

RFF and the Gulf Oil Spill

The offshore oil spill in the Gulf of Mexico has brought oil-related energy, liability, natural resource damages, and regulatory issues to the forefront of public policy discourse. RFF has a strong legacy of research and public events on these topics that can provide context for the ongoing crisis and for the analysis of policy implications that will no doubt be debated for many years. You can turn to www.rff.org/2010-Gulf-Coast-Oil-Spill for more on our work in these areas.

Who is liable for cleanup and damages? How much should they pay?

RFF researchers have previously written about the role of liability rules in preventing environmental harm, including such diverse areas as toxic pollution, hazardous wastes, underground storage tanks, nuclear power, commercial space exploration, and oil spills. On oil spills, **Mark Cohen**, the vice president for research, has examined optimal liability rules and enforcement policy to prevent oil spills. He subsequently published research analyzing how the courts have treated firms held liable for causing environmental harms such as oil spills. **James Boyd**, a senior fellow, has written about liability rules and the role of financial responsibility requirements. More recently, **Nathan Richardson**, a visiting scholar, has reviewed the relevant environmental laws to determine the liability rules

President Barack Obama, LaFourche Parish president Charlotte Randolph, right, and U.S. Coast Guard Admiral Thad Allen, national incident commander for the BP Deepwater Horizon oil spill, look at booms laid out to collect oil.

most likely facing BP and other firms involved in the current oil spill crisis.

What should the government's policy be toward offshore drilling?

Following the Gulf oil spill, the president ordered a moratorium on deepwater oil drilling off the U.S. coast. What impact would a permanent ban on offshore drilling have on the price of oil or our nation's energy security? What if the government were to impose new regulatory standards that raised the cost of drilling for oil by 10 to 20 percent? **Stephen Brown**, a non-resident fellow, has studied these issues and reports on the impact of an offshore drilling moratorium or an increase in regulatory costs.

Natural Resource Damages in Oil Spills

Many RFF Fellows have worked on developing methodologies and assessing natural resource

damages. During the Exxon Valdez spill, **Raymond Kopp**, a senior fellow, was part of a team that evaluated the public's willingness-to-pay to avoid wildlife destruction in the Alaskan spill. Jim Boyd has written extensively on natural resource damages in a marine context, including a recent paper explaining the concept of lost ecological wealth and its relevance to natural resource damages. He shows how the Gulf Coast oil spill could change the way in which ecosystem damages are estimated going forward.

How do we take into account catastrophic risk in assessing the costs and benefits of offshore drilling?

As policymakers begin to reassess how catastrophic risk is accounted for in regulatory policy, RFF's expertise in this subject may be particularly useful. **Roger Cooke**, the Chauncey Starr Senior Fellow, is an expert on uncertainty and risk analysis and has written on such diverse topics as health risks from oil fires in Kuwait following the first Gulf War, chemical weapons disposal, nuclear risk, etc. **Carolyn Kousky**, an RFF fellow, is an expert on natural resource management and decisionmaking under uncertainty and has studied how both individuals and policymakers respond to changes in extreme events. Both of these researchers together have recently analyzed the extent to which extreme catastrophic events can be predicted and insured against. ■



AP PHOTO/EVAN VUCCI

RFF President Phil Sharp and Scholar Robert Fri on the Energy Policy Challenges that Lie Ahead

In late April, RFF President Phil Sharp and Visiting Scholar and former RFF President Robert Fri testified before the Energy and Water Development Subcommittee of the U.S. Senate Committee on Appropriations, part of a panel that included Energy Secretary Steven Chu. Chairman Byron Dorgan (D-ND) called the hearing as part of an effort, "to take a broader look at our energy future and address the incrementalism that is part of the policy process."

In their separate remarks, Sharp and Fri addressed lessons to be learned from 40 years of energy policy.

"We are now grappling with how we should change and indeed, transform, our energy system to deal with global warming over decades ahead," Sharp said. "Significantly cutting emissions of greenhouse gases is a daunting challenge—global in scope, reaching deep into our economy, and requiring a long-term focus."

In the United States and elsewhere, major public and private efforts are underway to change the way we produce and use energy, Sharp said. Many incentives have been put in place to advance energy efficiency, renewables, and lower-carbon fuels, and to develop potentially critical technologies such as carbon capture and storage and advanced nuclear reactors.

