Fool's Gold in Alaska

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THE BOTTOM OF THE BARREL?

OIL PRICES have fluctuated randomly for well over a century. Heedless of this fact, oil's promoters are always offering opportunities that could make money—but on the flawed assumption that high prices will prevail. Leading the field of these optimists are Alaskan politicians. Eager to keep funding their state's de facto negative income tax—oil provides 80 percent of the state's unrestricted general revenue—they have used every major rise in oil prices since 1973 to advocate drilling beneath federal lands on the coastal plain of the Arctic National Wildlife Refuge. Just as predictably, environmentalists counter that the refuge is the crown jewel of the American wilderness and home to the threatened indigenous Gwich'in people. As some see it, drilling could raise human rights issues under international law. Canada, which shares threatened wildlife, also opposes drilling.

Both sides of this debate have largely overlooked the central question: Does drilling for oil in the refuge's coastal plain make sense for economic and security reasons? After all, three imperatives should shape a national energy policy: economic vitality, secure supplies, and environmental quality. To merit serious consideration, a proposal must meet at least one of these goals.

Drilling proponents claim that prospecting for refuge oil will enhance the first two while not unduly harming the third. In fact, not

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only does refuge oil fail to meet any of the three goals, it could even compromise the first two. First, the refuge is unlikely to hold economically recoverable oil. And even if it did, exploitation would only briefly reduce U.S. dependence on imported oil by just a few percentage points, starting in about a decade. Nor would the refuge yield significant natural gas. Despite some recent statements by the Bush administration, the North Slope's important natural-gas deposits are almost entirely outside the refuge. The gas-rich areas are already open to industry, and environmentalists would likely support a gas pipeline there, but its high cost—an estimated $10 billion—would make it seem uneconomical.

Furthermore, those who suppose that any domestic oil is more secure than imported oil should remember that oil reserves almost anywhere else on earth are more accessible and more reliably deliverable than those above the Arctic Circle. Importing oil in tankers from the highly diversified world market is arguably better for energy security than delivering refuge oil to other U.S. states through one vulnerable conduit, the Trans-Alaska Pipeline System. Although proponents argue that exploiting refuge oil would make better use of TAPS (which is all paid for but only half-full), that pipeline is easy to disrupt and difficult to repair. More than half of it is elevated and indefensible; in fact, it has already been bombed twice. If one of its vital pumping stations were attacked in the winter, its nine million barrels of hot oil could congeal into the world's largest Chapstick. Nor has the 24-year-old TAPS aged gracefully: premature and accelerated corrosion, erosion, and stress are raising maintenance costs. Last year, the pipeline suffered two troubling accidents plus another that almost blew up the Valdez oil terminal. If TAPS were to start transporting refuge oil, it would start only around the end of its originally expected lifetime. That one fragile link, soon to be geriatric, would then bring as much oil to U.S. refineries as now flows through the Strait of Hormuz—a chokepoint that is harder to disrupt, is easier to fix, and has alternative routes.

Available and proven technological alternatives that use energy more productively can meet all three goals of energy policy with far greater effectiveness, speed, profit, and security than can drilling in the refuge. The untapped, inexpensive "reserves" of oil-efficiency

technology exceed by more than 50 times the average projection of what refuge drilling might yield. The existence of such alternatives makes drilling even more economically risky.

In sum, even if drilling in the Arctic Wildlife Refuge posed no environmental or human rights concerns, it still could not be justified on economic or security grounds. These reasons remain as compelling as they were 14 years ago, when drilling there was last rejected, and they are likely to strengthen further with technological advances. Comparing all realistic ways to meet the goals of national energy policy suggests a simple conclusion: refuge oil is unnecessary, insecure, a poor business risk, and a distraction from a sound national debate over realistic energy priorities. If that debate is informed by the past quarter-century's experience of what works, a strong energy policy will seek the lowest-cost mix of demand- and supply-side investments that compete fairly at honest prices. It will not pick winners, bail out losers, substitute central planning for market forces, or forecast demand and then plan capacity to meet it. Instead, it will treat demand as a choice, not fate. If consumers can choose optimal levels of efficiency, demand can remain stable (as oil demand did during 1975–91) or even decline—and it will be possible to provide secure, safe, and clean energy services at the lowest cost. In this market-driven world, the time for costly refuge oil has passed.

