



CHANGING
THE WAY AMERICA
THINKS ABOUT ENERGY



A COMPENDIUM OF COMMENTARY
BY DR. MICHAEL E. WEBBER

PETROLEUM EXTENSION SERVICE
THE UNIVERSITY OF TEXAS AT AUSTIN



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About the Author

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Webber has published more than twenty peer-reviewed scientific articles; been awarded four patents; and given more than one hundred lectures, speeches, and invited talks, including briefings for senior decision-makers in government and executives in the private sector.

Webber's education includes B.A. (Liberal Arts) and B.S. (Aerospace Engineering) degrees from UT-Austin, and M.S. (Mechanical Engineering) and Ph.D. (Mechanical Engineering, Minor in Electrical Engineering) degrees from Stanford University, where he was a National Science Foundation Fellow from 1995-1998. In 2005, he was recognized by the College of Engineering at UT-Austin as an Outstanding Young Engineering Graduate and, in 2006, was honored as graduation commencement speaker.

In 2006, he was selected as a Next Generation Fellow of the American Assembly (founded by President Eisenhower) and, the following year, an American Memorial Marshall Fellow of the German Marshall Fund. From 2004 to 2006, he was a board member for the Hope Street Group, which is a nonprofit bipartisan national organization for young professionals interested in promoting policies that expand opportunity and economic growth. He is a member of Austin's Electric Utility commission; an advisor to the Clean Energy Incubator; a member of the steering committee for Power Across Texas, a nonprofit group dedicated to educating Texans about energy issues; and a board member for the Clean Texas Foundation.

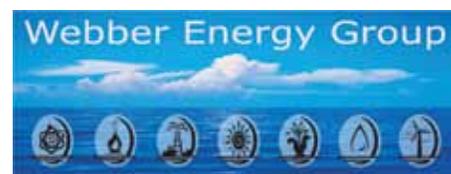
Webber's expertise, opinions, and research have been featured in the *Wall Street Journal*, *New York Times*, *USA Today*, *The Daily Telegraph*, *Discovery*, *Scientific American*, *Popular Mechanics*, *MSNBC*, *Nature Geoscience*, *Earth*, *Texas Monthly*, *Austin American-Statesman*, *Dallas Morning News*, *San Antonio Express-News*, *Fort Worth Star-Telegram*, and *Houston Chronicle*, and on NPR, PBS, BBC, ABC, and CBS.

Michael lives in Austin, Texas, with his wife and three children.

Webber Energy Group. Webber's multidisciplinary research group at UT-Austin, comprised of a small staff and more than 15 students, analyzes energy problems at the intersection of science, engineering, and public policy on topics related to energy and the environment. Topics of research include the nexus of water and energy, the nexus of food and energy, advanced biofuels, electrified transportation, renewable energy, waste-to-energy, energy security, and green design. Webber Energy Group is affiliated with UT-Austin's Center for International Energy and Environmental Policy of the Cockrell School of Engineering, LBJ School of Public Affairs, and Jackson School of Geosciences. For more information, visit www.webberenergygroup.com.



Photo by Holly Port: www.hollyportrait.com



Introduction

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Typically, engineers and scientists fail to engage in the policymaking process, the consequence of which is an incoherent mix of energy policies that accidentally undermine each other, fail to achieve strategic aims, or are impossible from the outset. We must collectively seek to rectify this problem by bridging the divide between policy-makers, engineers, and scientists on issues related to energy and the environment. It is important not to shy away from using technical skills to analyze the societal context of research problems.

I believe solutions to our energy problem can be formulated by bringing the scientific method and technical expertise to bear on policy-oriented research questions as a way to inform decision-makers and help put the world on a greener path. Bridging this divide and achieving this path is my passion.