"The hard challenge is to design a policy framework or architecture that will hold up over many years and change our economy in the most cost-effective way," Sharp said.

"We appear to have a choice between two broad strategies: put a rising price on carbon or regulate emitters of carbon under the current provisions of the Clean Air Act. Pricing



RFF President Phil Sharp (left), and Visiting Scholar and former RFF President Robert Fri.

carbon, of course, can be accomplished either by adopting a tax that rises over time or adopting a cap on emissions with allowance trading—or some combination of the two. Either strategy—pricing carbon or regulating emitters—can put us on a path to cut emissions; both will spur some level of technological innovation."

Most economists and many policy analysts, however, believe the pricing option is superior in terms of finding the least-costly emissions reductions and providing incentives for continuous technological innovation.

"Of course, in judging either strategy it is critical to know the details where the devil and angels reside," Sharp said. "In pursuing such a long-term challenge requiring persistent policy, there are a few, perhaps obvious, lessons from our previous experience:

- We should pursue a portfolio of fuels and technologies—indeed, a portfolio of policies. Do not put all your eggs in one basket, as the saying goes.

- We should periodically conduct major assessments of the effectiveness of our policies—perhaps every four to five years. Such evaluation should not only be done inside the government, but also independently of the government. Congressional committees, naturally, will need to continue their critical oversight role.

- And, whenever possible in policymaking, we should capitalize on the dynamism competitive markets can provide in meeting our policy goals."

Driving Change in the Private Sector

"Unless the nation responds aggressively to the challenges of energy security and climate change, the energy system of the future will look very much like the one of today," Fri said. It will be cleaner as environmental regulations continue to tighten and increasingly efficient as old capital stock turns over. Electricity will continue to be produced mostly by burning fossil fuels and most light-duty vehicles will continue to rely on gasoline.

"But more of the same is not destiny," Fri said, outlining four strategies that would help government policy spur technological change in the private sector:

Align private incentives with public goals.

Both price signals and regulation can provide the necessary incentive to drive innovation: the former is usually more directly linked to the desired outcome (pricing carbon directly affects carbon dioxide production, for example) and the latter can also have a potent effect as has been the case with refrigerator

efficiency and light-duty vehicles. But the danger of unintended side effects must be considered: the efficiency standard for light-duty vehicles substantially reduced fuel-consumption but it also helped induce a vast market for unregulated trucks posing as sports utility vehicles.

Fund purpose-driven basic research. Basic research will be essential for creating an energy system that is affordable and effective but it must be plausibly connected to desired outcomes. One way would be to focus on fundamental changes in our energy options, such as artificial photosynthesis, which could revolutionize the capture and storage of solar energy. Another would be to encourage experts from diverse disciplines, such as nanotechnology and genomic engineering, to converge on a problem.

Focus applied research to overcoming well-defined market barriers. Unlike basic research, the Department of Energy's applied research programs cover fairly well-defined technologies, which in some cases have a reasonable chance of market success if they meet attainable technical and commercial goals. Market barriers could be a risk that an innovator is unwilling to accept, such as demonstration of carbon capture and storage, or a problem of market structure, as is often the case in adopting energy efficiency measures.

Invest with great care in technologies that do not yet have markets. In the past, government energy programs have invested heavily in technologies that were not competitive at the time but seen as needed in the future to meet public policy goals. Unfortunately, such programs usually don't work out very well. The market turns out not to materialize, or if it does, addresses the problem in ways that were not foreseen. The crash of oil prices in the 1980s—not the synthetic fuels program—solved the looming oil crisis of the 1970s. "This is not to say, of course, that government should never invest in insurance policies, only that it should do so with its eyes open," Fri said. ■

New Academic Talent Augments RFF Research Agenda

As RFF expands and focuses its research horizons on emerging policy areas, it has concentrated on recruiting notable academicians to fill key senior-level roles. That effort has attracted five leading scholars who are steeped in policy experience drawn from their work in academia as well as government.

The newest additions to the research staff will augment RFF work in a variety of disciplines, including ecosystem management, energy efficiency, solar power, fuel economy, food and drug safety, land and water conservation, urban congestion, and mass transit.

Researchers joining RFF so far in 2010 include Fellows Joshua Linn and Lucija Muehlenbachs, Visiting Scholars Randall Lutter and P. Lynn Scarlett, and Nonresident Fellow Kenneth Small.

