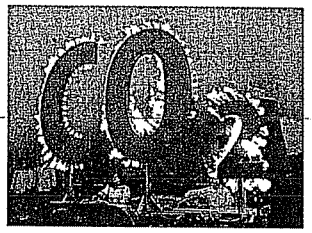
America and climate change

Cap and binge

America's politicians are at last getting to grips with global warming, but in a dangerously expensive way



THE power plant that heats Congress produces more carbon dioxide than any other facility in Washington, DC. It is almost 100 years old and runs partly on coal, a grubby fuel. Last week, protesters marched on it, urging Congress to cut its own emissions of greenhouse gases and to oblige the rest of America to do so as well.

The first demand was easily met: the leaders of the House of Representatives and the Senate instructed their staff to convert the plant to run on natural gas, which burns more cleanly than coal. But the second one is proving trickier. Congress is just beginning to grapple with laws to regulate greenhouse gases (see page 26), at the behest not just of protesters but also of Barack Obama, who has long advocated vigorous measures to curb global warming. Bringing about a wholesale change in America's energy supply will be a challenge, to say the least. And the sort of measures that are currently finding favour in Washington will make it harder still.

The president is right to want to cut emissions. The alternative, allowing climate change to take its course, would be far more damaging to America and the world. The economic impact of rising sea levels, reduced crop yields, fiercer storms and many other doleful consequences would be devastating.

But fighting climate change will be costly. It will involve swapping cheap but dirty fuels for cleaner but dearer ones, as Congress intends, as well as building lots of expensive new power plants to replace older, more polluting ones. That in turn will lead to higher electricity and fuel prices. Despite the president's airy talk of green jobs, cutting emissions, by almost all calculations, will increase costs for most businesses and families. Those extra costs must be kept to a minimum.

Mr Obama's preferred device for cutting emissions, a cap-and-trade scheme, is designed to do just that. It involves placing a limit on the volume of emissions that can be produced around the country each year, and then auctioning tradable permits to pollute. The intention is to encourage firms that find it cheap to cut emissions to do so, while allowing those with no easy means to pollute less to buy permits instead. Politicians and bureaucrats, meanwhile, do not need to identify where emissions cuts should be made; the market takes care of that for them.

Sunshine and moonshine

Many congressmen are unconvinced. There is a general worry that the required emissions cuts will be harder than expected to find, pushing up the cost of the permits and thus flattening an already slouching economy. And there are particular fears that, even if the system works well enough overall, states that rely heavily on coal, heavy industry or some other sooty activity will suffer badly.

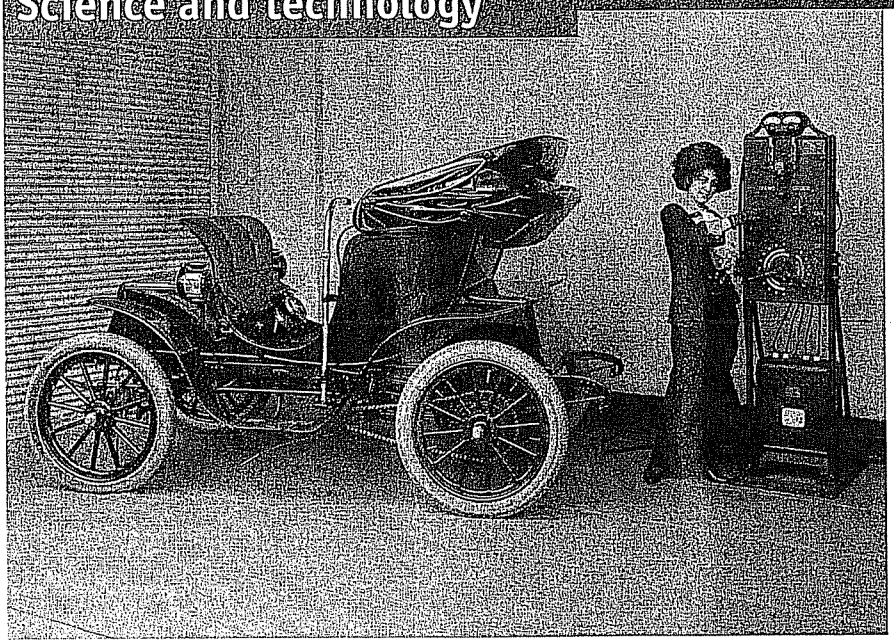
Both the president and cap-and-trade's supporters in Congress seem inclined to respond with subsidies for pet technologies that might help those hardest hit, or with mandates to cut emissions in particular ways. The president, for example, wants to double the amount of electricity that comes from renewables, meaning wind farms, solar-power plants and the like. Handouts for hybrid cars and for coal plants with low emissions are also popular.

The main effect of these schemes would be to raise the costs of cutting emissions. Much of the money doled out by the government would inevitably be wasted, adding to the overall bill for fighting climate change. Worse, such measures would risk distorting the carbon market, steering private capital as well as public money away from the cheapest technologies and towards those that have caught the eye of the politicians.

Under the stimulus bill, renewables benefit from a tax credit, grants, loan guarantees and an expensive overhaul of the electric grid. No wonder that each tonne of emissions avoided thanks to the measures in the stimulus to encourage renewable energy would cost somewhere between $69 and $137, according to a recent study. Under a cap-and-trade scheme, the price would be less than $15 to begin with, by most accounts.

There are some green things on which the government could usefully spend money. Investments in energy efficiency—of which the stimulus package included a lot—are particularly worthwhile. Increasing the budget for advanced scientific research may yield technological breakthroughs. But on the whole, government intervention is only likely to raise the cost of mitigating climate change. Fat handouts may make the politics of going green easier in the short run, but in the long run they will make it harder. ■

Northern Ireland



Tech.view, our online column on personal technology, appears on Economist.com on Fridays. The columns can be viewed at Economist.com/techview

Electric vehicles

Batteries now included

The missing piece of the electric-car jigsaw has just turned up

IF YOU want to buy an electric car, you can. Tesla Motors, a firm based in San Carlos, California, will sell you a nifty open-top sports job for $109,000. Not cheap, admittedly, but cheap to run. Plugged in overnight, it can be refuelled for the equivalent of 25 cents a litre of petrol. The catch is, "plugged in overnight". Tesla's vehicles use standard lithium-ion battery cells. As any owner of a mobile phone or laptop computer knows, these take time to charge. If you use 6,831 of them, as a Tesla sports car does, that time does tend to drag on. Which is fine if you are not planning a long trip the following day, for a full charge will take you about 350km (220 miles). But it might cramp the style of anyone planning to bomb down from, say, Paris to Cannes, and who would therefore need to refuel on the way.

Gerbrand Ceder and Byoungwoo Kang of the Massachusetts Institute of Technology hope to change this, and thus help make the electric car a work-a-day consumer item, rather than a high-end boy's toy. In this week's *Nature* they have published the technical details of a new battery material that will, if all goes well, take the waiting out of wanting, at least when it comes to recharging.

Broadly speaking, there are two ways of storing electrical energy in a chemical system. One is a standard battery, in which the whole material of the electrodes acts as a storage medium. That allows lots of energy to be squirrelled away, but makes it relatively hard to get at—and so it can be released or put back in only slowly. The other way is called a supercapacitor. This stores energy only at the surface of the electrode. It is quick to charge and discharge, but cannot hold much energy. The great prize in the battery world has thus been a material that can both store a lot and discharge rapidly, and it is this that Dr Ceder and Mr Kang think they have come up with.

Nanogobstoppers

Lithium-ion batteries, as their name suggests, work by the movement of lithium ions (which carry a positive electric charge) along with electrons (which carry a negative charge). Electrons are small and mobile but lithium ions are much larger and slower. In a standard lithium-ion battery one electrode is made from a material such as lithium iron phosphate and the other from graphite. The ions pass from the graphite to the phosphate through an intervening electrolyte while the electrons make the journey via an external circuit that allows them to do useful work. When the battery is recharged, they go in the opposite direction.