DOING MORE WITH LESS

UNSTABLE OIL PRICES have historically triggered new energy strategies. In the years following the oil-price jump in 1973, Presidents Richard Nixon and Gerald Ford sought to reduce U.S. dependence on oil imports by stimulating domestic energy supplies. With the country beset by inflation, however, they also controlled oil and gas prices, so the new supplies often appeared cheaper than they really were. President Jimmy Carter repeated this supply mistake by promoting a costly flop in synthetic fuels, but he also trusted the market enough to deregulate oil and gas prices. (Paradoxically, he discouraged exploration for natural gas by prohibiting its use in most new power plants.) The fall of the shah of Iran again hiked oil prices in 1979 and contributed to Carter's political demise. Yet that second shock also stimulated a nationwide, seven-year drive for greater energy efficiency. Cheaper ways

of delivering "energy services" (e.g., hot showers and cold beer) by using energy more productively left the energy-supply industries with costly surpluses as their prices collapsed in 1985–86. This crash benefited consumers but punished the same energy producers that the Reagan administration had sought to help. Underlying this energy glut was not just a response to higher prices but a basic policy shift: Carter had emphasized the efficient use of energy, especially in cars, and Americans then discovered how quickly demand-side policies can swing the global oil market.

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Don't be fuelish: the Trans-Alaska Pipeline

Greater efficiency bore dramatic results. Carter's policies made new American-built cars more efficient by seven miles per gallon (mpg) over six years. During Carter's term and the five years following it, oil imports from the unstable Persian Gulf region fell by 87 percent. From 1977 to 1985, U.S. GDP rose 27 percent while total U.S. oil imports fell by 42 percent, or 3.74 million barrels a day. That savings took away from the Organization of Petroleum Exporting Countries an eighth of its market. The entire world oil market shrank by a tenth; OPEC's share of it was slashed from 52 percent to 30 percent, while OPEC's output fell by 48 percent. The United States accounted for one-fourth of that reduction. More-efficient cars—each driving one percent fewer miles on 20 percent fewer gallons—were the most important cause; 96 percent of those savings came from smarter design, whereas 4 percent came from smaller size. Other countries also improved car efficiency, but they used higher fuel taxes instead of higher efficiency standards to do so.

In those eight years, U.S. oil productivity soared by 52 percent, demonstrating an effective new source of energy security and a potent weapon against high oil prices and supply manipulations. The United States showed that a major nation could respond to supply disruptions by focusing on the demand side and boosting its energy productivity at will. It could thereby exercise more market power than suppliers, beat down prices, and enhance the relative importance of less vulnerable, more diversified sources of energy.

If the United States had conserved oil at the same rate that it did in 1976–85, it would have needed no Persian Gulf oil after 1985.

Drilling proponents today ignore this lesson. Instead, they cite the imperative of displacing Middle East oil to justify drilling in every U.S. site where oil might occur. But even if this imperative existed, refuge oil would be a poor solution. After a decade of drilling and preparation, it could provide only modest, brief relief—totaling less than one percent of projected U.S. oil needs—and would cost much more than the efficiency-boosting alternatives. Repaying refuge-oil investments would require oil prices so high that, in the ensuing decade, they would elicit far greater efficiency. Those efficiency gains, in turn, would depress oil prices, displace the targeted imports, and make refuge oil unnecessary. That was what happened in the mid-1980s; repeating the same experiment will yield the same result.

The United States has exploited its reserves longer and more fully than has any other nation, so the essence of its oil problem is that finding and lifting the next barrel typically costs more at home than abroad. A market economy offers three possible solutions to this puzzle: protectionism, trade, and substitution. Protectionism means subsidizing domestic output, which deters efficient use, or taxing imports, which violates free-trade rules. Either way, market principles are scorned, competitiveness wanes, and domestic oil depletion is illogically countered by faster depletion. Most countries opt for the trade solution. Germany and Japan, for example, import all their oil and are adept at earning foreign exchange to pay for it. They rely on a global oil-trading and transport system so flexible that even the Persian Gulf War did not create lines at gas stations. Trade is hardly

novel to the United States, which imports many vital commodities, including 52 percent of its oil last year at a cost of $109 billion. But if concerned Americans fear that higher costs or thorny questions of political instability make importing unattractive, a third option exists: substitution.

