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***JANUARY 2005***

# Is there an Impending Oil Shortage?

Michael J. Economides



"...the energy wealth and poverty of nations has replaced industrialization as the defining national quality."



"...we are running out of oil."

Newspapers in the Eastern United States, 1865 (6 years after Drake)

*Hubbert's Peak: The Impending World Oil Shortage*

Kenneth S. Deffeyes, 2001

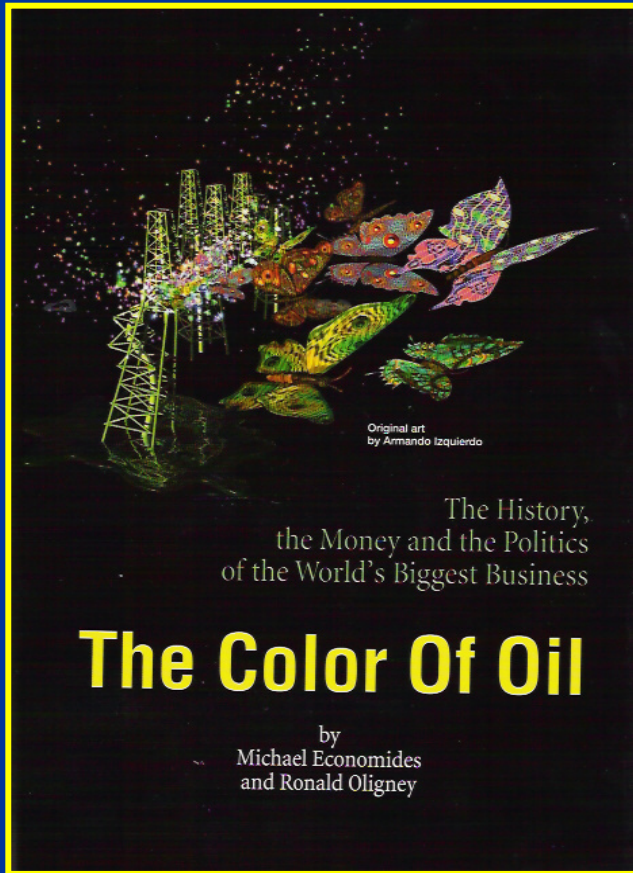
*Out of Gas: The End of the Age of Oil*

David Goodstein, 2004



# THE COLOR OF OIL

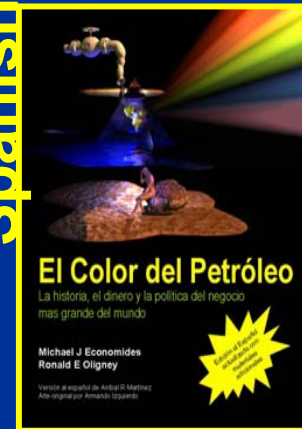
NOW IN 5 LANGUAGES



Russian



Spanish



Chinese



Korean



Available at Amazon.com or from Round Oak Publishing Company (1) 281-395-4783.

# The Continuous Energy Crisis of the 21st Century

- ✓ Oil over \$50 (It is not just OPEC)
  - ✓ Venezuela, Nigeria, Iraq
  - ✓ China has gone berserk
  - ✓ Price may go even higher, soon
- ✓ Natural gas at \$10-plus (Over and over again)
- ✓ Alan Greenspan (“LNG the only solution”)



# We'll be looking at \$50 oil, and likely by next winter

■ The candidates don't have workable plans and things will only get worse

By **MICHAEL J. ECONOMIDES**  
and **RONALD E. OLIGNEY**

**T**HE price of oil is not going down. Oil is trading at the highest levels in a decade, just months after OPEC's grandiose announcement that it would increase its quota by 2 million barrels a day.

Expect oil to flirt with \$50, creeping up to that level next winter, once OPEC's impotence becomes apparent. There should be no illusions after the past few years. The oil cartel has been rendered virtually powerless to affect oil prices

ity of most OPEC governments. The infrastructure in almost all OPEC countries is woefully outdated and obsolete, a process that dates back 25 years and has accelerated dramatically since 2000.