It is the speed with which the ions can enter and leave the electrodes that governs how fast a battery can be charged and discharged. Graphite has an open structure and is easily penetrated. However, in the case of lithium iron phosphate and other, similar, materials, the crystal structure allows entrance and egress in only one direction. That creates a traffic jam that slows the movement of ions down.

What Dr Ceder and Mr Kang have done is create electrodes that are made of two different materials, one of which is good at storing ions while the other is good at conducting them. The two substances themselves are arranged in tiny spheres less than 50 billionths of a metre across. The core of each sphere is a crystal of lithium iron phosphate. This acts as a standard battery material. The surface, however, is made of a glassy (ie, non-crystalline) form of lithium phosphate. This lithium-phosphate glass is good at conducting lithium ions, though it cannot actually store many. It thus acts as a supercapacitor. The result is that any ion arriving at a sphere is quickly conducted around the surface by the supercapacitor phase until it finds its way to the right place to enter the battery phase in the core—or, if the battery in question is being charged, the other way round.

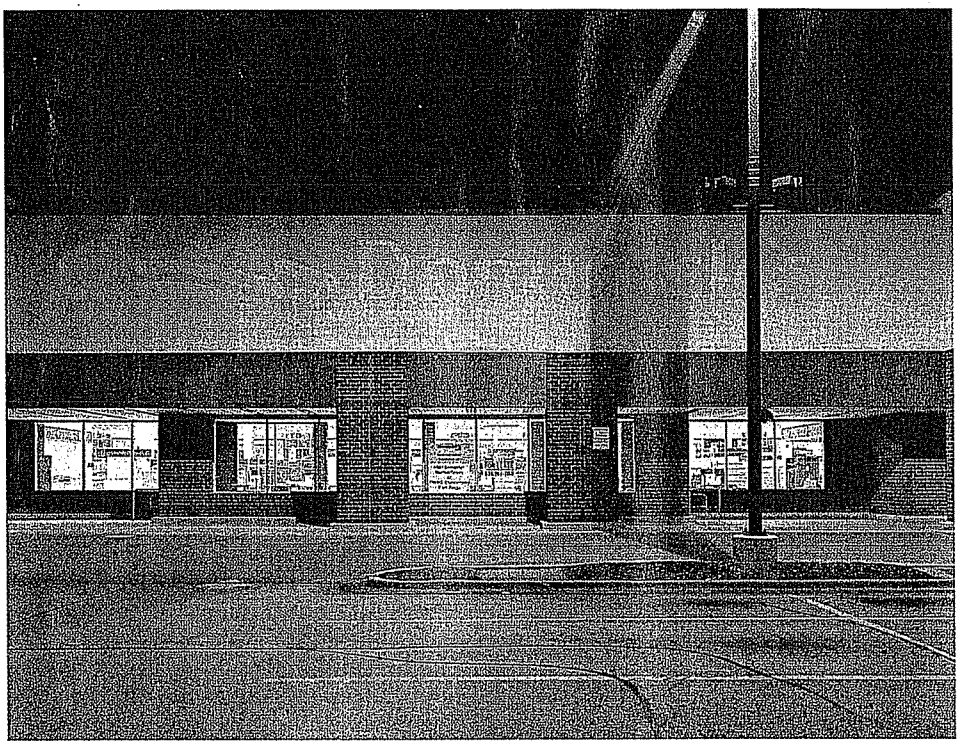
The really clever bit, though, is how the spheres are made. They crystallise from a melt that does not have enough iron in it to become pure lithium iron phosphate, so eventually no more of that material can form as the melt cools down. From then on the growing sphere is just lithium phosphate and, by manipulating the conditions, the researchers were able to make the coating glassy rather than crystalline.

The result is a material that, when tested in experimental batteries, was able to charge and discharge in a few seconds. In the future, therefore, that weekend in the south of France need not be interrupted by running out of juice. ■

Video: for an animation showing how a lithium-ion battery works, see "*Flow chart*" at: Economist.com/videographics

#2 Recycling the Suburbs

BY BRYAN WALSH



THE AMERICAN SUBURB AS WE KNOW IT is dying. The implosion began with the housing bust, which started in and has hit hardest the once vibrant neighborhoods outside the urban core. Shopping malls and big-box retail stores, the commercial anchors of the suburbs, are going dark—an estimated 148,000 stores closed last year, the most since 2001. But the shift is deeper than the economic downturn. Thanks to changing demographics, including a steady decline in the percentage of households with kids and a growing preference for urban amenities among Americans young and old, the suburban dream of the big house with the big lawn is vanishing. The Metropolitan Institute at Virginia Tech predicts that by 2025 there will be a surplus of 22 million large-lot homes (on one-sixth of an acre [675 sq m] or more) in the U.S.

Environmentalists will celebrate the demise of sprawling suburbs, which left the nation addicted to cars. But all the steel, concrete and asphalt that went into making the suburbs can't simply be tossed out in favor of something new, even if it's perfectly green. That would be worse. "As much as possible, we need to redirect development to existing communities and infrastructure," says Kaid Benfield, director of the smart-growth program at the Natural Resources Defense Council. "Otherwise, we're just eating up more land and natural resources."

The suburbs need to be remade, and just such a transformation is under way in regions that were known for some of the worst sprawl in the U.S. Communities as diverse as Lakewood, Colo., and Long Beach, Calif., have repurposed boarded-up malls as mixed-use developments with retail stores, offices and apartments. In auto-dependent suburbs that were built without a traditional center, shopping malls offer the chance to create downtowns without destroying existing infrastructure, by recycling what's known as underperforming asphalt. "All of these projects are developer-driven, because the market wants them," says Ellen Dunham-Jones, a co-author of the new book *Retrofitting Suburbia*.

Not every suburb will make it. The fringes of a suburb like Riverside in Southern California, where housing prices have fallen more than 20% since the bust began, could be too diffuse to thrive in a future where density is no longer taboo. It'll be the older inner suburbs like Tysons Corner, Va., that will have the mass transit, public space and economic gravity to thrive postrecession. Though creative cities will grow more attractive for empty-nest retirees and young graduates alike, we won't all be moving to New York. Many Americans will still prefer the space of the suburbs—including the parking spaces. "People want to balance the privacy of the suburbs with more public and social areas," says Dunham-Jones. But the result will be a U.S. that is more sustainable—environmentally and economically. ■

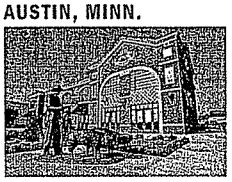
Dark Stores

For more of Brian Ulrich's haunting images, go to **time.com/darkstores**

The Second Life Of Shopping Malls

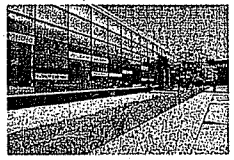
As big retail centers die out, suburbs have begun remaking them into libraries, schools and town centers

AUSTIN, MINN.