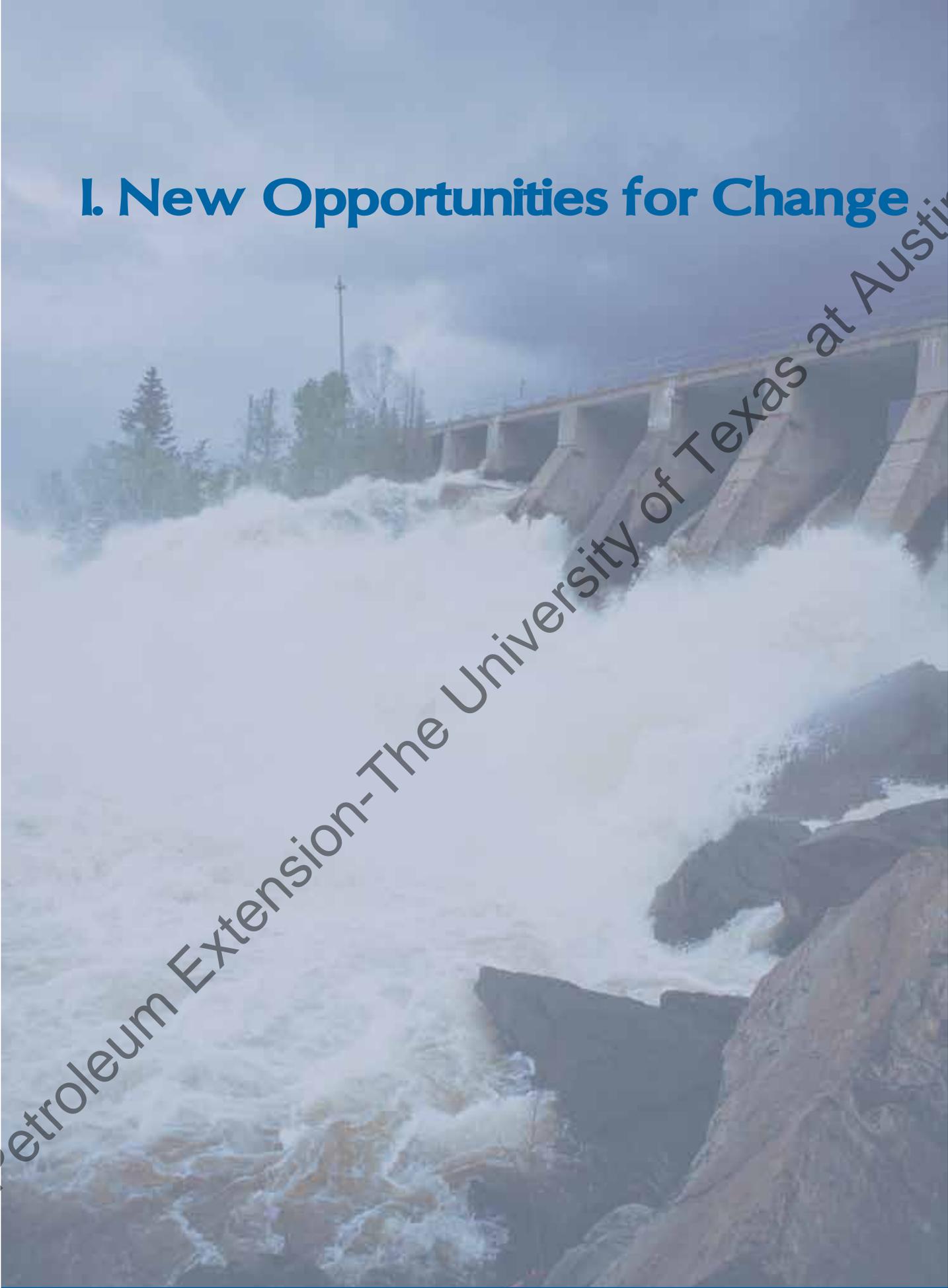
In addition, an educated and engaged public citizenry on these topics is ultimately the best way to successfully manage the energy transition. Unfortunately, we often lack accurate and accessible information about the tradeoffs of different energy options and are given false either-or choices about energy. A good example of these false choices is the pithy refrain that we must either believe in protecting the environment or having a robust economy, when we should obviously choose both.