Social and political strife in Venezuela and Nigeria, the ongoing grind in Russia, not to mention how far awry Iraq has gone (didn't we go there for the oil?) all bode for a problematic future for oil prices, markets and oil supply.

And this is not the worst of it.

The price of oil will climb to \$50 overnight if a terrorist attack in Saudi Arabia threatens oil production in a big way. Make no mistake: Islamist terrorists know the impact of such an attack.

If most people think that there is a high likelihood of a 9/11-type attack to hit the United States, they should be certain that the terrorists

four years ago is now tilted toward supply shortages. This will not go away, no matter what.

True equilibrium pricing for new global oil exports is now nearing \$30 a barrel.

The nation must recognize this. If there is one real shortcoming of the Bush administration, and one that history will not look too kindly upon (remember this was supposed to be the "energy administration") it is that it has not yet passed an energy plan.

Nor has it been able to articulate to the American people the importance that energy and energy abundance have on the well-being of the country and the lifestyle we enjoy. Transition to other energy sources, primarily natural gas and coal-fed zero-emission energy plants, should be the highest of priorities, but little has been done.

John Kerry is no better and in many ways is worse. His previous few announcements have

# OUTLOOK

Editorials & Opinion

The  
**Economist**

MARCH 6TH - 12TH 1999

GERMANY  
 V FRANCE  
 page 27

AMERICA  
 V EUROPE  
 pages 18 and 71

## Drowning in oil



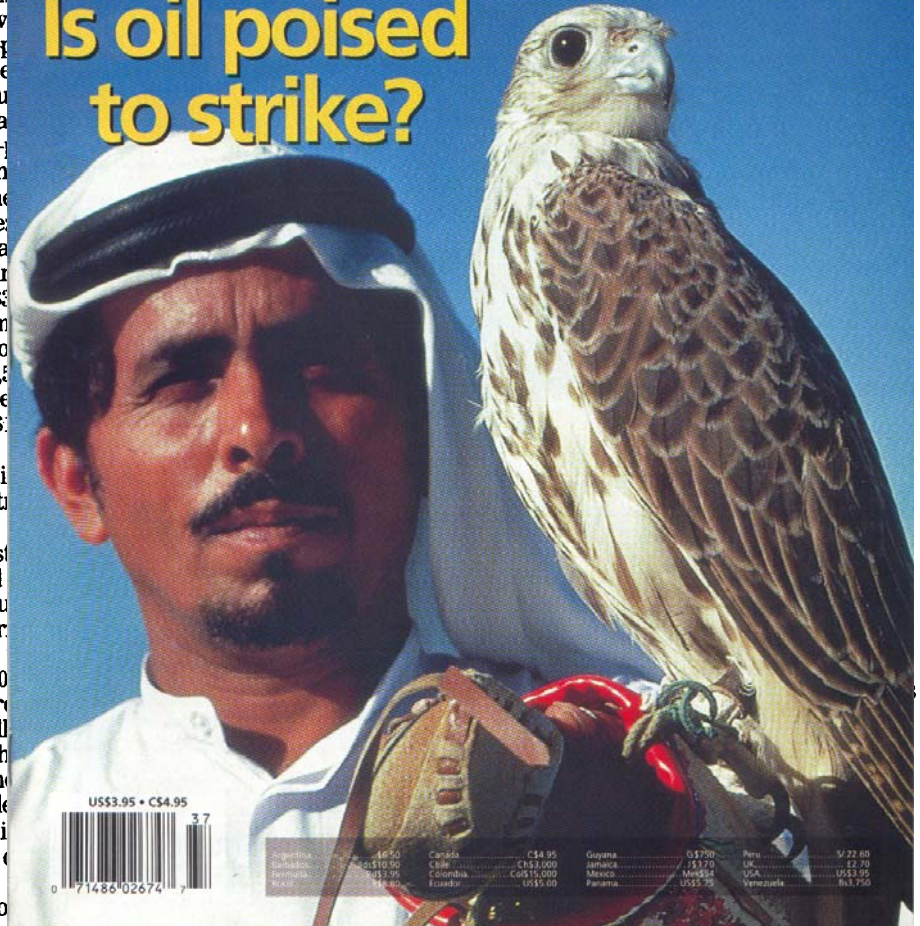
Austria... ASPO... Bahrain... Brazil... Canada... Chile... Colombia... Costa Rica... Czech Rep... Denmark... Egypt... Finland... France... Germany... Greece... Hong Kong... India... Indonesia... Italy... Japan... Korea... Kuwait... Luxembourg... Malaysia... Mexico... Netherlands... New Zealand... Norway... Oman... Pakistan... Peru... Philippines... Portugal... Saudi Arabia... Singapore... South Africa... Spain... Sweden... Switzerland... Taiwan... Thailand... Turkey... UK... USA... Venezuela...