THEN: Kmart
NOW: Spam Museum

DENTON, TEXAS



THEN: Food Lion supermarket
NOW: New public library

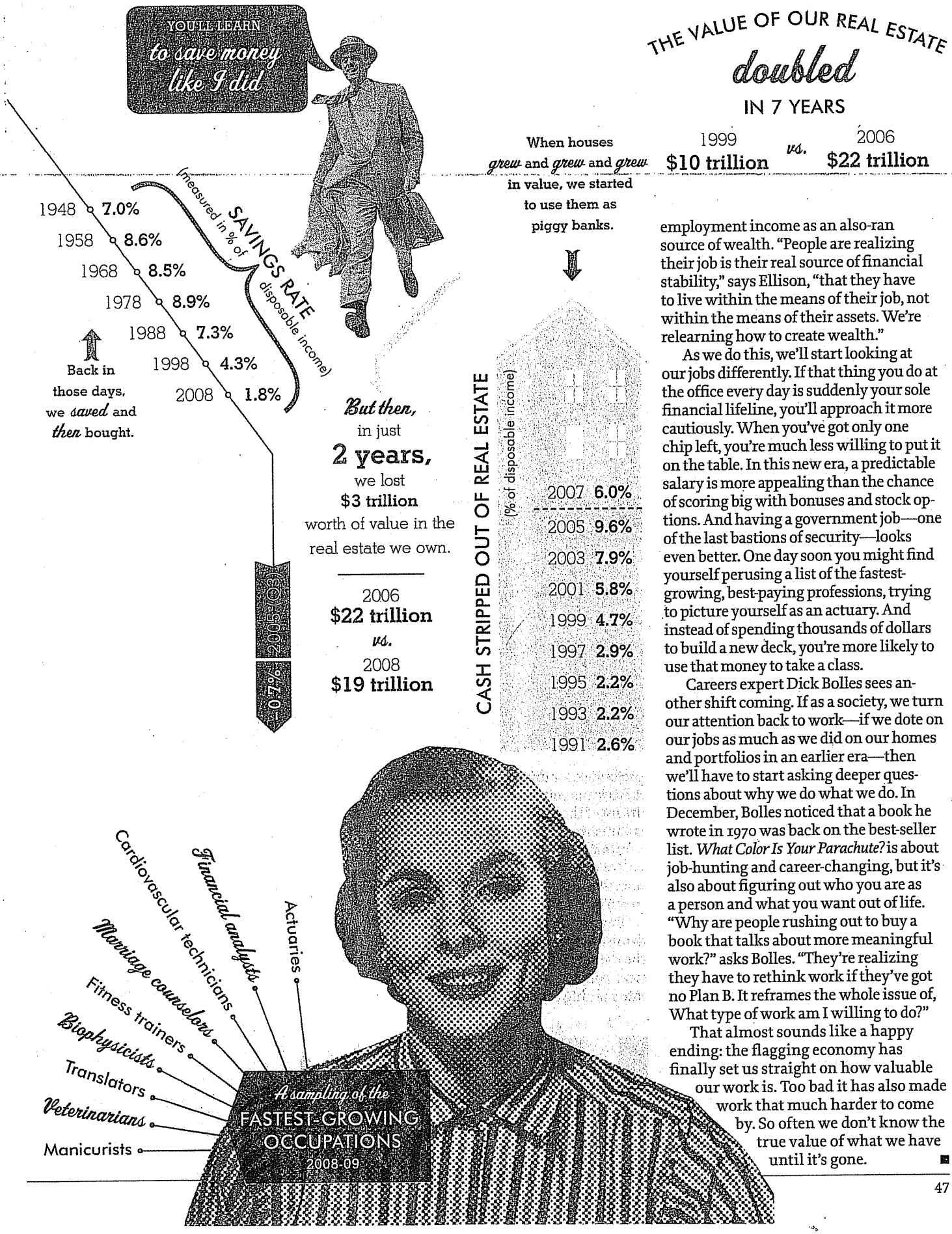
BOCA RATON, FLA.

THEN: Shopping mall
NOW: Mixed-use town center

MASHPEE, MASS.

THEN: Strip of chain stores
NOW: Town commons

TOP: BRIAN ULRICH; BOTTOM, FROM LEFT: CNS PHOTO/SPAM; RETROFITTING SUBURBIA BY ELLEN DUNHAM-JONES—JOHN WILEY & SONS INC. (3)

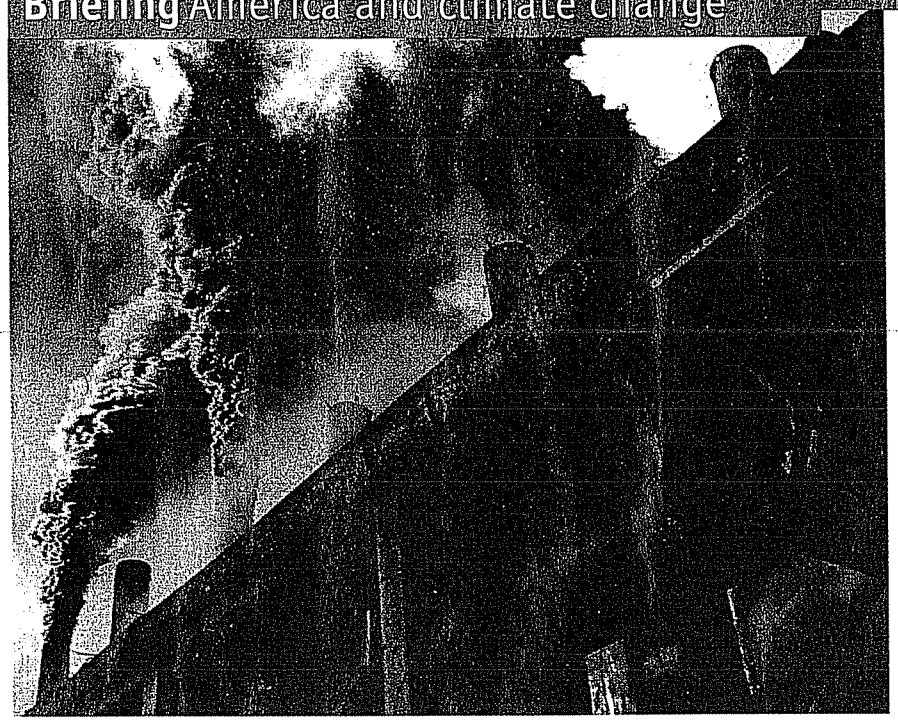


employment income as an also-ran source of wealth. "People are realizing their job is their real source of financial stability," says Ellison, "that they have to live within the means of their job, not within the means of their assets. We're relearning how to create wealth."

As we do this, we'll start looking at our jobs differently. If that thing you do at the office every day is suddenly your sole financial lifeline, you'll approach it more cautiously. When you've got only one chip left, you're much less willing to put it on the table. In this new era, a predictable salary is more appealing than the chance of scoring big with bonuses and stock options. And having a government job—one of the last bastions of security—looks even better. One day soon you might find yourself perusing a list of the fastest-growing, best-paying professions, trying to picture yourself as an actuary. And instead of spending thousands of dollars to build a new deck, you're more likely to use that money to take a class.

Careers expert Dick Bolles sees another shift coming. If as a society, we turn our attention back to work—if we dote on our jobs as much as we did on our homes and portfolios in an earlier era—then we'll have to start asking deeper questions about why we do what we do. In December, Bolles noticed that a book he wrote in 1970 was back on the best-seller list. *What Color Is Your Parachute?* is about job-hunting and career-changing, but it's also about figuring out who you are as a person and what you want out of life. "Why are people rushing out to buy a book that talks about more meaningful work?" asks Bolles. "They're realizing they have to rethink work if they've got no Plan B. It reframes the whole issue of, What type of work am I willing to do?"

That almost sounds like a happy ending: the flagging economy has finally set us straight on how valuable our work is. Too bad it has also made work that much harder to come by. So often we don't know the true value of what we have until it's gone. ■



Sins of emission

Barack Obama is keen to curb greenhouse-gas emissions with a cap-and-trade scheme. Can Congress come round to his way of thinking?

AS HE clinched the Democratic nomination for president last year, Barack Obama declared: "This was the moment when the rise of the oceans began to slow and our planet began to heal." Not yet two months into his term, despite lots of other pressing concerns, Mr Obama has taken on the task of tackling global warming with zeal (although the oceans nonetheless continue to rise: see page 82). He has increased government spending on environmental causes, instructed civil servants to increase the fuel-efficiency of America's cars, promised to double America's output of renewable energy and urged Congress to pass the greenest measure of them all: a cap on the country's emissions of greenhouse gases. Could Mr Obama live up to his grand green rhetoric?