The key to overcoming these barriers is to get better, balanced information out to the public and change the way we think about energy. These essays and columns are my contribution to this effort.

Dr. Michael E. Webber
Austin, Texas

I. New Opportunities for Change

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Priorities for a Sensible Energy Policy

post-election 2006

By presenting a divided government, the 2006 midterm elections ended up producing a unique opportunity for bipartisan, sensible action on energy policy. Within the day after polls closed, leaders from both parties emphasized the need for urgent action on energy. It's about time.

Recently, Americans have endured all-time highs in energy costs, wild price swings, ballooning deficits from oil and gas imports, and an emboldened attitude from energy-producing countries such as Iran and Russia. On the positive side, the power of markets, the promise of new technologies, and the size of our total resource base can help rectify our energy situation. But these opportunities are missing a critical ingredient: political leadership.

Unfortunately, the politicians cannot look for guidance from the American peo-

ple because voters and consumers are notoriously confused about what they want from our nation's energy policies.

The energy debate that has raged for decades still breaks down into two ideological camps: those who believe in low production and low consumption, and those who believe in high production and high consumption. Consequently, America has the worst of both—high consumption combined with low production. This means we suffer the national security and environmental impacts of high consumption but reap few economic benefits from low production.

Americans do not even know whether they want high prices (good for the environment, energy companies, and allies like Saudi Arabia) or low prices (good for consumers and manufacturing, and bad for countries like Iran). If Americans cannot

make up their minds about something as fundamental as whether energy should be cheap or expensive, then it is clear that our politicians will need to lead.

In that context, here are three priorities for a forward-looking energy policy:

- *Reduce demand and increase supply.* Historically, Republicans have pushed to increase supply at the expense of reducing demand, and Democrats have pushed to reduce demand at the expense of increasing supply. It is time to forego that false choice and, instead, select both.

Voters and consumers are notoriously confused about what they want from our nation's energy policies.

II. Global Dynamics

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Don't Blame China for High Oil Prices

Don't look now, but energy prices are on the rise again. And, as before, articles, commentaries, pundits, and letters to the editor will all decry the same foe as bearing responsibility for these higher prices. In a refrain that is eerily repeated countless times almost word for word across the front pages of newspapers and respected news programs nationwide, we hear the culprit's name, loud and clear: The People's Republic of China.

It's all China's fault. Our most trusted newspapers and talking heads have told us that China's "soaring demand," "insatiable thirst" and "quest for oil"—absolutely unprecedented throughout the broad sweep of human history—are single-handedly responsible for the run-up in energy prices (though to be fair, some people will also lump in India for adding fuel to the fire, so to speak).

The reason China is assigned so much blame is because Chinese oil consumption has been on an amazing rise over the last decade, with its daily demand for petroleum increasing by more than 4.2 million barrels between 1996 and 2008. In other words, China presently demands 4.2 million more barrels of oil every single day than it did in 1996. Though Chinese domestic oil production has increased to meet some of that demand, China today still imports 3.7 million more barrels every single day from the world markets than in 1996, making imports about half of its total consumption and helping to drive up world oil prices.