Substitution means displacing oil with more efficient use of oil or alternative energy sources. This strategy reduces dependence in the quickest and cheapest way and maximizes competition and innovation. Indeed, the United States has already partly followed this course; its oil productivity has already doubled since 1975. But the efficiency-promotion strategy could have gone much further if U.S. policymakers had not quickly combated and suppressed it after the 1986 oil-price collapse. (In that year, for example, a rollback of car and light-truck efficiency standards doubled U.S. oil imports from the Persian Gulf and wasted one "refuge" of oil.) If the United States had continued to conserve oil at the same rate that it did in 1976–85 or had simply bought new cars that got 5 mpg more than they did, it would no longer have needed Persian Gulf oil after 1985. Instead, policy in the 1980s discouraged energy efficiency, which was officially characterized as an intrusive, interventionist burden of curtailment and sacrifice. Efficiency also appeared needless when the 1986 price crash ushered in a decade of cheap oil, while deep budget cuts crippled technological innovation in energy productivity. Today, the dramatic gains in energy efficiency that the United States launched during the Carter years have been forgotten. Many journalists and political leaders no longer remember that efficiency gains are not only possible but profitable. Yet despite the neglect of efficiency from 1986 to 1996 (when efficiency began a sudden resurgence), the nation has still cut $200 billion off its annual energy bill.

U.S. oil imports crept back up in the late 1980s, spurred by low prices, abundant supplies, corporate inattention, and policy neglect. If the first Bush administration had required in 1991 that the average car get 32 mpg, that measure alone would have displaced all Persian Gulf oil imports to the United States. Instead, the United States fought a war that deployed tanks moving at 0.56 mpg and aircraft carriers moving at 17 feet per gallon. That effort cost the United States more than it would have cost to save (through investing in

efficiency technology) all the oil imported from the Gulf. That lesson was ignored as Congress stalled most efficiency initiatives in the 1990s. By 2000, oil imports had rebounded to their record 1977 level, and oil prices spiked once more. The three-member Alaskan congressional delegation, chairing three of the four chief congressional committees controlling public lands, again pressed for drilling in the refuge. On January 22, 2001, aides to President George W. Bush claimed that California's electricity crisis showed that the nation desperately needs more fuel. In fact, California has no shortage of oil, and only one percent of its electricity comes from oil; nationwide, only two percent of oil is consumed to generate electricity. Curiously, the administration's response to the nation's supposed "energy crisis" has been to reject the notion of "doing more with less," the very definition of energy efficiency. It has halved key budgets for efficiency research, increased future power needs by 13 billion watts by weakening cost-effective air-conditioner standards, and centered its supply-side strategy on seeking—against all odds—congressional approval to exploit refuge oil.

OIL ROULETTE

THE REFUGE is one of the planet's most inhospitable and remote locations. For oil companies to invest profitably there, it must hold a lot of oil. Furthermore, world oil prices must stay high enough for a long enough time to recover costs and earn profits. But even official proponents of drilling have found its economics dubious.

In 1998, the U.S. Geological Survey (USGS) found that better (and fourfold cheaper) production technologies could probably draw 3.2 billion barrels from the refuge.[1] This oil would be worth recovering only if its long-term price were at least $22 per barrel in West Coast ports (the destinations that the USGS picked for its price calculations). But until it spiked up from $13 per barrel in 1998 to $30 per barrel in

[1] This is the mean of a range of projections, from 0.5 billion to 6.5 billion, from the USGS's 1998 study. The higher estimates that some drilling proponents cite, such as the 13.7 billion barrels mentioned by *The Wall Street Journal*'s editorial page, exceed the USGS's highest projection at any price, because they typically ignore recoverability, economics, and geographic location. All prices in this article are in 2000 dollars (fourth quarter).

late 2000, Alaskan oil did not exceed that level for 8 years. That spike was a blip, not a trend. In April 2001, Alaska's Department of Revenue forecast a steady price drop from $22 per barrel in 2001–2 to less than $13 per barrel in 2009–10—the earliest that any refuge oil might flow. Alaska's latest price forecast for 2020 is $18 per barrel. The U.S. Department of Energy predicts that world oil prices will not reach $23 per barrel until 2020; nearly all industry forecasts are lower.