There is no questioning his enthusiasm. He has appointed ardent advocates of emissions-cuts to senior jobs, including secretary of energy and head of the Environmental Protection Agency (EPA). Many of his appointees, such as Carol Browner, who is charged with co-ordinating policy on climate and energy, are veterans of the Clinton administration, which agreed to cut emissions under the Kyoto protocol but could not muster enough support in the Senate to get it ratified.

The administration has dedicated roughly a tenth of the $787 billion to be spent under the stimulus bill to energy and the environment, making it "the biggest energy bill the country's ever seen", according to Miss Browner. That includes $33 billion to green the country's electricity supply, $27 billion for energy efficiency and $19 billion for cleaner forms of transport. Voguish technologies such as renewables (meaning windmills, solar panels and the like), high-speed rail, carbon capture and storage, advanced batteries, "smart" electrical grids and plug-in hybrid cars all received big dollops of cash.

In his first budget, too, Mr Obama has proposed spending more on greenery. The EPA would receive a third more than it did last year. Some of that is slated for closer monitoring of greenhouse gases. The Department of the Interior would get more money to assess the potential for renewable energy and to protect endangered species from global warming; $150 billion would go towards improving green technology over the next decade.

Meanwhile, Mr Obama has directed the EPA to produce tighter fuel-efficiency standards for cars and to reconsider its refusal under Mr Bush to allow California to regulate greenhouse-gas emissions from cars. The EPA is also wondering whether to overturn another decision from Mr Bush's day and regulate greenhouse-gas emissions itself. That, in effect, would allow it to set emissions standards for new power plants, and also to raise fuel-economy standards for cars beyond the levels required by existing laws.

All this, says Miss Browner, would complement Mr Obama's broader ambition to tackle global warming through a cap-and-trade scheme, whereby the government would set steadily declining annual limits on emissions, and would then auction permits to pollute up to that level. The president has consistently called for such a scheme, most recently in his first address to Congress, and even included revenues from permit auctions in his budget projections. Ideally, officials say, they would like to see cap-and-trade enacted this year, in time for a United Nations summit in Copenhagen in December, where negotiators hope to agree on a new treaty to stem global warming.

Congress seems receptive to the idea. The leaders of both the House of Representatives and the Senate have promised to allow a vote on cap-and-trade this year. The relevant committees in both chambers have said they will produce draft bills soon. The increased Democratic majority in both houses bodes well, since Democrats are keener on environmental measures, on the whole, than Republicans. But Environment & Energy Daily, a website that follows congressional wrangling on the subject, reckons there is not yet a majority in favour of cap-and-trade in either chamber. In the Senate, where 60 out of 100 votes are needed, it counts only 47 probable supporters and 21 fence-sitters.

The odds of winning over the waverers depend on the details of a cap-and-trade bill. But provisions designed to appeal to one lot might put off others. One of the most hotly disputed questions is what to do with the money earned by selling emissions permits. Some congressmen want it spent on the industries and households hardest hit by the rises in fuel and power prices that cap-and-trade will inevitably bring. Others want it spent on research into and subsidies for cleaner forms of energy. Yet others fear that the government will squander its takings, and so propose returning the money to citizens in the form of tax rebates or cuts, an idea known as cap-and-dividend. The president proposes a mixture of all three approaches.

The role of administrative measures is also up in the air. Mr Obama has repeatedly argued that it would be better for Congress to take charge of emissions than for the EPA to regulate them under the Clean Air Act, as the Supreme Court has said it can. But while Congress ruminates, the EPA is going ahead with measures that will have a bearing on emissions from vehicles in particular. Some congressmen might prefer to leave the reduction of emissions from transport up to the bureaucrats at the EPA rather than be seen to increase the ▸▸

price of driving—a red rag to many voters.

The volatility of carbon markets is another worry. In recent months the price of an emissions permit in the European Union, where a cap-and-trade system has been up and running since 2005, has reached a peak of over €30 and a trough of less than €10, thanks to the sour economic outlook. Analysts fear that such wild swings will make businesses reluctant to invest in low-carbon technology.

One solution is to adopt a tax on carbon instead of a cap-and-trade scheme. But that idea has little support in Congress, despite endorsements from Al Gore, America's climate-crusader-in-chief, Exxon Mobil, its biggest oil firm, and this newspaper. Alternatives doing the rounds include setting reserve prices for emissions permits at auction and creating a "Federal Reserve of carbon", which would manage the supply of permits—or try to—much as its namesake manages America's money supply.

Up in smoke

By far the most common concern, however, is that the price of carbon emissions will rise too high, and so cripple the economy. Many Republicans denounce cap-and-trade as a "stealth tax". PointCarbon, a consultancy, calculates that Mr Obama's plan would raise fuel prices by 6% and power prices by 7% on average in 2012, and by gradually increasing amounts thereafter. At a time when the economy is shrinking and hundreds of thousands of jobs are being lost, any law that would add to the woes of firms and families is bound to be a tough sell.

Moreover, higher energy costs would be unevenly spread. States with lots of heavy industry, and especially those where coal fuels most power plants or provides lots of mining jobs, will suffer most. Many of the waverers in the Senate come from such states, primarily in the Midwest; much of the congressional leadership comes from coastal states with less to lose.

The "Gang of 15", a group composed mostly of wary Midwestern senators, say they will not vote for cap-and-trade unless their concerns about the economic impacts on their constituents can be assuaged. They might be mollified by a generous slug of auction revenues for their states, or a mechanism to cap the price of permits, or a rule that allowed extensive use of cheap international offsets in lieu of emissions cuts at home. But those fixes would upset both fiscal conservatives and environmental hawks.

In theory, the cap-and-trade system automatically minimises the cost of reaching any given emissions target, by allowing whichever firms can reduce their emissions most cheaply to do so on behalf of others, using whatever technology they like. But neither Mr Obama nor the Democratic leadership in Congress wants to leave things entirely to market forces. They all support the idea of obliging utilities to generate a certain proportion of their output—perhaps 15% by 2020—from renewable sources, for example, and want such a rule included in a cap-and-trade bill.

As several sceptical congressmen have noted, this "renewable portfolio standard" is redundant at best, in so far as utilities constrained by an emissions cap would choose to invest in renewables anyway. At worst, it will oblige utilities to invest in renewables when there are cheaper low-carbon alternatives available, and so add to the cost of cutting emissions. Ed Markey, the chairman of a House committee that focuses on climate change and energy security, disagrees. He wants to force utilities to invest not only in renewables, but in energy efficiency too.

The president and Congress are also keen to complement cap-and-trade with subsidies of various kinds. The main beneficiary, again, is renewable electricity. The stimulus bill extends the life of an existing tax credit for investments in it. It also allows developers to swap that credit for a grant from the government, since the credit is of use only to firms that are making taxable profits—a rare thing these days. In addition the bill sets aside $6 billion for loan guarantees for renewable projects, to add to the money originally allocated for the same purpose in 2005, but never used, and further funds proposed in the latest budget. On top of all that, the stimulus allocates billions to upgrade the grid, a step that will help bring power from remote wind farms and solar plants to big cities.

Most of these measures would be unnecessary if a cap-and-trade scheme were in place. Extending the tax credit, for example, would stimulate only slightly more investment in renewables than a cap-and-trade bill, at greater expense to the government, according to a recent study by the Peterson Institute for International Economics and the World Resources Institute, two think-tanks. Unless most subsidies for renewables are phased out once a cap-and-trade system is in place, says Paul Bledsoe, a former adviser on energy to the Clinton administration, they risk creating a boondoggle akin to the proliferation of incentives for corn ethanol. If taken too far, such handouts tend to become a crutch rather than a leg-up, and can end up sapping public support for the policy.