AUSTRALIA  
 A survey after page 66

The  
**Economist**

SEPTEMBER 9TH - 15TH 2000

## Is oil poised to strike?



Argentina... ASPO... Bahrain... Brazil... Canada... Chile... Colombia... Costa Rica... Czech Rep... Denmark... Egypt... Finland... France... Germany... Greece... Hong Kong... India... Indonesia... Italy... Japan... Korea... Kuwait... Luxembourg... Malaysia... Mexico... Netherlands... New Zealand... Norway... Oman... Pakistan... Peru... Philippines... Portugal... Saudi Arabia... Singapore... South Africa... Spain... Sweden... Switzerland... Taiwan... Thailand... Turkey... UK... USA... Venezuela...

WHY EUROPE  
 NEEDS AMERICA  
 pages 23-26

BIOMETRICS: THE  
 NEXT NEW THING  
 pages 85-91

See OIL on Page 4C.

market shaping events for the next decade and beyond.



## Behind the Bouncing Ball of Oil Prices

**Y**OU wouldn't expect to walk into a drugstore and find regular toothpaste selling for as much as \$6 a tube. You might be equally surprised if the price dropped to \$1.50. But in the market for oil, where forecasts for prices now vary by a factor of four, that kind of range may soon become a reality.

The future price of oil is a topic on which very intelligent, well-informed people can have completely different views. Michael J. Economides, a professor of chemical engineering at the University of Houston who has advised Russian oil companies, predicted this week that oil would soon sell for more than \$100 a barrel. Frederick P. Leuffer, a senior managing director and senior energy analyst for Bear Stearns, forecast that oil would average just \$25 a barrel in 2005.

The peculiar thing is, each could be correct at some point this year. Oil prices, now at about \$45 a barrel, can be extremely volatile, spiking and plunging within weeks. If they were not, the current level of uncertainty might seem much less rational. Where does the volatility come from, though, and is it likely to persist?

The first question has some obvious answers. The market for oil carries more risk of huge shocks to supply and demand than most markets for commodities.

Sure, it is possible that scientists will someday discover that orange juice causes cancer, but that thought probably doesn't keep many traders up at night.

The demand for oil, however, could be hurt in an instant—for example, if someone invented a portable cold fusion generator that could safely power a car or heat a house. It would take time for countries to switch to the new power source, and oil would still be needed for producing plastics and other products, but the writing would be on the wall.

On the supply side, conflicts and cartels haven't been able to cut off or control the world's coffee or cocoa. But every time a butterfly flaps its wings in the Persian Gulf, a hurricane hits London and New York.

There is clearly plenty of room for unexpected turns in the price of oil, and perhaps that justifies the huge range in predictions. Yet according to Stephen Figlewski, a professor of finance at New York

University, uncertainty can actually increase volatility.

It can happen in two ways. The first occurs when uncertainty is perceived as risk, Professor Figlewski said, as in the case of shares in a company. If the shares are seen as risky, fewer people might trade them. As a result, the market would be less liquid, and prices would be likely to move in fits and starts rather than in smooth, continuous trends.

"A little bit of new information, or buying or selling demand pressure, will push the price a lot," he said.

The second occurs when there are many buyers and sellers but poor information, as in the market for illegal drugs. If someone decides to sell drugs above the market price, buyers may assume that the correct

price has changed, even if they don't know why the price is rising. With better information, no one would buy, and the price would stay at its old level. But the lack of information means that the price might hover at an inefficient level—either higher or lower than the competitive price—without the knowledge of the buyers and sellers. This case, Professor Figlewski said, may be more applicable to the market for oil.