"We are delighted that these outstanding individuals are part of the RFF family," said President Phil Sharp. "Their backgrounds and perspectives will further solidify our reputation for sound and serious research."

Vice President for Research Mark Cohen added that "the range of academic and policy experience that these new researchers bring to RFF will be enormous assets to our policy research."



JOSHUA LINN



RANDALL LUTTER

Joshua Linn

Linn's research focuses on corporate responses to environmental regulation and market incentives. Several of his studies have investigated the effect of the Corporate Average Fuel Economy standards on new vehicle characteristics and the effects of different regulatory instruments on technology adoption in the electric power sector. In research on the manufacturing sector and new vehicle markets, Linn has empirically studied the effect of prices on energy efficiency and new vehicle fuel economy. He has published in leading general interest and field journals in environmental, energy, and health economics.

Linn joined RFF as a fellow in March 2010. Previously, he was an assistant professor in the Economics Department at the University of Illinois at Chicago and a visiting research scientist at MIT, where he served as the executive director of the MIT Study of the Future of Solar Energy.

Randall Lutter

Lutter, a former chief economist and deputy commissioner for policy at the U.S. Food and

Drug Administration (FDA), joined RFF as a visiting scholar on May 1. His research will focus on the economics of selected regulatory issues related to risk, including food

safety and the environment.

During his tenure at FDA, Lutter oversaw policies on a variety of public health concerns, ranging from pandemic flu countermeasures to the risks of imported and counterfeit drugs, and from nanotechnology to genetically engineered animals. He also changed the management of FDA's advisory committees to improve transparency and predictability.

Before joining FDA in 2003, Lutter was a resident scholar with the American Enterprise Institute and a fellow with the AEI-Brookings

Joint Center for Regulatory Studies. From 1991 to 1997, he served at the Office of Management and Budget in the Office of Information and Regulatory Affairs, and from 1997 to 1998 he was senior economist for regulation and the environment at the President's Council of Economic Advisers.

Lutter coedited the 2004 RFF Press book, *Painting the White House Green: Rationalizing Environmental Policy Inside the Executive Office of the President*, which examined the

public disclosure of environmental violations, and oil and gas activity on First Nation reserve lands.

P. Lynn Scarlett

Scarlett, deputy secretary and chief operating officer at the U.S. Department of the Interior from 2005 to 2009, has joined RFF as a visiting scholar, focusing on climate change and its effects on land, water, and wildlife; conservation

Plan. She serves on the boards of the American Hiking Society, the Continental Divide Trail Alliance, and RESOLVE, and is a trustee emeritus of the Udall Foundation.

Scarlett received her B.A. and M.A. in political science from the University of California, Santa Barbara, where she also completed doctoral coursework and exams in political science.

Kenneth A. Small

Small, research professor and professor emeritus of economics at the University of California at Irvine, is RFF's newest nonresident fellow. He specializes in urban, transportation, and environmental economics, with recent research covering urban highway congestion, measurement of value of time and reliability, effects of fuel efficiency standards, public transit pricing, and fuel taxes.

Previously, Small was associate editor of *Transportation Research Part B—Methodological*, and he remains on the editorial boards of that and four other professional journals. He was also North American coeditor of the international journal *Urban Studies*. Small has served on several study committees of the National Research Council, examining cost-benefit analysis and the federal program on congestion management and air quality. His book, *Urban Transportation Economics*, was recently updated in a new edition (*Economics of Urban Transportation*), which has become a widely cited standard reference in the field.

Small was honored in 1999 with the distinguished member award by the Transport & Public Utilities Group of the American Economic Association, and in 2004 with the distinguished transportation research award by the Transportation Research Forum. He has advised many public and private groups including the Canadian Royal Commission on National Passenger Transportation, the European Union, the South Coast Air Quality Management District, the World Bank, and the California Air Resources Board. ■



LUCIJA ANNA MUEHLENBACHS



P. LYNN SCARLETT



KENNETH A. SMALL

interface between economics and environmental policymaking at the top levels of the federal government.

He received his B.A. in economics from the University of California at Berkeley and his M.A. and Ph.D. in economics from Cornell University.

Lucija Anna Muehlenbachs

Muehlenbachs, who joined RFF as a fellow on July 1, will pursue research on energy-related topics as part of the Center for Energy Economics and Policy. A 2002 graduate of the University of Alberta, Muehlenbachs received her Ph.D. in agricultural and resource economics in 2009 at the University of Maryland.