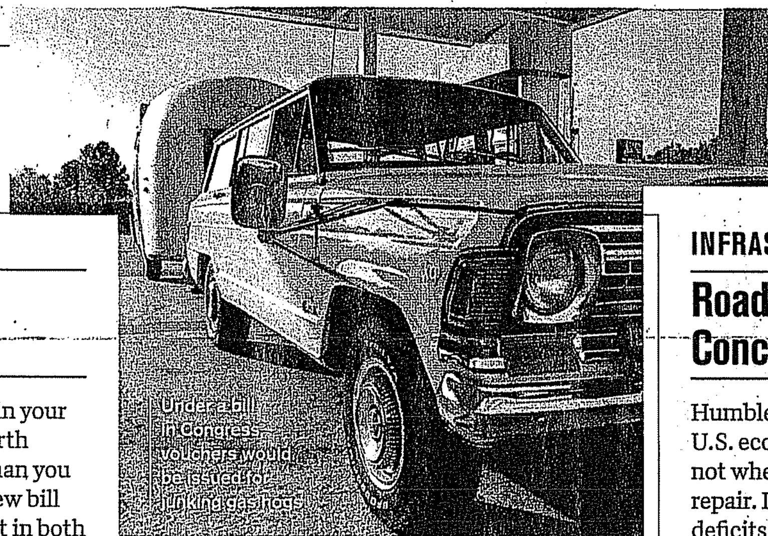
The Department of Energy's loan-guarantee scheme certainly has the potential to create a bonanza. The $6 billion budgeted should allow it to back loans worth $60 billion, assuming a default rate of around 10%, says an official. That, in turn, should prompt $120 billion in investments. This comes on top of $10 billion in loan guarantees for renewables initially authorised by the Energy Act of 2005, but not yet disbursed. Guarantees are also on offer for new nuclear plants and coal plants with low emissions.

The department says it aims to pick projects in as transparent and objective a manner as possible, and to concentrate on projects that were well advanced, but collapsed when finance dried up as a result of the credit crunch. But those, arguably, are the least in need of government support. And with such a lot of money to spend, the bureaucrats will need to cast their net quite widely.

In general, the emissions cuts picked by politicians are far more expensive than those chosen by the private sector. The study by the two institutes puts the cost of every tonne of emissions avoided thanks to the renewables provisions of the stimulus bill at somewhere between $69 and $137. PointCarbon, by contrast, estimates that the carbon price under the sort of cap-and-trade bill the president envisages will be roughly $13 a tonne.

Congress is unlikely to swallow the castor oil of cap-and-trade without such sweeteners, Washingtonians say. But the more lavish the subsidies, the more expensive cutting emissions becomes—and the harder for voters to stomach. ■

EDITED BY ADAM ASTON



Under a bill in Congress, vouchers would be issued for junking gas hogs

AUTOS

Bucks for Gas Guzzlers

The land yacht parked in your garage soon may be worth more at the junkyard than you guessed because of a new bill with bipartisan support in both houses of Congress. Its aim is to get the most inefficient vehicles off U.S. roads as quickly as possible. To qualify, cars, SUVs, and trucks must be registered, be drivable, and have been rated at 18 miles per gallon or less when new. Drive over to an authorized junkyard or auto dealer, and they'll hand you a voucher worth up to $4,500 and then have your guzzler crushed for scrap. The coupon could be redeemed for a new or used vehicle with fuel economy at least 25% better than today's CAFE target for the same vehicle category. The credits also could be used for transit fares.

The bill is similar to "cash for clunkers," the catchphrase for laws passed in California, Texas, and Canada that paid drivers to junk smoky older vehicles. By its fourth year, the cash-for-guzzlers plan would save up to 80,000 barrels of gas per day, estimates Therese Langer, transportation program director at the nonpartisan American Council for an Energy-Efficient Economy. Automakers largely support the bill, formally the Accelerated Retirement of Inefficient Vehicles Act, which may be folded into the stimulus bill. The bill does have its critics: mostly collectors of classic cars who fear shortages of spare parts.

ENERGY

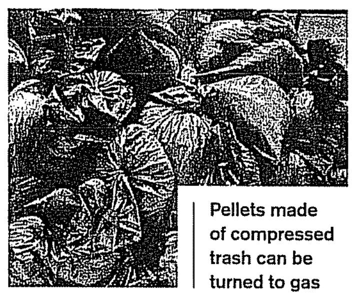
Dumpster Diving For Fuel

There's gold in those giant trash bins behind sports stadiums and office buildings. In January, IST Energy of Waltham, Mass., rolled out a mobile system that turns regular trash into energy. Each $850,000 Dumpster-sized unit will pay for itself in as little as three years, says IST, thanks to energy generated from the garbage and reduced waste-disposal fees.

90%

Weight reduction of trash when converted to energy by IST's system

Claims of this sort have been made before, but analysts say IST has brought some unique features to bear—most of all, mobility. It delivers its rigs right to the lot or loading bay near the trash source. Bags of garbage are fed into a hopper at one end. Inside, the rubbish is squeezed into pellets, which are converted to flammable gas that can run an on-site generator. The machine ingests up to three tons of trash daily, unleashing enough power and heat to run a 200,000-square-foot building for a day. The process isn't waste-free: A ton of trash yields about 100 pounds of ash. Burning the gas releases carbon dioxide, too. On the other hand, there's no need to burn fuel schlepping garbage to the dump. – *Heather Green*



Pellets made of compressed trash can be turned to gas

INFRASTRUCTURE

Roads: A Part-Concrete Solution

Humble asphalt keeps the U.S. economy rolling—but not when it sinks into disrepair. In recent years state deficits have squeezed transportation department budgets just as costly oil caused asphalt prices to more than double. As a result, thousands of miles of asphalt roads in the U.S. are disintegrating. PolyCon Manufacturing in Madison, Miss., says it has a less costly but durable road-resurfacing material that is also gentle on the environment. It's a hybrid called E-Krete that's part concrete and part flexible polymer. It can be applied as a thin liquid coating on top of aging blacktop. Experts who assessed E-Krete at the National Center for Asphalt Technology at Auburn University say the smooth surface left behind when the material flows over asphalt, filling in cracks and holes, can extend the life of a road or runway by 10 years or more. The covering appeals to green-building gurus, too, because it comes in pale hues that reflect sunlight rather than absorb its heat. No more "heat islands" in outdoor parking lots, which get so hot they drive up air-conditioning bills in nearby buildings.

E-Krete is easier on the environment than asphalt

(TOP) BRAD CORNELIUS; (BOTTOM) COTO ELIZONDO/GETTY IMAGES

BTW

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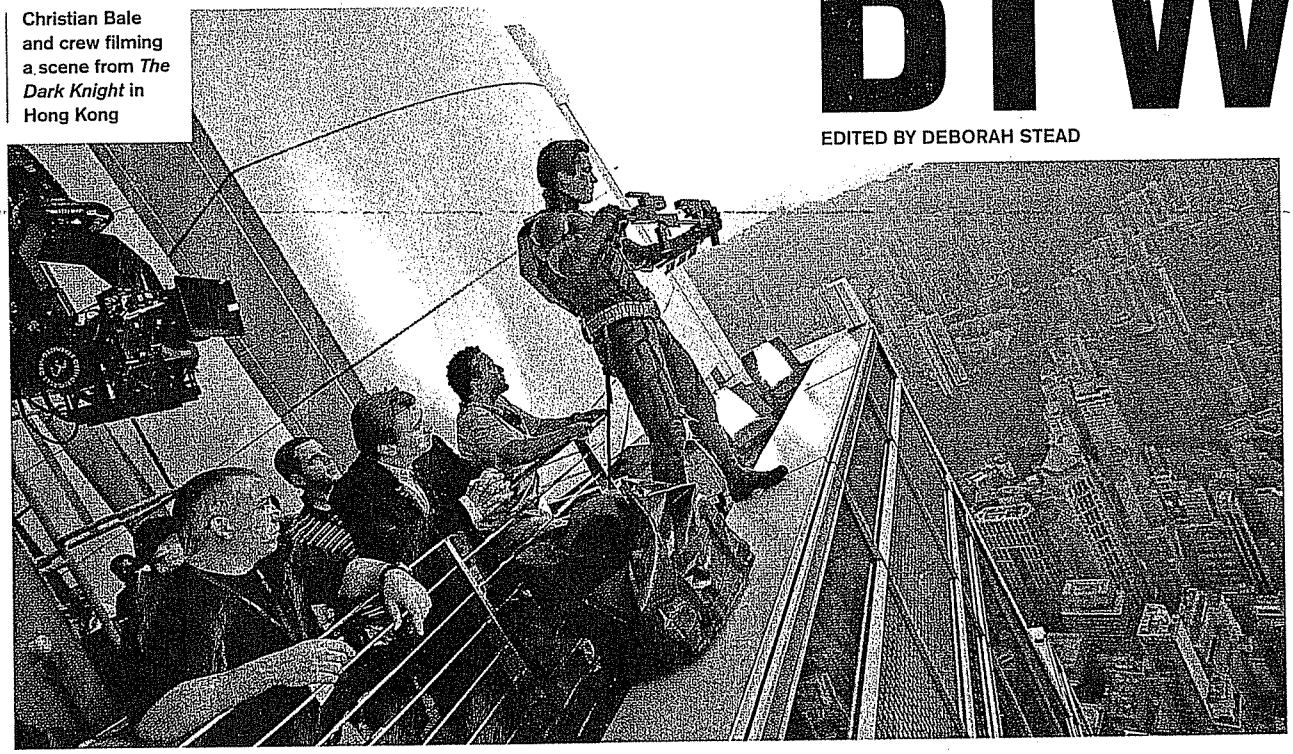