But it is no longer necessary to speculate which forecast is correct; they all tend to converge on the prices discovered in the futures market. Alaska's forecasters agree that this convergence is unaffected by price spikes such as the one in 2000. Their projection for 2004–10 accordingly stays under $16 per barrel. (One of the world's largest oil companies does not even consider any prospect requiring a delivered price of more than $14 per barrel.) According to the USGS, that price is also the threshold below which there is probably no economically recoverable oil beneath the refuge. Even that threshold may be too high; volatile oil prices make drilling especially risky, requiring higher returns and prices in any high-cost area where exploration and development will be slow and difficult. And if the federal government were to demand lease fees, such as the multi-billion-dollar revenues that the Alaskan delegation inserts into budget bills, or if TAPS needed more maintenance, the price threshold would rise.

Some drilling advocates argue that technological advances in finding and extracting oil can still make refuge oil profitable. Those advances are indeed real and astoundingly rapid. From 1987 to 1999, they increased the discovery of new U.S. oil resources by an estimated three-fifths. One-ninth of all U.S. oil reserves discovered since 1859 were found just in the past decade, even as oil prices fell. Better technologies could make extracting refuge oil cheaper—but those same advances would also cut costs everywhere else, and just about anywhere else is easier and more attractive. Better technology makes global oil more plentiful and therefore cheaper, so it renders high-cost areas less competitive. During the 1990s, this process combined with increasing competition from energy alternatives to halve long-term forecasts of oil prices, which are still falling. The Department of Energy now forecasts that imported oil will cost three-fifths less by 2020 than what the Department of the Interior

had forecast in 1987, when it predicted prices hitting $61 per barrel. If oil companies really believed in sustained high prices, they would be drilling everywhere—and they are not. On the contrary, when oil prices rose from $10 per barrel to $25 per barrel in 1998–99 and lifted the oil and gas revenues of major U.S. energy companies by more than 50 percent, those firms cut exploration and development outlays by 66 percent in the United States (onshore) and 38 percent worldwide. These companies believe that advancing technology will keep the world long awash in oil that is too cheap for refuge drilling to beat.

Who, then, is pushing for drilling—aside from the powerful Alaskan congressional delegation? Oil-service companies and Alaskan operations offices of major oil companies naturally want to extend and expand their activities and apply their special skills, but they would be risking others' money, not their own. Likewise, the TAPS consortium wants more revenue and a political commitment that might justify a later government bailout if the pipeline turned out to need costly repairs, but it too would not be the one making the huge investment. Conspicuously absent is a ringing endorsement from leaders of major oil firms. They understand the high risk and the prospect of poor rewards, and those that are more astute also fear global consumer boycotts. To the extent that any are interested, it is to seek a bargaining chip for other areas now off-limits or to avoid the social embarrassment of being left off the dance card if the government throws an oil party—not because there is a sound business case.

Finally, the rationale that refuge drilling is urgently needed to relieve U.S. dependence on OPEC oil is full of holes. Net U.S. oil imports have indeed risen past their 1977 peak, but OPEC's share of those imports has fallen by one-third. Only a quarter of the oil consumed in the United States now comes from OPEC members. Imports are diversified and come mainly from western hemisphere countries that offer major opportunities for expanding both oil and gas supplies. The more that imports are a concern, however, the stronger the case for substituting not just any option but the cheapest one—slashing America's energy bills by a further $300 billion a year by raising energy productivity.

IT'S EASY (AND LUCRATIVE) BEING GREEN

OIL IS becoming more abundant but relatively less important. For each dollar of GDP, the United States used 49 percent less oil in 2000 than it did in 1975. Compared with 1975, the amount that energy efficiency now saves each year is more than five times the country's annual domestic oil production, twelve times its imports from the Persian Gulf, and twice its total oil imports. And the efficiency resource is far from tapped out; instead, it is constantly expanding. It is already far larger and cheaper than anyone had dared imagine.

Increased energy productivity now delivers two-fifths of all U.S. energy services and is also the fastest growing "source." (Abroad, renewable energy supply is growing even faster; it is expected to generate 22 percent of the European Union's electricity by 2010.) Efficient energy use often yields annual after-tax returns of 100 to 200 percent on investment. Its frequent fringe benefits are even more valuable: 6 to 16 percent higher labor productivity in energy-efficient buildings, 40 percent higher retail sales in stores with good natural lighting, and improved output and quality in efficient factories. Efficiency also has major policy advantages. It is here and now, not a decade away. It improves the environment and protects the earth's climate. It is fully secure, already delivered to customers, and immune to foreign potentates and volatile markets. It is rapidly and equitably deployable in the market. It supports jobs all across the United States rather than in a few firms in one state. Yet the energy options now winning in the marketplace seem oddly invisible, unimportant, and disfavored in current national strategy.