Muehlenbachs has used computational methods to study issues in the oil and gas industry. She has experience in structural estimation of dynamic programming models, and has estimated conventional oil and gas extraction costs as well as the probability of change in recoverable reserves, production, and prices. Her current research interests lie in financial assurance of environmental liability,

policies; and ecosystem adaptation strategies. Her research will explore the nexus of science and policy, the challenges of large landscape conservation, and the opportunities of using natural landscapes to benefit communities.

From 1982 through 2001, Scarlett held a variety of positions at the Los Angeles-based Reason Foundation, a nonpartisan public policy organization. She served briefly as president of the organization in 2001 before being appointed to the Interior Department.

After leaving government, she was named the Zurich Financial Services Distinguished Visiting Lecturer on Climate Change at the Bren School of Environmental Science and Management at the University of California, Santa Barbara. She also has been an independent consultant with the Environmental Defense Fund on issues pertaining to climate, ecosystem services, and stewardship of open lands.

She is a member of the Commission on Climate and Tropical Forests, and from 2003 to 2004, she chaired the Wildland Fire Leadership Council, an interagency, intergovernmental forum for implementing the National Fire

RFF Receives Prestigious Award from FEEM

Resources for the Future was awarded the FEEM 20th Anniversary Prize in Environmental Economics at the Fourth World Congress of Environmental and Resource Economists held in June in Montreal, Canada.

FEEM (Fondazione Eni Enrico Mattei) is a nonpartisan research institution headquartered in Italy that is devoted to the study of sustainable development and objective analysis on a wide range of environmental, energy, and global economic issues. The prize celebrates the 20th anniversary of FEEM's founding in 1989. Corecipient of the prize is Martin L. Weitzman, professor of economics at Harvard University. The prizes bestow a monetary award of €10,000 to each awardee.

In awarding the prize, judges of the international competition, considering more than 90 nominations, said:

"It is difficult to think of any group of economists who have had more impact in environmental economics, particularly in terms of its extension to actual policymaking, than Resources for the Future. RFF has probably incubated more research and made more advances than any other organization by getting researchers started on careers, by supporting a distinguished staff of senior researchers, and by providing infrastructure for the profession in general.

Acknowledged as the organization that got environmental and resource economics off the ground in the '50s and '60s, RFF remains highly influential and productive in the field of research, and continues as a leader in effective interface with the policy process and in capac-

ity building. Particularly in the United States, RFF invented the field as a serious contributor to policy choices and key driver of market-based environmental policy.

RFF has pioneered the application of economics as a tool to develop more effective policy about the use and conservation of natural resources. Its scholars continue to analyze critical issues concerning pollution control, energy and transportation policy, land and water use, hazardous waste, climate change, biodiversity, ecosystem management, public health, and the environmental challenges of developing countries."

In accepting the award, RFF President Phil Sharp expressed the institution's deep gratitude and emphasized the important role that resource and environmental economics plays in helping address global challenges. RFF will use its share of the prize to support further research and continue its tradition of objective analysis.

Following the award presentation, Richard Schmalensee, a member of the RFF Board of Directors and former dean of the Sloan School at MIT, gave the session's keynote speech on the structure and merits of various renewable energy policy options. ■

RFF Also Awarded for GIS Work

The Environmental Systems Research Institute (ESRI) presented RFF with a Special Achievement in GIS award earlier this month for our work on the Global Adaptation Atlas. The award is bestowed upon 100 organizations worldwide and signals innovative use of mapping technology and principles to improve decision and policymaking. Nominations are made by ESRI staff and partners, and personally reviewed and selected by ESRI's president, Jack Dangermond. ■

Status Report on Biofuels: Progress, but It's Getting Harder

J.W. Anderson

In light of the massive oil spill in the Gulf of Mexico, there's a rising urgency to the search for alternative fuels. Among the most prominent prospects are biofuels manufactured from renewable feedstocks. But while the first phase of substituting biofuels for gasoline has been successful, further progress will require solutions to daunting challenges.

Ethanol, the most common of the biofuels, has now replaced almost 7 percent of the country's gasoline consumption. But nearly all of this ethanol is made from corn, which raises a couple of important concerns. The first is that the enormous new demand for corn is having an impact on world food and feed markets—tolerable so far, perhaps, but not a trend that wise public policy would push much further. Second, the process of making and consuming corn ethanol produces volumes of climate-changing greenhouse gases that, per unit of energy, are not much lower than those generated by gasoline.