Christian Bale and crew filming a scene from *The Dark Knight* in Hong Kong

WARNER BROS/DC COMICS KOBAL COLLECTION

HOW GREEN WAS MY MOVIE?

It's a fair question, given Hollywood's obsession with hybrid cars and green politics. Like many celebrities, the people running the entertainment conglomerates, including News Corp.'s Rupert Murdoch, proclaim their efforts to go carbon-neutral and to recycle. But as they make films and TV shows, they're struggling to live up to their ideals. "They've taken the pledge," says Lauren Selman, an activist whose Reel Green Media works with producers. "But it's hard to get the word down the line from the guys at the top."

Big-budget flicks with locations around the globe make going green all the harder. Warner Bros.' *The Dark Knight* required jetting to shoots in Chicago, London, and Hong Kong. With 88 actors and about 900 crew members in Chicago in the spring of summer of 2007, the production consumed some $500,000 worth of gasoline and $1 million in building materials, including lots of lumber. Later, more than 50 people flew to Hong Kong for a scene that runs 15 minutes in the film. And because director Christopher Nolan wanted to make the most of Hong Kong's iconic skyline, the city's commercial property companies—and some of their tenants—left many of their lights burning into the night.

Other directors, too, spend energy to get the effects they want. In Marvel Studio's *Iron Man*, terrorists hold the hero (Robert Downey Jr.) in a cave. Director Jon Favreau wanted viewers to see Downey's breath, so his team chilled the set.

Studios are trying to change the way they operate. Marvel acknowledges cooling the *Iron Man* cave, but says it cut emissions in other ways. Warner slashed its annual energy bill by more than $1 million using solar and conservation and is building a soundstage from recycled materials. Walt Disney and NBC Universal say that, where possible, their productions rent only hybrid vehicles. Focus Features, which made *Away We Go*, Sam Mendes' next movie, says it recycled roughly 5,000 tons of the production's waste—food, utensils, scrap wood. While making its upcoming Ang Lee film, *Taking Woodstock*, Focus swapped about 15,000 plastic water bottles for refillable stainless steel containers. And the "Fox Green Guide" for producers has dozens of suggestions. Among them: using recycled cooking fat in generators, buying organic-cotton wardrobes, and distributing scripts digitally. Producer and green activist Gale Anne Hurd says the $150 million *Incredible Hulk* spent $100,000 on green practices like recycling. To offset their carbon output, studios also help fund wind farms or methane plants. These efforts aside, the moguls are still more likely to say "Make [the movie] for this amount, and don't take a day longer than necessary," says a producer. "I've never heard them say, 'Keep it green.'" *–Ronald Grover, Tom Lowry, and Frederik Balfour*

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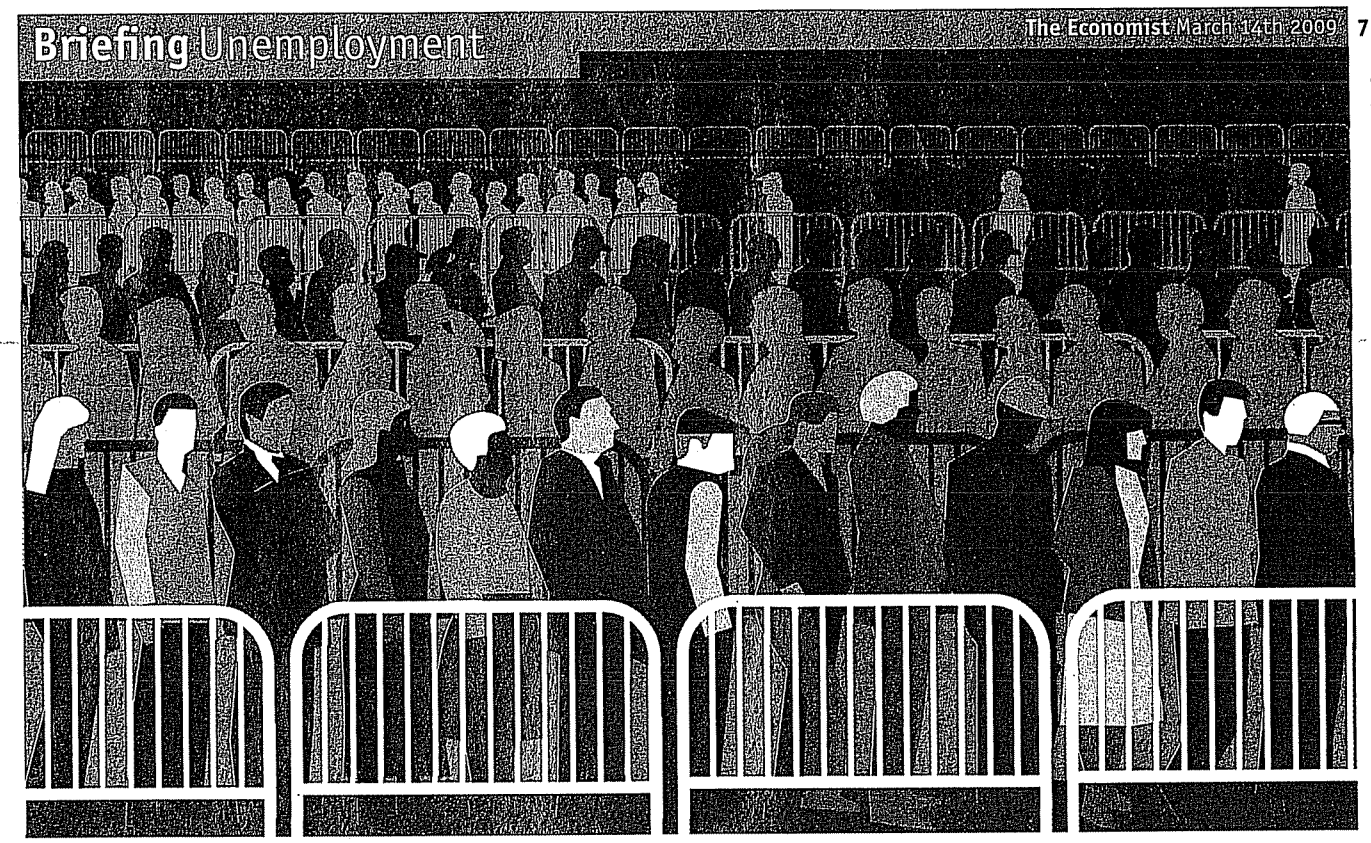
Tons of steel used in the production of Warner Bros.' *The Dark Knight.*

Data: Chicago Film Office



When jobs disappear

LONDON, TOKYO AND WASHINGTON, DC

The world economy faces the biggest rise in unemployment in decades. How governments react will shape labour markets for years to come

LAST month America's unemployment rate climbed to 8.1%, the highest in a quarter of a century. For those newly out of a job, the chances of finding another soon are the worst since records began 50 years ago. In China 20m migrant workers (maybe 3% of the labour force) have been laid off. Cambodia's textile industry, its main source of exports, has cut one worker in ten. In Spain the building bust has pushed the jobless rate up by two-thirds in a year, to 14.8% in January. And in Japan, where official unemployment used to be all but unknown, tens of thousands of people on temporary contracts are losing not just their jobs but also the housing provided by their employers.