Those who have forgotten the power of energy efficiency should remember the painful business lessons learned from the energy policies of the early 1970s and the 1980s. Energy gluts rapidly recur whenever customers pay attention to efficiency—because the nationwide reserve of cheap, qualitatively superior savings from efficient energy use is enormous and largely accessible. That overhang of untapped and unpredictably accessed efficiency presents an opportunity for entrepreneurs and policymakers, but it also poses a risk to costly supply investments. That risk is now swelling ominously.

In the early 1980s, vigorous efforts to boost both supply and efficiency succeeded. Supply rose modestly while efficiency soared.

From 1979 to 1986, GDP grew 20 percent while total energy use fell by 5 percent. Improved efficiency provided more than five times as much new energy service as the vaunted expansion of the coal and nuclear industries; domestic oil output rose only 1.5 percent while domestic natural gas output fell 18 percent. When the resulting glut slashed energy prices in 1985–86, attention strayed and efficiency slowed. But just in the past five years, the United States has quietly entered a second golden age of rapidly improving energy efficiency. Now, with another efficiency boom underway, the whole cycle is poised to repeat itself—threatening another energy-policy train wreck with serious economic consequences.

From 1996 to 2000, a complex mix of factors—such as competitive pressures, valuable side benefits, climate concerns, and e-commerce's structural shifts—unexpectedly pushed the pace of U.S. energy savings to nearly an all-time high, averaging 3.1 percent per year despite the record-low and falling energy prices of 1996–99. Meanwhile, investment in energy supply, which is slower to mature, lagged behind demand growth in some regions as the economy boomed. Then in 2000, Middle East political jitters, OPEC machinations, and other factors made world oil prices spike just as cold weather and turbulence in the utility industry coincidentally boosted natural gas prices. Gasoline prices are rising this year—even though crude-oil prices are softening—due to shortages not of crude oil but of refineries and additives. California's botched utility restructuring, meanwhile, sent West Coast electricity prices sky-high, although not for the oft-cited reasons. (Demand did not soar, and California did not stop building power plants in the 1990s, contrary to many observers' claims.)

The higher fuel and electricity prices and occasional local shortages that have vexed many Americans this past year have rekindled a broader national interest in efficient use. The current economic slowdown will further dampen demand but should also heighten business interest in cutting costs. Efficiency also lets numerous actors harness the energy market's dynamism and speed—and it tends to bear results quickly. All these factors could set the stage for another price crash as burgeoning energy savings coincide, then collide, with the new administration's push to stimulate energy supplies. Producers who answer that call will risk shouldering the cost of added supply without

the revenue to pay for it, for oil prices high enough to make refuge oil profitable would collapse before or as supply boomed.

Policymakers can avoid such overreaction and instability if they understand the full range of competing options, especially the ability of demand to react faster than supply and the need for balancing investment between them. As outlined above, in the first half of the 1980s, the U.S. economy grew while total energy use fell and oil imports from the Persian Gulf were nearly eliminated. This achievement showed the power of a demand-side national energy policy. Today, new factors—even more powerful technologies and better designs, streamlined delivery methods, and better understanding of how public policy can correct dozens of market failures in buying efficiency—can make the demand-side response even more effective. This can give the United States a more affordable and secure portfolio of diverse energy sources, not just a few centralized ones.

A BARREL SAVED, A BARREL EARNED

IF OIL WERE FOUND and profitably extracted from the refuge, its expected peak output would equal for a few years about one percent of the world oil market. Senator Frank Murkowski (R-Alaska) has claimed that merely announcing refuge leasing would bring down world oil prices. Yet even a giant Alaskan discovery several times larger than the refuge would not stabilize world oil markets. Oil prices reached their all-time high, for example, just as such a huge field, in Alaska's Prudhoe Bay, neared its maximum output. Only energy efficiency can stabilize oil prices—as well as sink them. And only a tiny fraction of the vast untapped efficiency gains is needed to do so.