Congress has worked for years to advance biofuels, with the enthusiastic support of the farm lobbies. Responding to the objections about the increasing use of corn ethanol, Congress, in the Energy Independence and Security Act (EISA) of 2007, imposed an intricate set of mandates intended to force the ethanol industry to shift to sources that would not threaten food price increases and would produce less greenhouse gas emissions.

Under these mandates, refiners are required to blend 12.95 billion gallons of biofuel into the gasoline supply in 2010. (Current consumption of gasoline plus ethanol is running around 136 billion gallons a year.) Ethanol

production is currently approaching 13 billion gallons a year. So far, so good.

But the EISA also mandates a proportion of ethanol, rising rapidly over the years, to be made from sources other than corn. That's where the trouble arises. The mandate for 2010 originally required 950 million gallons of "advanced" renewable fuel—that is, not made from corn and resulting in much lower greenhouse emissions—of which 100 million gallons was to be, specifically, cellulosic. Production of advanced renewables is rising, but earlier this year the U.S. Environmental Protection Agency reduced the mandate for cellulosic fuel from 100 million gallons to 6.5 million gallons because there was no way to meet the original requirement. For 2011, the statute calls for 250 million gallons of cellulosic fuel but in July, the agency proposed to lower the figure to somewhere between 5 million and 17.1 million gallons, depending on what the market appears capable of producing later in the year.

In a survey of the prospects for biofuels published last May, the U.S. Department of Agriculture's Economic Research Service estimated that production capacity for cellulosic biofuel will rise to about 200 million gallons by 2012, although actual production will be lower because some of the plants will be experimental or demonstration facilities not designed for continuous production. The statutory mandate for 2012 is 500 million gallons.

Congress has previously used mandates in environmental legislation to force technology forward, and the tactic has had some notable successes. But in the case of cellulosic biofuels, once seen as the solution to the threat to the food supply, the technology of large-scale production is coming along a good deal less rapidly than its proponents had hoped.

A Chicken-and-Egg Dilemma

The shift to greater reliance on biofuels is also inhibited by a separate challenge that the industry calls the "blend wall." Ethanol is more corrosive than gasoline, and most American cars are not designed to use fuel that contains more than a small fraction of ethanol. Currently, most American gasoline contains 10 percent ethanol,

as the signs on the pumps tell us. Whether our cars can handle higher percentages is a matter of some controversy and may become an issue in the months ahead. But at present, unless you have one of the small minority of flex-fuel vehicles, you will risk voiding the warranty on your car if you use fuel that is more than one-tenth ethanol.

It's another example of the chicken-and-egg dilemmas that bedevil the shift away from

It's a chicken-and-egg-dilemma. Until there are more flex-fuel cars on the road, refiners have no reason to produce high-ethanol fuels. And until the fuels are widely available, car buyers have little incentive to buy flex-fuel cars.

fossil fuels. Until there are more flex-fuel cars on the road, refiners have no reason to produce high-ethanol fuels. And until the fuels are widely available, car buyers have little incentive to buy flex-fuel cars. Because it involves consumers' habits and the inertia of America's vast highway transportation system, the blend wall may be harder to overcome than the engineering difficulties of biofuels production.

To encourage the transition to biofuels, Congress has constructed over the years a substantial structure of subsidies and protection. The most important of the subsidies is a tax credit of 45 cents a gallon of ethanol blended with gasoline.

You may wonder why Congress is subsidizing a product the consumption of which it has mandated by law. That subsidy currently costs more than \$5 billion a year and, if the ethanol program stays on schedule, the cost will triple over the next 12 years—a conspicuous target in a time of severe budget-cutting.

Domestic producers are also protected by a tariff of 54 cents per gallon of ethanol, plus an *ad valorem* tax of 2.5 percent. That's to keep out, primarily, Brazilian ethanol made from sugarcane. It is much cheaper to produce than American corn-based ethanol, yields more power per acre of crop, and generates much less greenhouse gas emissions in the cycle of production and consumption.

And beyond the subsidy and tariff issues lie broader questions about the value of the whole ethanol program. Let's make the optimistic assumption that, by vigorous public action such as tightening vehicle fuel standards, the United States can hold automobile fuel consumption to its present level despite growth of the population and the economy. In 2022, the mandated 36 billion gallons a year of ethanol would represent about a quarter of automobile fuel consumption by volume. Because a gallon of ethanol contains only two-thirds as much energy as a gallon of gasoline, it would replace about 18 percent of petroleum-based gasoline consumption compared with nearly 7 percent today.