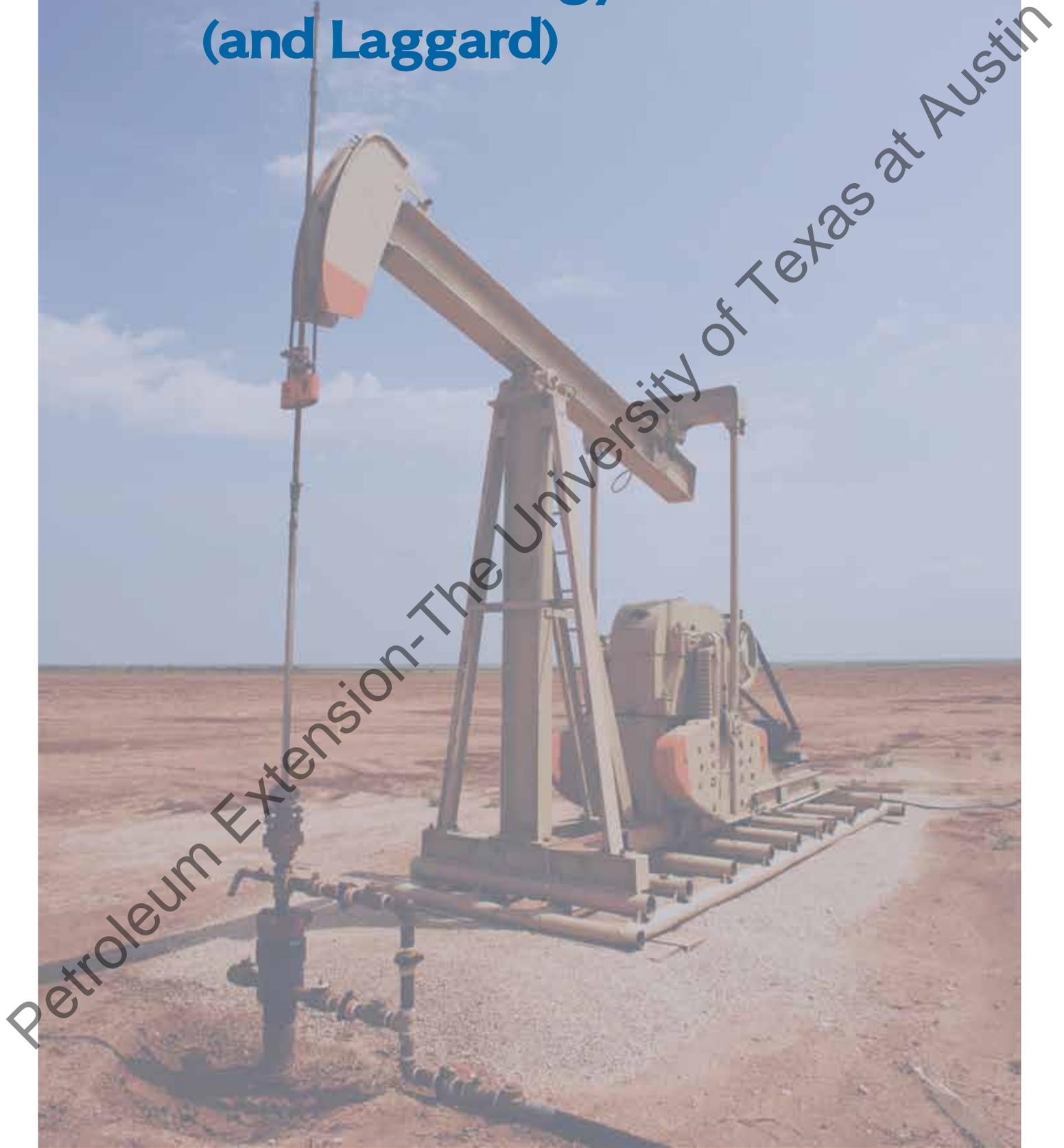
And so it's no wonder these clever pundits neatly pin the blame for high prices on recent Chinese demand. After all, any country that imports such a high percentage of oil for their own selfish use and whose absolute growth in oil imports has

been so steep must clearly be an inconsiderate energy hog who doesn't play nice with others and is deserving of shame, blame, and ridicule. How dare they buy the oil we planned on buying!

But the part of the story that is repeatedly left out is that between 1996 and 2007, U.S. demand for oil from the world markets also went up 3.7 million barrels every single day. These new imports of oil from the world make America's "soaring demand," "insatiable thirst," and "quest for oil" just as responsible for high prices as China's.