The explanation fits with Professor Economides's view, too. With colleagues at the University of Houston, he has created a model for the market price of oil based only on demand and available supply, putting aside the political hiccups that affect prices in reality. If oil were to trade on a free market with buyers and sellers acting like profit-seeking businesses, he said, the average price would be \$29 or \$30 a barrel.

What keeps prices high and may push them higher, Professor Economides said, is fear.

"People are worried about supply more than anything," he said. "That's really what creates a lot of the volatility in the market. It's human psychology. It's not really an economic fundamental."

Some of those worries are justified, he added. Militancy by Venezuela and Iran, the Russian government's control of major oil companies and terror in Saudi Arabia could combine with rising Chinese demand to send oil prices "through the roof," he said.

But Mr. Leuffer of Bear Stearns was not

buying it. In fact, at Professor Economides's prices, he would be selling.

"The event I'm telling you to look for is no event," he said. "No event, no calamity, will be the death toll of high oil prices."

The biggest disaster for oil buyers, Mr. Leuffer said, would be a terrorist strike on Saudi Arabia's oil fields. The fact that no such strike has happened, he asserted, is evidence enough that it probably will not happen soon. He also dismissed concerns about Venezuela, whose president, Hugo Chávez, has often advocated higher prices. "For years, we worried about the Chávez government. But the fact of the matter is, he's still there, he just won another election, and they pump."

Prices could fall quickly, Mr. Leuffer said, as speculators find themselves on the wrong side of their bets. "You still have a speculative premium in crude oil of \$13 to \$15 a barrel in today's price. As the price goes, down, it encourages the speculators to liquidate those positions." Risking comparisons to the famously laconic Yogi Berra, he concluded, "to get prices to go down a lot, you need to get them to go down a little first."

But even with low prices in the next year, volatility could continue and even increase. Ups and downs, Mr. Leuffer explained, benefit Saudi Arabia, which has the world's biggest reserves. High prices provide needed revenue to support the Saudi government in the near term, he said, but a long plateau of high prices could encourage people to seek other sources of energy. Occasional periods of low prices are just the thing to keep them hooked, and to guarantee a century of Saudi fiscal stability.

**A**LL of this is good news for holders of options to buy and sell oil. With prices jumping around, it's more likely that those investors will find profitable prices for trading. But volatility by itself is rarely good news for buyers or sellers, apart from the Saudis. Prices took their toll at gasoline stations on their way up, but on the way down they left overoptimistic governments of oil-producing countries facing big budget deficits.

How to end the volatility? Professor Economides suggested switching vehicles to natural gas, though the United States would still need about a quarter of its current oil purchases to make plastics and other byproducts, and the shift would certainly take more than a decade, he said. Perhaps, in the meantime, a little peace would do. □



DANIEL ALTMAN

# Behind the Bouncing Ball of Oil Prices

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tional. Where does the vola-  
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and is it likely to persist?

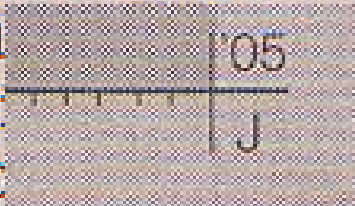
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# Factors Affecting Oil Price

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- **“Activation Index”**
- **Geopolitics**
  - **Political motivations**
  - **Political stability**
  - **Fiscal regime**
  - **Activation time**
- **Decline rates**
- **Reserves**

# Equilibrium Oil Price expressed as a function of Activation Index

---

- *Production Activation Index*

$$I_p = e^{-i_c t_p} \int_0^{t_{dpo} - t_p} 365 \text{NOI } P_{o,eq} q(t) DF(t) dt$$

**where**  $q(t) = e^{-D_i t}$  **and**  $DF(t) = e^{-i_c t}$

- *Equilibrium Oil Price*

$$P_{o,eq} = \frac{I_p}{365 \text{NOI } e^{-i_c t_p} \frac{1 - e^{-(D_i + i_c)(t_{dpo} - t_p)}}{D_i + i_c}}$$