What could the refuge actually produce under optimal conditions? Starting about ten years from now, if oil prices did stay around $22 per barrel, if Congress approved the project, and if the refuge yielded the USGS's mean estimate of about 3.2 billion barrels of profitable oil, the 30-year output would average a modest 292,000 barrels of crude oil a day. (This estimate also assumes that such oil would feed U.S. refineries rather than go to Asian markets, as some Alaskan oil did in 1996–2000.) Once refined, that amount would yield 156,000 barrels of gasoline per day—enough to run 2 percent of American cars and

light trucks. That much gasoline could be saved if light vehicles became 0.4 mpg more efficient. Compare that feat to the one achieved in 1979–85, when new light vehicles on average gained 0.4 mpg every 5 months.

Equipping cars with replacement tires as efficient as the original ones would save consumers several "refuges" full of crude oil. Installing superinsulating windows could save even more oil and natural gas while making buildings more comfortable and cheaper to construct. A combination of all the main efficiency options available in 1989 could save today the equivalent of 54 "refuges"—but at a sixth of the cost. New technologies for saving energy are being found faster than the old ones are being used up—just like new technologies for finding and extracting oil, only faster. As gains in energy efficiency continue to outpace oil depletion, oil will probably become uncompetitive even at low prices before it becomes unavailable even at high prices. This is especially likely because the latest efficiency revolution squarely targets oil's main users and its dominant growth market—cars and light trucks—where gasoline savings magnify crude-oil savings by 85 percent.

New American cars are hardly models of fuel efficiency. Their average rating of 24 mpg ties for a 20-year low. The auto industry can do much better—and is now making an effort. Briskly selling hybrid-electric cars such as the Toyota Prius (a Corolla-class 5-seater) offer 49 mpg, and the Honda Insight (a CRX-class 2-seater) gets 67 mpg. A fleet that efficient, compared to the 24 mpg average, would save 26 or 33 refuges, respectively. General Motors, DaimlerChrysler, and Ford are now testing family sedans that offer 72–80 mpg. For Europeans who prefer subcompact city cars, Volkswagen is selling a 4-seater at 78 mpg and has announced a smaller 2003 model at 235 mpg. Still more efficient cars powered by clean and silent fuel cells are slated for production by at least eight major automakers starting in 2003–5. An uncompromised fuel-cell vehicle—the Hypercar℠—has been designed and costed for production and would achieve 99 mpg; it is as roomy and safe as a midsized sport-utility vehicle but uses 82 percent less fuel and no oil.[2] Such high-efficiency vehicles, which probably can

[2] Amory B. Lovins was the originator of this project. A private firm, in which he holds a minor financial interest, is preparing such vehicles for commercial production.

be manufactured at competitive cost, could save globally as much oil as OPEC now sells; when parked, the cars' dual function as plug-in power stations could displace the world's coal and nuclear plants many times over.

As long as the world runs largely on oil, economics dictates a logical priority for displacing it. Efficient use of oil wins hands down on cost, risk, and speed. Costlier options thus incur an opportunity cost. Buying costly refuge oil instead of cheap oil productivity is not simply a bad business decision; it worsens the oil-import problem. Each dollar spent on the costly option of refuge oil could have bought more of the cheap option of efficient use instead. Choosing the expensive option causes more oil to be used and imported than if consumers had bought the efficiency option first. The United States made exactly this mistake when it spent $200 billion on unneeded (but officially encouraged) nuclear and coal plants in the 1970s and 1980s. The United States now imports oil, produces nuclear waste, and risks global climate instability partly because it bought those assets instead of buying far cheaper energy efficiency.

Drilling for refuge oil is a risk the nation should consider taking only if no other choice is possible. But other choices abound. If three or four percent of all U.S. cars were as efficient as today's popular hybrid models, they would save the equivalent of all the refuge's oil. In all, many tens of times more oil is available—sooner, more surely, and more cheaply—from proven energy efficiency. The cheaper, faster energy alternatives now succeeding in the marketplace are safe, clean, climate-friendly, and overwhelmingly supported by the public. Equally important, they remain profitable at any oil price. They offer economic, security, and environmental benefits rather than costs. If any oil is beneath the refuge, its greatest value just might be in holding up the ground beneath the people and animals that live there.