farming project. But beyond the obvious benefits to a city-bound society that may soon be starved of basic nutritional building blocks, the vertical farm also serves a very important purpose to the world as a whole. ¶ "On the day after humans disappear, nature takes over and immediately begins cleaning house—or houses, that is. Cleans them right off the face of the Earth," says Alan Weisman in "The World Without Us." In that statement lies the more hidden, but globally meaningful benefit of vertical farming. In less than 50 years, says Weisman, left to its own devices, any ordinary home will crumble—fall to a heap of corroding metal and dissolving plastics and become overrun with an army of plants and animals. Truly, anyone who's been to the American South understands the rabid spirit of nature, and knows that a coup of this type is imminently possible. Take one look at a 20-foot retention wall overtaken with kudzu, and the sheer will of plant survival becomes evident. But it's also useful. The vertical farming project embraces this de-evolutionary theory, perpetuating "benign neglect"—intentionally allowing farmed ecosystems to go rogue as vertical farms around the world come online and take their place. ¶ It's estimated that one acre of vertical farm could be equivalent to as many as ten to twenty traditional, "2-D" acres, depending on crop type. Once released of its servitude to society's appetites, our farmed land—the whole of it the size of the country of Brazil—is expected to "cure" itself of the disease of industrial agriculture in less than a generation. In this way, vertical farming has the potential to not only save an increasingly city-bound humanity from starvation, but rescue whole ecosystems from being blotted out permanently. ¶ You could argue that both goals are essentially the same.

Vertical farm concept by Chris Jacobs

VIABLE TEST MARKETS

JAPAN

Japan is 73 percent mountainous and unable to support traditional agriculture. Also, the population eats a lot of fish, which is easily supported in vertical farming. Overall, environmental conditions in the country are not favorable for farming in the small areas available to be farmed, as the region is prone to typhoons, earthquakes and landslides.

ICELAND

Iceland is 10 percent glacier and has a population that is highly concentrated on the coasts. They also eat lots of fish, most vegetables must be imported, and the country is a geological hotspot (which makes geothermal power a possibility).

CUBA

Cuba suffers from variable precipitation and is hurricane prone. Vertical farms could decrease dependency on other countries for food.

MALI

Mali has high population growth, non-sustainable exploitation of natural resources and is heavily dependent on sometimes sparse rainfall.

NYC

Nearly all food in Manhattan is imported, and the landscape presents obvious space constraints for traditional farming. But New Yorkers are uniquely ready to accept extreme or unusual methods and environmentally-friendly options, owing to a diverse culture, public-transit oriented population, and an energy-efficiency tolerance higher than in other urban areas.