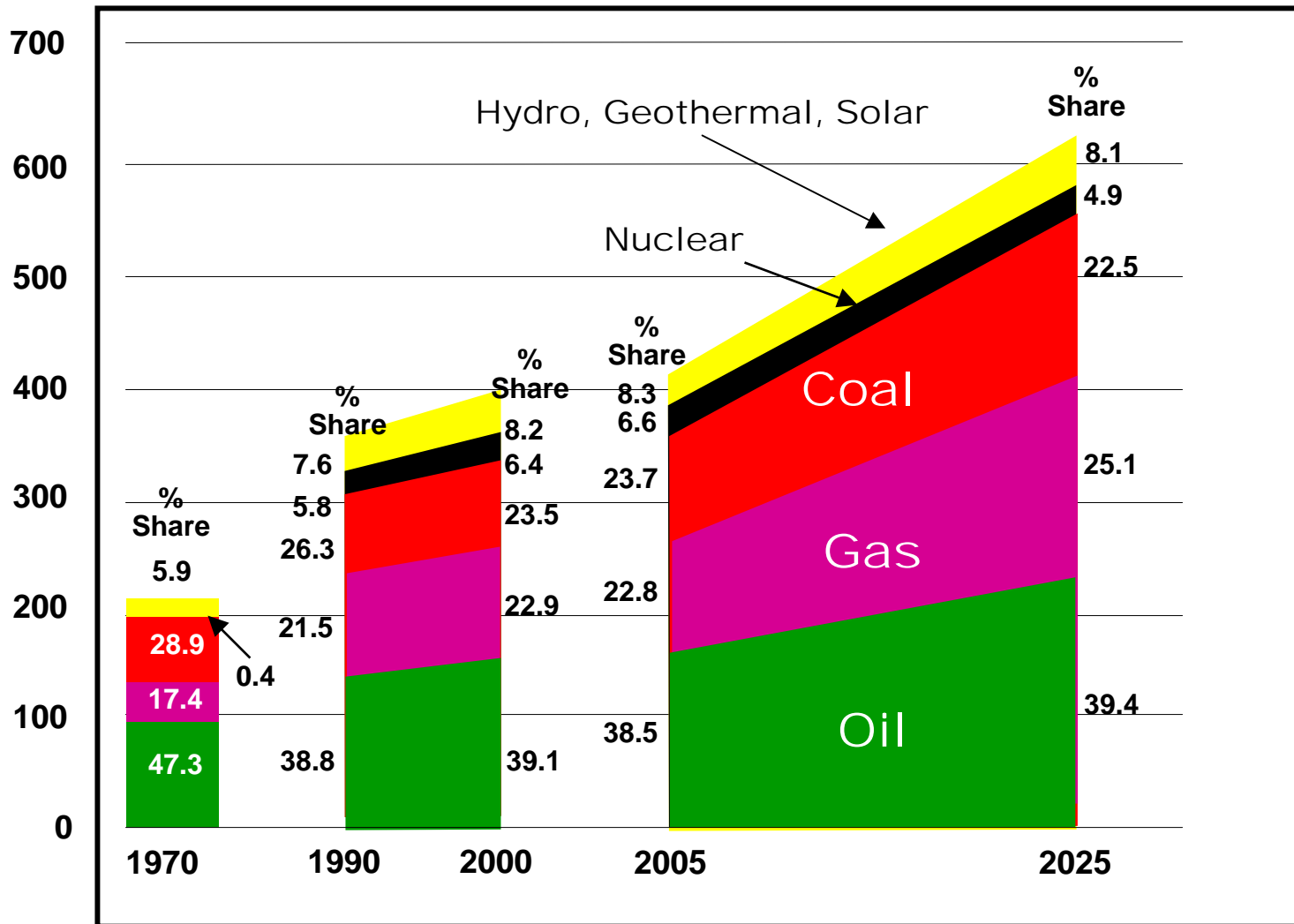
# Equilibrium Oil Price Calculation for World Basket of Oil Producing Countries