It's as if we operate from the mindset that rapidly growing demand for imported oil is acceptable in America, but not in China.

III. Texas as Energy Leader (and Laggard)





The Great Texas Coal Fight of 2007

In the overheated debate about how Texas will generate its future electricity, too many parties are stretching the truth—and in the process, scaring citizens. We need to see past scare tactics so we can objectively look at the energy future of Texas.

The propaganda is knee-deep on both sides. As the *Austin American-Statesman* recently reported, dueling forces are “masquerading as activists.” Both sides produce slick, official-sounding fact books, Web sites, and guides about what we should *really* be afraid of in Texas. The news section that contained this article featured five prominent ads by pro- and anti-coal groups, confirming the article’s point.

Taking a page from recent political campaigns that use divisive language and scare tactics to affect our votes, the pro- and anti-coal forces appeal to some of our basest fears. But instead of politicians taking jabs at

each other, these are big energy companies slugging it out in a battle for statewide energy supremacy with global implications. And while some of these companies are addicted to oil, coal, and gas, they are not addicted to telling the truth.

TXU Energy in Texas tried to influence the debate with a 5-inch thick “*Fact*” *Book* it sent to every state legislator, full of false or misleading claims such as, “97% of natural gas is from overseas—largely controlled by governments not aligned with U.S. interests.” This is patently false: we import less than 16% of our natural gas from overseas, almost all from Canada, hardly a country hostile to the United States.

TXU’s *Fact Book* further claims that competition has caused retail electricity prices in Texas to decrease substantially in 2006. But a *Wall Street Journal* article on October 27, 2006, pointed out the oppo-

site, that as a result of competition, “many Texans are paying 15 cents to 19 cents per kilowatt-hour, about double the national average of eight cents.” And now it’s reported that TXU is about to ratchet up the rhetoric with its marketing campaign called “monsters,” where, presumably without TXU’s power to keep the lights on, monsters in our closets will ravage our kids.

The anti-coal groups aren’t any better. They raise the specter of doom with intimations that arsenic, lead, or radiation will be sprinkled on our food, friends, and family, even though these are not toxins

All energy options should be compared objectively to determine what’s best.

IV. Resource Constraints





Catch-22: Water vs. Energy

Water is needed to generate energy. Energy is needed to deliver water. Both resources are limiting the other—and both may be running short. Is there a way out?

In June, the State of Florida made an unusual announcement: it would sue the U.S. Army Corps of Engineers over the corps' plan to reduce water flow from the reservoirs in Georgia into the Apalachicola River, which runs through Florida from the Georgia-Alabama border. Florida was concerned that the restricted flow would threaten certain endangered species. Alabama also objected, worried about another species: nuclear power plants, which use enormous quantities of water, usually drawn from rivers and lakes, to cool their big reactors. The reduced flow raised the specter that the Farley Nuclear Plant near Dothan, Alabama, would need to shut down.