That raises the question whether that modest reduction in oil consumption is worth the effort of adapting the highway fuel system to ethanol over the next 12 years. The larger question is whether Congress is wise to try to predict technological breakthroughs, and to steer markets toward them.

What about the tariff and the subsidy? The debate over those will come to a resolution later this year, for under present law they will expire on December 31. The case for them is weak. Energy security is improved by diversifying supply, not by economic isolationism. And the cost of the shift to ethanol is most fairly carried by the people who drive cars, not by the taxpayers. ■

A Resource War Resurgence?

Divining Facts and Fears in China's Energy Strategy

Joel Darmstadter

Quite apart from periodic concerns about resource scarcity that can drive up worldwide prices but are available for those able to pay, anxiety about the—literally physical—lack of critical natural resource supplies has intermittently been part of one or another nation's strategic concerns. The most recent example that has made the headlines, for reasons that aren't entirely clear, concerns China's ongoing shopping spree for energy resources.

To set the context for what's now going on in China, let's pause for a quick history lesson. Past examples of resource shortages invariably include Germany's situation during World War II, when the country's only source of petroleum—critical to its military needs—was Romania. But, with that country the target of Allied bombing, adequacy of German oil supplies depended critically on liquefaction of its abundant coal resources. Similarly, in the post-World War II years, apartheid South Africa employed advanced coal-liquefaction technology to guard against the threat of embargoed foreign oil deliveries.

In the United States, Cold War rivalry and tensions that followed the critical materials challenges of World War II prompted new fears of resource supply shortages at the highest levels and, in turn, establishment of the Paley Commission (so called after its chairman, William Paley). The commission's comprehensive five-volume effort (*Resources for Freedom: Report to the President by the President's Materials Policy Commission, 1952*) took a somber look at the "worsening relationship between our requirements and our means of

satisfying them," concluding, at the end of its work, with the chastening statement that "The evidence brought together in this report points to the breadth, depth, and complexity of the materials problem that confronts the United States and other free nations." (In turn, the commission's findings helped lead to RFF's establishment nearly 60 years ago.)

Since the Cold War did not metamorphose into the shooting kind, but also because of the robustness and efficiency of international resource trade and markets, the last six decades have, almost uninterrupted and largely successfully, warded off any serious disruption in the flow of world resources. Even the at-

tempted Arab oil embargo of 1973–1974, primarily directed at the United States, was foiled by a combination of OPEC discord and the inherent fungibility that characterizes oil and its world market network. (As the international liquefied natural gas trade begins to take on that fungibility characteristic, unsettling acts, such as Russia's episodic disruptions of natural gas exports, may similarly prove futile.)