i, Periodic discount rate, 1/yr:		15.0%		D, Periodic production decline rate, 1/yr:		15.0%					
i, continuous discount rate, 1/yr:		14.0%		D <sub>i</sub> , Instantaneous production decline rate, 1/yr:		14.0%					
	$I_p$ Activation Index	$t_p$ Activation time	$t_{dpo}$ Discounted payout time, years	NOI, net operating interest	$P_{o,eq}$ Equilibrium oil price	$N_p$ Reserves, Bbbl	$N_p/P_{o,eq}$	weight, $N_p/P_{o,eq} / \Sigma(N_p/P_{o,eq})$	(weight) ( $P_{o,eq}$ )	(weight) ( $t_p$ )	(weight) ( $I_p$ )
Iran	4679	3.0	8	20%	36.2	89.7	2.478	0.100	3.616	0.300	467
Iraq	5000	3.0	6	20%	51.3	112.5	2.193	0.088	4.536	0.265	442
Russia	1500	4.0	7	40%	8.8	50	5.651	0.228	2.016	0.911	342
Saudi Arabia	4900	2.0	8	25%	24.4	261.5	10.71	0.432	10.543	0.864	2116
USA onshore	14000	0.5	10	40%	30.9	25.5	0.825	0.033	1.028	0.017	466
USA shelf	4110	1.0	5	40%	13.4	5	0.372	0.015	0.202	0.015	62
USA deepwater	11250	2.0	8	40%	35.0	46.5	1.327	0.054	1.875	0.107	602
Venezuela	4900	2.0	5	15%	58.3	72.6	1.246	0.050	2.927	0.100	246
Weighted:	4743	2.6		Average:	32.3	Sums:	24.80	1.000			
								<b>Weighted <math>P_{o,eq}</math>:</b>	<b>26.742</b>		