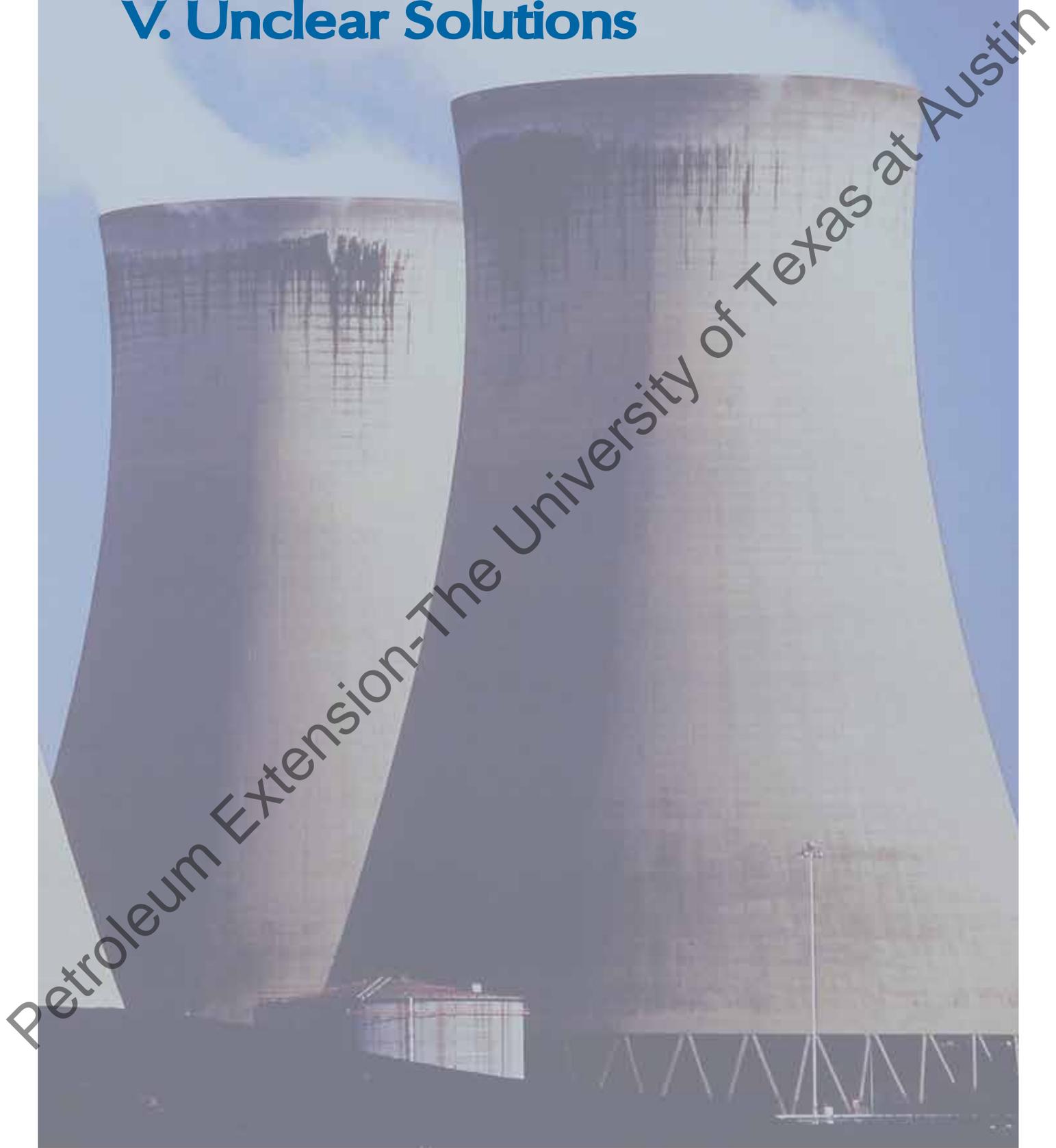
Georgia wanted to keep its water for good reason: a year earlier, various rivers dropped so low that the drought-stricken state was within a few weeks of shutting down its own nuclear plants. Conditions had become so dire that one of the state's legislators suggested that Georgia move its upper border a mile further north to annex freshwater resources in Tennessee, pointing to an allegedly faulty border survey from 1818. Throughout 2008, Georgia, Alabama, and Florida have continued to battle; the corps, which is tasked by Congress to manage water resources, has been caught in the middle. Drought is only one cause. A rapidly growing population, especially in Atlanta, as well as overdevelopment and a notorious lack of water planning, is running the region's rivers dry.

Water and energy are the two most fundamental ingredients of modern civilization.

Without water, people die. Without energy, we cannot grow food, run computers, or power homes, schools, or offices. As the world's population grows in number and affluence, the demands for both resources are increasing faster than ever.