The next phase of the world's economic downturn is taking shape: a global jobs crisis. Its contours are only just becoming clear, but the severity, breadth and likely length of the recession, together with changes in the structure of labour markets in both rich and emerging economies, suggest the world is about to undergo its biggest increase in unemployment for decades.

In the last three months of 2008 America's GDP slumped at an annualised rate of 6.2%. This quarter may not be much better. Output has shrunk even faster in countries dependent on exports (such as Germany, Japan and several emerging Asian economies) or foreign finance (notably central and eastern Europe). The IMF said this week that global output will probably fall for the first time since the second world war. The World Bank expects the fastest contraction of trade since the Depression.

An economic collapse on this scale is bound to hit jobs hard. In its latest quarterly survey Manpower, an employment-services firm, finds that in 23 of the 33 countries it covers, companies' hiring intentions are the weakest on record (see chart 1 on the next page). Because changes in unemployment lag behind those in output, jobless rates would rise further even if economies stopped contracting today. But there is little hope of that. And several features of this recession look especially harmful.

The credit crunch has exacerbated the impact of falling demand, pressing cash-strapped firms to cut costs more quickly. The asset bust and unwinding of debt that lie behind the recession mean that eventual recovery is likely to be too weak to create jobs rapidly. And when demand does revive, the composition of jobs will change. In a post-bubble world indebted consumers will save more and surplus economies, from China to Germany, will have to rely more on domestic spending. The booming industries of recent years, from construction to finance, will not bounce back. Millions of people, from Wall Street bankers to Chinese migrants, will need to find wholly different lines of work.

For now the damage is most obvious in America, where the recession began earlier than elsewhere (in December 2007, according to the National Bureau of Economic Research) and where the ease of hiring and firing means changes in the demand for workers show up quickly in employment rolls. The economy began to lose jobs in January 2008. At first the decline was fairly modest and largely confined to construction (thanks to the housing bust) and manufacturing (where employment has long been in decline). But since September it has accelerated and broadened. Of the 4.4m jobs lost since the recession began, 3.3m have gone in the past six months. Virtually every sector has been hit hard. Only education, government and health care added workers last month.

So far, the pattern of job losses in this recession resembles that of the early post-war downturns (starting in 1948, 1953 and 1957). Those recessions brought huge, but temporary, swings in employment, in an economy far more reliant on manufacturing than today's. As a share of the workforce, more jobs have been lost in this recession than in any since 1957. The pace at which people are losing their jobs, measured by the share of the workforce filing for weekly jobless claims, is much quicker ▸▸

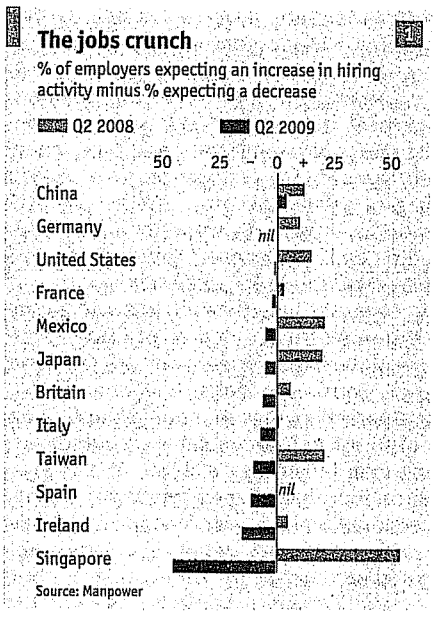
than in the downturns of 1990 and 2001 (see chart 2).

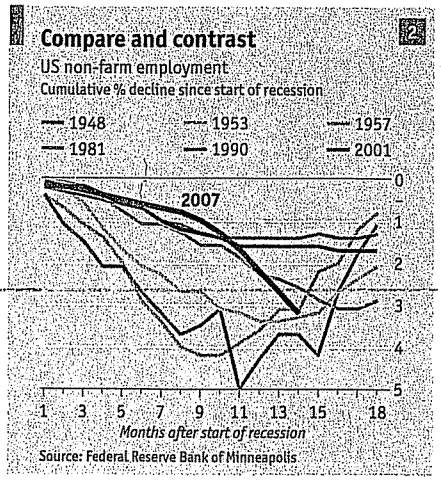
The worry, however, is that the hangover from excess debt and the housing bust will mean a slow revival—looking more like the jobless recoveries after the past two downturns than like the vigorous v-shaped rebounds from the early post-war recessions. Ominous signs are a sharp increase in permanent-job losses and a rise in the number of people out of work for six months or more to 1.9% of the labour force, near a post-war high.

Official forecasts can barely keep up. In its budget in February the Obama administration expected a jobless rate of 8.1% for the year. That figure was reached within the month. Many Wall Street seers think the rate will exceed 10% by 2010 and may surpass the post-1945 peak of 10.8%. Past banking crises indicate an even gloomier prognosis. A study by Carmen Reinhart of the University of Maryland and Ken Rogoff of Harvard University suggests that the unemployment rate rose by an average of seven percentage points after other big post-war banking busts. That implies a rate for America of around 12%.

Moreover, the official jobless rate understates the amount of slack by more than in previous downturns. Many companies are cutting hours to reduce costs. At 33.3 hours, the average working week is the shortest since at least 1964. Unpaid leave is becoming more common, and not only at the cyclical manufacturing firms where it is established practice. A recent survey by Watson Wyatt, a firm of consultants, finds that almost one employer in ten intends to shorten the work week in coming months. Compulsory unpaid leave is planned by 6% of firms. Another 9% will have voluntary leave.

Europe's jobs markets look less dire, for now. That is partly because the recession began later there, partly because joblessness had been unusually low by European standards and partly because Europe's less flexible labour markets react more slowly than America's. The euro area's unemployment rate was 8.2% in January, up from 7.2% a year before. That of the whole European Union was 7.6%, up from 6.8%. For the first time in years American and European jobless rates are roughly in line (see chart 3 on the next page).





Within the EU there are big variations. Ireland and Spain, where construction boomed and then subsided most dramatically, have already seen heavy job losses. Almost 30% of Ireland's job growth in the first half of this decade came from the building trade. Its unemployment rate has almost doubled in the past year. In Britain, another post-property-bubble economy, the rate is also rising markedly. At the end of last year 6.3% of workers were jobless, up from 5.2% the year before. Figures due on March 18th are likely to show unemployment above 2m for the first time in more than a decade.

In continental Europe's biggest economies, the consequences for jobs of shrivelling output are only just becoming visible. Although output in Germany fell at an annualised rate of 7% in the last quarter of 2008, unemployment has been only inching up. The rate is still lower than it was a year ago. Even so, no one doubts the direction in which joblessness is heading. In January the European Commission forecast the EU's jobless rate to rise to 9.5% in 2010. As in America, many private-sector economists expect 10% or more.

Structural changes in Europe's labour markets suggest that jobs will go faster than in previous downturns. Temporary contracts have proliferated in many countries, as a way around the expense and difficulty of firing permanent workers. Much of the reduction in European unemployment earlier this decade was due to the rapid growth of these contracts. Now the process is going into reverse. In Spain, Europe's most extreme example of a "dual" labour market, all the job loss of the past year has been borne by temps. In France employment on temporary contracts has fallen by a fifth. Permanent jobs have so far been barely touched.