**Equilibrium Oil Price = \$27 per barrel**

# World Energy Consumption

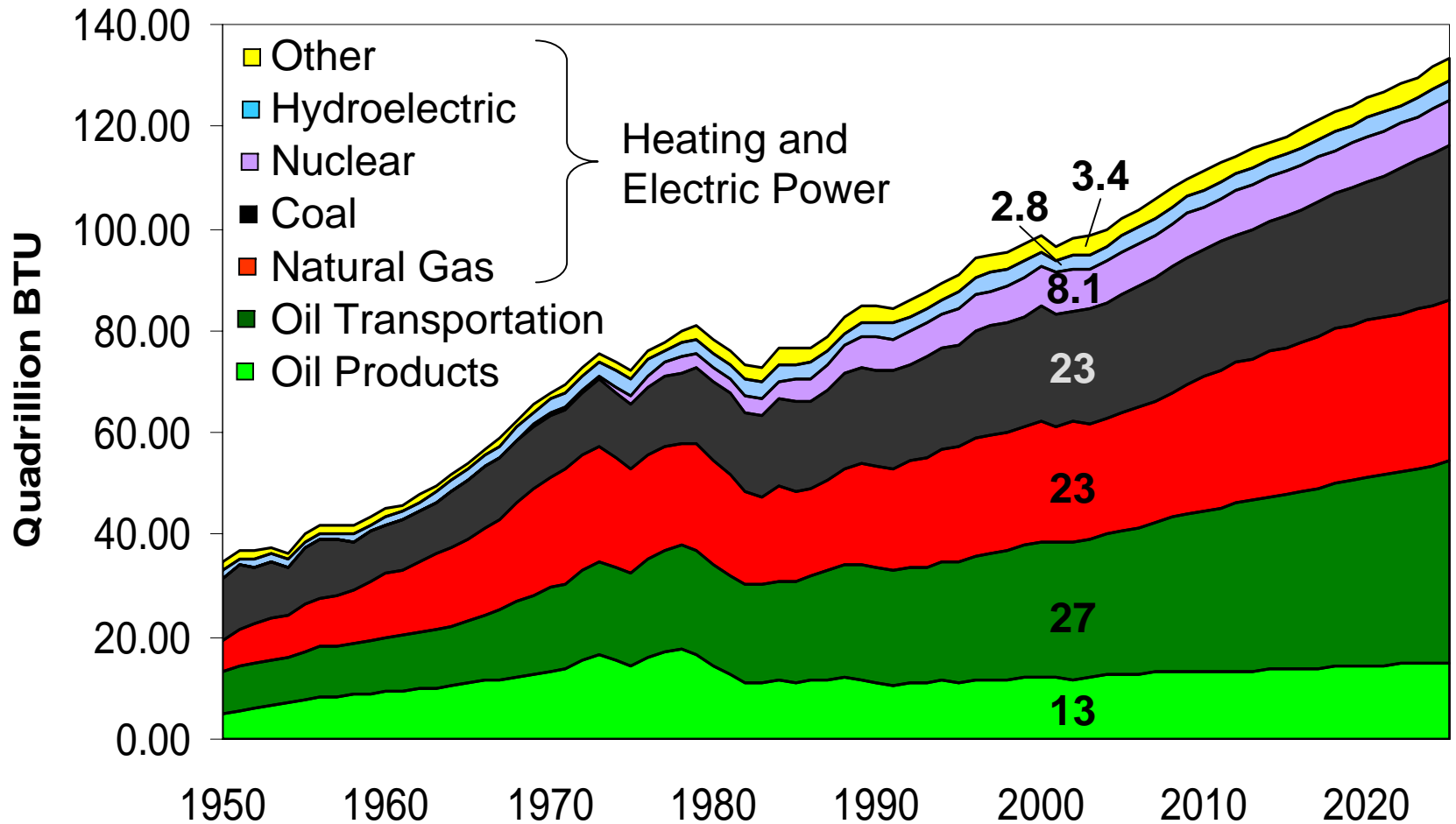
Quadrillion Btu



**There are no alternatives  
to hydrocarbons energy  
sources in the  
foreseeable future**



# US Energy Consumption

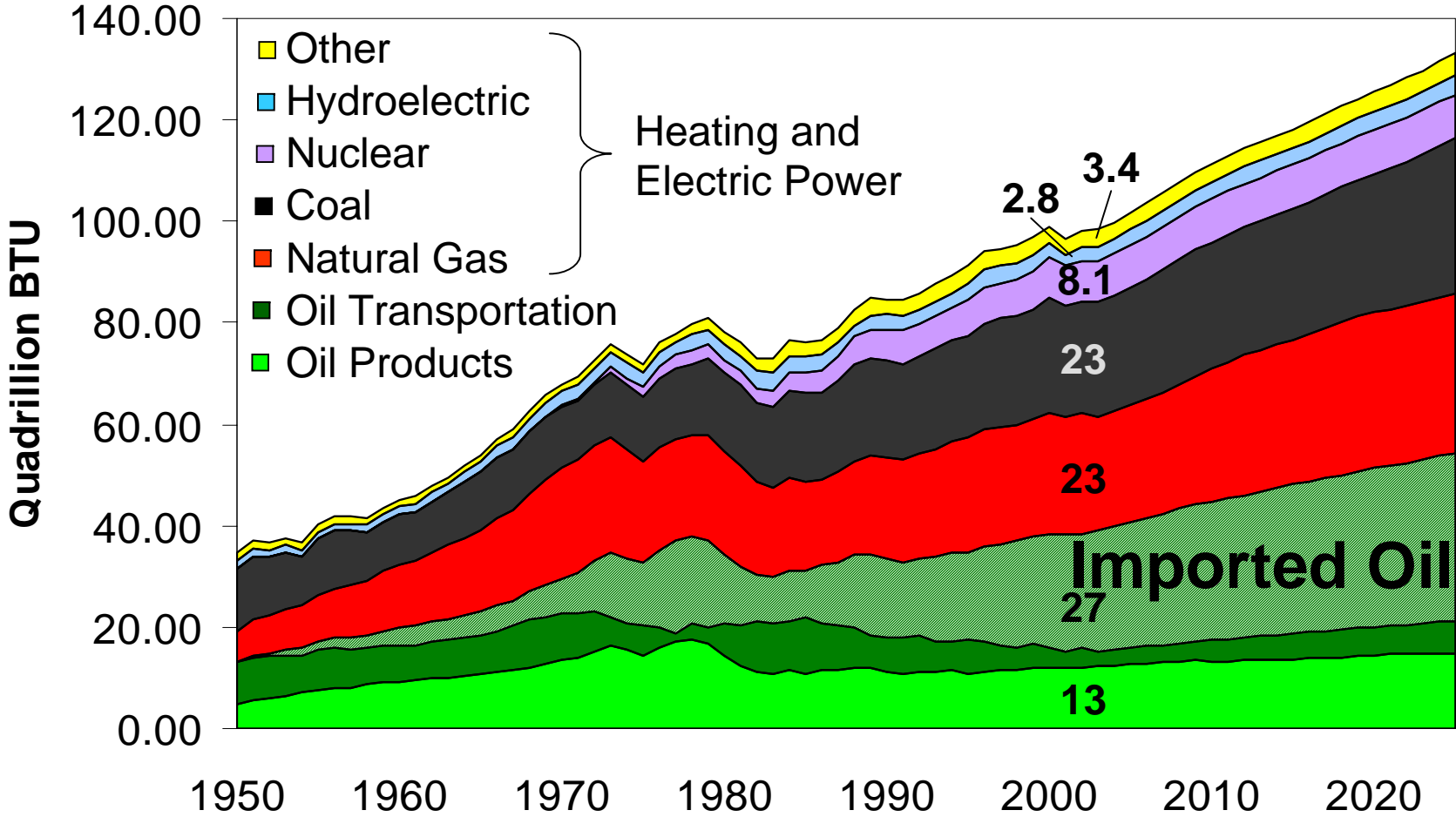




# **Presidential Candidate on *Meet the Press*, Sunday, April 18**

**“I'm going to move the United States of America towards energy independence. I'm going to set a goal, that by the year 2020, 20 percent of our electricity will be produced from alternative and renewable sources.”**

# Transportation Oil Dependency



# Energy Use in the United States (2004)

✓ Total	100 Quads	(Direct)*
✓ Residential	20%	(34%)
✓ Commercial	18%	(24%)
✓ Industrial	34%	(66%)
✓ Transportation	28%	(99.8%)**

\*Rest is electricity

\*\*Almost all oil

# The New Energy Economy

- Wood (1800s)
- Coal
- Oil
- Natural Gas
- Hydrogen (envisioned)

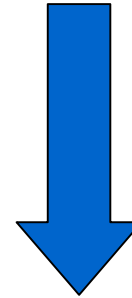
Carbon  
content:

High

Medium

Low

(Zero)



Increasingly:

- Clean
- Energy intensive
- Technologically sophisticated
- Distributed

## Energy

# Renewable hydrogen may be 'grown'

Bloomberg News

LONDON — A clean, low-cost and renewable source of energy may be generated by making hydrogen fuel from plant material, a study in last week's edition of the journal Nature says.