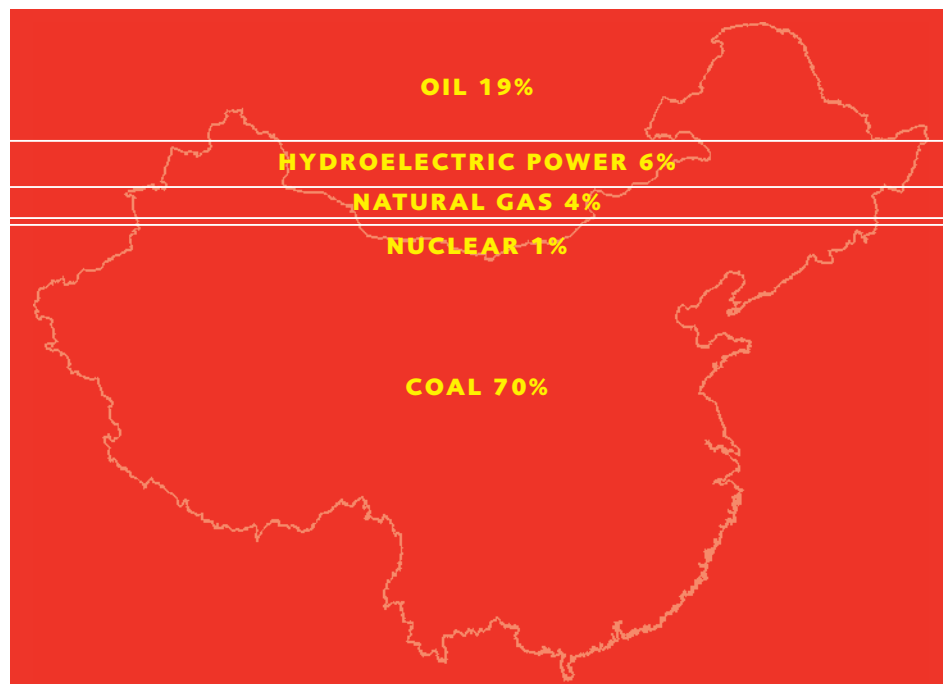
Renewed Resource Fears

But that reassuring long-term record has evidently not foreclosed a noticeable re-emergence of concern over access to natural resource supplies. Is this development grounded in misapprehension, new realities, or perhaps some of each?

Given its size and robust economic growth, China is clearly the most conspicuous among nations showing concern about meeting their natural resource—and especially energy—requirements. (Annual GDP and energy growth of around 10 percent and 7 percent, respectively, have been China's norm for much of the past decade.) You don't have to go very far perusing the financial and business pages without encountering word of yet one more

Total Energy Consumption in China, by Type (2009)

Source: BP. 2010. *Statistical Review of World Energy* June 2010. www.bp.com/statisticalreview.



Chinese bid for, or acquisition of, an equity stake in some country's natural resource sector—whether in Africa, Latin America, Iraq's Kurdish area, Canada, or elsewhere. In fact, it is Canada where China's drive for acquiring access seems to be most pronounced. In just the latest such transaction (April 2010), China's Sinopec purchased a 9 percent (\$5 billion) stake in Syncrude Canada, the country's largest oil-sands producer.

Frequently, even in the less sensational press, these deals are couched in language reminiscent of wartime (hot and cold) resource anxieties. One example of such peacetime resource anxiety was reflected, not long ago, in a *New York Times* account of the China National Offshore Oil Company's purchase of an interest—the *Times* labeled it a "beachhead"—in an Argentine offshore oil company. As other such articles typically observe, the *Times* painted the deal in the context of a strategic "international drive to secure raw materials;" and, in an earlier piece, described China as having "long been scouring the globe for energy and commodities to feed its thrumming economy."

It might make sense not just to cool the language, but to parse this investment phenomenon into some analytically separable components. (What can be readily dismissed is the prospect of China achieving market power in international energy resources, whose concentration, after all, is much greater elsewhere in the world.) On at least one level, things seem relatively straightforward. If a Chinese company successfully edges out another nation's firm in an overseas investment bid, the return on such investments will accrue to China's GDP rather than another country's. The investment may additionally expand outlets for Chinese exports and, in joint ventures, provide opportunities for capitalizing on the technological capabilities of partnering firms. Finally, a search for higher yields than those offered by investments in U.S. Treasury securities may be yet one other complementary motive.

But do these investment decisions play out under competitively transparent ground rules? Maybe an internationally level playing field can be assumed to govern Chinese negotiations

with Canadian firms. However, if Sudan lures Chinese petroleum investments with favorable exploration, royalty, and production-sharing terms, how connected might such preferential treatment be to, say, China's abstention from Security Council deliberations on Sudan's human rights record? In this and similar situations, might the host country willingly shrug off economic-efficiency losses in return for political advantages? Geopolitical expertise, no less than economic analysis, is needed to probe such possible tacit reciprocal understandings.

Capital Investments versus World-Market Purchases

But even apart from such a political dimension, the matter of guaranteed Chinese resource access through foreign investments is more complicated. Unquestionably, China—like other countries experiencing energy-intensive economic growth—wants to be able to count on an abundant supply at stable prices. The key question is, how is that condition more likely to be satisfied through foreign investment than through transactions on the world market?

Let's say there's a sharp rise in the world oil price. Even if China has somehow negotiated preferential access through its stake in Sudanese, Venezuelan, Nigerian, or—for that matter—Canadian reserves and production, can it count on obtaining such supplies more cheaply than buying on the world market? Even if, in the unlikely event that country X (or a firm in country X) was obliged to accommodate Chinese demand at \$70 per barrel while the world price stood at \$90 per barrel, would not China itself face a dilemma? In so many words, yes, we can meet the needs of our domestic energy-hungry industry with a \$20 per barrel subsidy, but we'd be forfeiting a corresponding amount of revenue by not selling that barrel on the world market.