Although the profusion of temporary contracts has brought greater flexibility, it has laid the burden of adjustment disproportionately on the low-skilled, the young and immigrants. The rising share of immigrants in Europe's workforce also makes the likely path of unemployment less certain. As Samuel Bentolila, an economist at CEMFI, a Spanish graduate school, points out, the jump in Spain's jobless rate is not due to fewer jobs alone. Thanks to continued immigration, the labour force is still growing apace. In Britain, in contrast, hundreds of thousands of migrant Polish workers are reckoned to have gone home.

Despite having few immigrants, Japan is also showing the strains of a dual labour market. Indeed, its workforce is more starkly divided than that of any other industrial country. "Regular" workers enjoy strong protection; the floating army of temporary, contract and part-time staff have almost none. Since the 1990s, the "lost decade", firms have relied increasingly on these irregulars, who now account for one-third of all workers, up from 20% in 1990.

As Japanese industry has collapsed, almost all the jobs shed have been theirs. Most are ineligible for unemployment assistance. A labour-ministry official estimates that a third of the 160,000 who have lost work in recent months have lost their homes as well, sometimes with only a few days' notice. Earlier this year several hundred homeless temporary workers set up a tent village in Hibiya Park in central Tokyo, across from the labour ministry and a few blocks from the Imperial Palace. Worse lies ahead. Overall unemployment, now 4.1%, is widely expected to surpass the post-war peak of 5.8% within the year. In Japan too, some economists talk of double digits.

In emerging economies the scale of the problem is much harder to gauge. Anecdotal evidence abounds of falling employment, particularly in construction, mining and export-oriented manufacturing. But official figures on both job losses and unemployment rates are squishier. Estimates from the International Labour Organisation suggest the number of people unemployed in emerging economies rose by 8m in 2008 to 158m, an overall jobless rate of around 5.9%. In a recent report the ILO projected several scenarios for 2009. Its gloomiest suggested there could be an additional 32m jobless in the emerging world this year. That estimate now seems all too plausible. Millions will return from formal employment to the informal sector and from cities to rural areas. According to the World Bank, another 53m people will be pushed into extreme poverty in 2009.

History implies that high unemploy- ▸▸

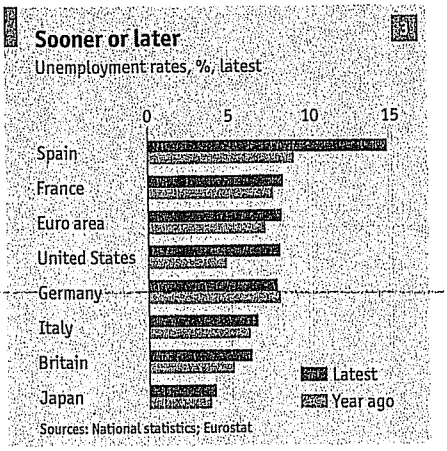
ment is not just an economic problem but also a political tinderbox. Weak labour markets risk fanning xenophobia, particularly in Europe, where this is the first downturn since immigration soared. China's leadership is terrified by the prospect of social unrest from rising joblessness, particularly among the urban elite.

Given these dangers, politicians will not sit still as jobs disappear. Their most important defence is to boost demand. All the main rich economies and most big emerging ones have announced fiscal stimulus packages.

Since most emerging economies lack broad unemployment insurance, the main way they help the jobless is through labour-intensive government infrastructure projects as well as conditional cash transfers for the poorest. China's fiscal boost includes plenty of money for infrastructure; India is accelerating projects worth 0.7% of GDP. However, a few emerging economies have more creative unemployment-insurance schemes than anything in the rich world. In Chile and Colombia formal-sector workers pay into individual unemployment accounts, on which they can draw if they lose their jobs. Many more countries have created prefunded pension systems based on individual accounts. Robert Holzmann of the World Bank thinks people should be allowed to borrow from such accounts while unemployed. Several countries are considering the idea.

In developed countries, governments' past responses to high unemployment have had lasting and sometimes harmful effects. When joblessness rose after the 1970s oil shocks, Europe's governments, pressed by strong trade unions, kept labour markets rigid and tried to cut dole queues by encouraging early retirement. Coupled with generous welfare benefits this resulted in decades of high "structural" unemployment and a huge rise in the share of people without work. In America, where the social safety net was flimsier, there were far fewer regulatory rigidities and people were more willing to move, so workers responded more flexibly to structural shifts. Less than six years after hitting 10.8%, the post-war record, in 1982, America's jobless rate was close to 5%.

Policy in America still leans towards keeping benefits low and markets flexible rather than easing the pain of unemployment. Benefits for the jobless are, if anything, skimpier than in the 1970s. Unemployment insurance is funded jointly by states and the federal government. The states set the eligibility criteria and in many cases have not kept up with changes in the composition of the workforce. In 32 states, for instance, part-time workers are ineligible for benefits. All told, fewer than half of America's unemployed receive assistance. The benefits they get also vary a lot from state to state, but overall are among the lowest in the OECD when compared with the average wage.



America's recent stimulus package strengthened this safety net. Jobless benefits have increased modestly, their maximum duration has been extended, and states have been given a large financial incentive to broaden eligibility. The package also includes temporary subsidies to help pay for laid-off workers' health insurance. Even so, benefits remain meagre.

Housing is a far bigger drag on American job mobility. Almost a fifth of American households with mortgages owe more than their house is worth, and house prices are set to fall further. "Negative equity" can lock in homeowners, making it hard to move to a new job. A recent study suggests that homeowners with negative equity are 50% less mobile than others.

Europe's governments, at least so far, are trying hard to avoid the mistakes of the 1970s and 1980s. As Stefano Scarpetta of the OECD points out, today's policies are designed to keep people working rather than to encourage them to leave the labour force. Several countries, from Spain to Sweden, have temporarily cut social insurance contributions to reduce labour costs.

A broader group including Austria, Denmark, France, Germany, Hungary, Italy and Spain, are encouraging firms to shorten work weeks rather than lay people off, by topping up the pay of workers on short hours. Germany, for instance, has long had a scheme that covers 60% of the gap between shorter hours and a full-time wage for up to six months. The government recently simplified the required paperwork, cut social-insurance contributions for affected workers, and extended the scheme's maximum length to 18 months.

Britain has taken a different tack. Rather than intervening to keep people in their existing jobs, it has focused on deterring long-term joblessness with a package of subsidies to encourage employers to hire, and train, people who have been out of work for more than six months.

Of all rich-country governments, Japan's has flailed the most. Forced to confront the ugly reality of its labour market, it is trying a mixture of policies. Last year it proposed tax incentives for companies to turn temps into regular employees—a futile effort when profits are scarce and jobs being slashed. The agriculture ministry suggested sending the jobless to the hinterland to work on farms and fisheries. As Naohiro Yashiro, an economist at the International Christian University in Tokyo, puts it: "Although temporary and part-time workers are everywhere in Japan, they are thought to be a threat to employment practices and—like terrorists—have to be contained."

Recently, a more ambitious strategy has emerged. The government is considering shortening the minimum work period for eligibility to jobless benefits. It is providing newly laid-off workers with six-month loans for housing and living expenses. It is paying small-business owners to allow fired staff to remain in company dorms. It is subsidising the salaries of workers on mandatory leave. It is paying firms for re-hiring laid-off staff, and offering grants to anyone willing to start a new business.

Whether these policies will be enough depends on how the downturn progresses. For by and large they are sticking-plasters, applied in the hope that the recession will soon be over and the industrial restructuring that follows will be modest. Subsidising shorter working weeks, for instance, props up demand today, but impedes long-term reordering. The inequities of a dual labour market will become more glaring the higher unemployment rises. Politicians seem to be hoping for the best. Given the speed at which their economies are deteriorating, they would do better to plan for the worst. ■