Woefully underappreciated, however, is the reality that each of these precious commodities might soon cripple our use of the other. We consume massive quantities of water to generate energy, and we consume massive quantities of energy to deliver clean water. Many people are concerned about the perils of peak oil—running out of cheap oil. A few are voicing concerns about peak water. But almost no one is addressing the tension between the two: water restrictions are hampering solutions for generating more energy, and energy problems, particularly rising prices, are curtailing efforts to supply more clean water.

V. Unclear Solutions



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Coal-to-Liquids: The Good, the Bad, the Ugly

Can Fuel Made from Coal Replace Gasoline?

Amid all the attention to the converging of three energy-related crises—climate change, resource depletion, and international extremism funded by the energy trade—a surprising energy choice keeps rearing its head: coal. That especially includes liquid fuels made from coal, which can be a substitute for gasoline, jet fuel, and just about any other transportation fuel on which we currently rely.

Think tanks, defense specialists, policymakers and others seeking a domestic antidote to our energy woes have been calling for coal-to-liquids (CTL) as an alternative to oil since the energy crises of the 1970s. The challenge is stark: In the United States, we use about 20 million barrels of petroleum every day, of which we import about 14 million barrels—the amount we

need just to satisfy our thirst for transportation fuels. That equates to 140 billion gallons of gasoline and 40 billion gallons of diesel from petroleum sources each year. America's *oil problem* is thus another way of describing our *transportation problem*. Despite all of our efforts to date, no domestic, sustainable, scalable, affordable, and environmentally friendly alternative for transportation fuels has emerged. So, is it time to give CTL a chance?

CTL may be the panacea for our transportation problems. Or, it might be just another bad idea. The jury is still out on whether it is a viable fuel that makes sense given our carbon-constrained world. There is a lot of good news, a lot of bad news, and a highly uncertain outlook because of looming policy decisions that have not been finalized.

The Good News

There is a lot to love about coal. It is abundant, we have a lot of experience with it, and we continue to improve the technology used to create energy from it.

The United States has the world's largest reserves of coal—an estimated 250 billion tons—a fact that has created an alluring vision of a domestic, everlasting (or at least for the next 250 years) source of energy. We have been using it for 150 years to power everything from early steam engines to today's electrical grids. Today, we produce more than a billion tons of coal annually

Coal-to-liquid fuels are of excellent quality and are relatively clean, but the process of making them can be carbon-intensive.

Epilogue

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Converging Crises and Competing Priorities

The first step in solving the energy problem is to admit we have a problem. And that problem is comprised of *three* converging crises:

- Resource depletion
- Climate change
- Violent extremism funded by the energy trade

And the way to tackle these crises is to develop energy solutions that simultaneously balance *three* competing priorities that say energy should be:

- Abundant
- Clean
- Produced domestically or by countries that share our values

We need to use the high price of oil as a market incentive to bring forward alternative fuels and approaches: the higher the prices, the faster the innovation.

Instead of giving ourselves false choices, we need to look objectively and clearly at the tradeoffs of all the options. Instead

of always looking for yet another source of supply, we should add conservation to our arsenal of policy options. Instead of a race



Resources

To learn more about energy options and policies, check out the following reports, articles, and publications:

Annual Energy Review, Energy Information Administration, Department of Energy

Annual Energy Outlook, Energy Information Administration, Department of Energy

International Energy Outlook, Energy Information Administration, Department of Energy, 2008

Transportation Energy Data Book, Department of Energy

British Petroleum Statistical Review

What You Need to Know About Energy, National Academies, 2008

Energy at the Crossroads: Global Perspectives and Uncertainties, Vaclav Smil, The MIT Press, 2003

Sustainable Energy: Choosing Among Options, Jefferson W. Tester, Elisabeth M. Drake, Michael J. Driscoll, et. al., The MIT Press, 2005

Understanding and Responding to Climate Change, The National Academies, 2008

National Geographic

Earth magazine

Wall Street Journal

Scientific American

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