Reinforcing that argument, a 2006 U.S. Department of Energy report on the national security aspects of America's international energy requirements succinctly observed that "[e]ven if China's equity oil investments 'remove' assets from the global market, in the sense that they are not subsequently available for resale, these

actions merely displace what the Chinese would have otherwise bought on the open market." But the report then reminds us as well that "[r]egardless of whether China secures its oil through equity investments or purchases on the global market, its increasing demand for these resources will continue to play a role in world oil markets (as will rising demand from other areas, such as the U.S. and India)."

In short, it seems insufficient to answer the question "What is China seeking?" the way an otherwise insightful analysis by the Federal Reserve Bank of San Francisco recently did: "One evident goal of Chinese acquisitions is access to resources, especially those China lacks." Doesn't that simply beg the question of "With what intent?"

A Note on Environmental Connections

As if these investment-and-trade strategy questions weren't tough enough, they may become increasingly intermingled with environmental issues. A Chinese firm contemplating acquisition of, say, a stake in Canadian oil sands, as mentioned earlier, must reckon on the possibility of emissions restrictions in Canada that could alter the economic and strategic calculus driving its investment decision.

Such a turn of events could hardly be surprising. After all, China finds itself under increased international pressure to improve its own environmental performance—not least, when that performance occurs under a kind of carbon-intensive "pollution haven," with some considerable amount of investment and manufacturing activity ultimately directed to serving green foreign markets. (A cheeky *Science Daily* headline describes the broader trend—not limited to just China—as "Carbon Emissions 'Outsourced' to Developing Countries.") A recent 20-year \$60 billion (U.S.) deal to supply Chinese power stations with Australian coal inspired an American academic to observe that, facing political curbs on using its coal domestically, Australian "production is going to flow where there is no restriction for using coal."

Perhaps as a way of parrying rumblings about China's culpability in intensifying the

global warming problem, some of the country's leaders—pre-Copenhagen—pointed precisely to an estimated 30 percent of China's emissions attributable to production destined for Western consumers. This table-turning argument—that it's the West's responsibility to offset such emissions—was reported to have been sympathetically greeted by other developing countries.

Summing Up

Looking ahead, rapid economic growth in China, India, and elsewhere could signal perhaps inescapable real price increases for energy and other resources, not to mention accompanying environmental stress. In both cases, smart anticipatory policies—in R&D, conservation, and technology—could blunt such outcomes. What seems more problematic is the logic and success of strategies to lock in or guarantee resource supply availability through investments in resource-rich countries. Given the efficacy of transactions on relatively open international energy and other resource markets over a period of some 60 years, the argument for a resurgent resource war seems therefore tenuous. Still, without more rigorous analysis of the issue, it may be unreasonable to expect the press and some in the public-policy community to, any time soon, ease up on the more single-minded and alarmist perspective on the matter. ■

Further Reading

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RFF POLICY COMMENTARY

When Fuel Taxes No Longer Get the Job Done

The future of transportation finance

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The principle of paying for roads and transit by charging those who use the system has served our nation well, but in its current form it will soon outlive its usefulness. Americans are driving more but paying less fuel tax, creating a crisis in transportation financing. For economic, environmental, and political reasons, this is the moment to transition to a new and better approach to charging for road use.

History

Before 1920, state governments faced fiscal crises because of growing demands for infrastructure resulting from burgeoning use of autos and trucks. States could not afford to build and maintain their growing networks of roads needed to connect cities. Oregon, long an innovator in transportation finance, was the first to respond by inventing the concept of user financing. It shifted from using general government revenues, as other states were doing,

reasoning instead that drivers of trucks and cars should pay more directly for roads and bridges because users both imposed the costs of these facilities on the states and benefited from them most directly.

Tolls were seen as the most direct and appropriate form of user fee. But toll booths had to be built and staffed around the clock, even where roads carried only light traffic. The costs of toll collection in many locations could be a third or more of the revenue. In response, Oregon adopted a "second best" solution: taxes levied on gasoline and diesel fuel. Collected at a handful of wholesale distribution points and passed on to road users at the fuel pumps, fuel taxes per gallon had collection costs of only a small percentage of the revenues. Users of fuel paid more when they drove more, roughly proportional to the tolls they might have paid.

By 1940, all states and the federal government had motor fuel taxes. The federal motor fuel tax was the largest source of revenue sup-