The process converts sugar from plant materials like corn into hydrogen that could power energy-intensive consumer needs, according to study author Jim Dumesic, a chemical engineer at the University of Wisconsin at Madison.

Hydrogen is a power source for fuel cells, batterylike devices that convert hydrogen and oxygen directly into electrical energy with little or no waste. Hydrogen production is energy intensive, making fuel cells expensive to operate, Dumesic said.

"Right now, most of the hydrogen from fuel cells comes from petroleum," he said. "We're looking at making hydrogen from renewable resources, like corn stalks."

If it works, it would be possible to get large amounts of a clean, energy-rich fuel from waste plant

products, such as tons of leftover sugar cane, weeds and wood, and even from such animal byproducts as cheese whey.

Dumesic and his colleagues have devised a way of getting hydrogen from vegetable matter by heating it to about 437 degrees,

about 120 degrees lower than current methods of hydrogen production. The process produces only small amounts of carbon monoxide, which degrades fuel cells Dumesic said.

A number of automakers have built or are planning prototypes powered by fuel cells.

# Ethyl Benzene vs. Hydrogen Combustion

Ethyl Benzene, $C_8H_{10}$	4564 kJ/mol
Hydrogen, $H_2$	286 kJ/mol

It will take a huge volume of hydrogen, compared to gasoline (15 times the number of moles), producing more than 3 times the water vapor.

# U.S. Natural Gas Demand and Supply Sources

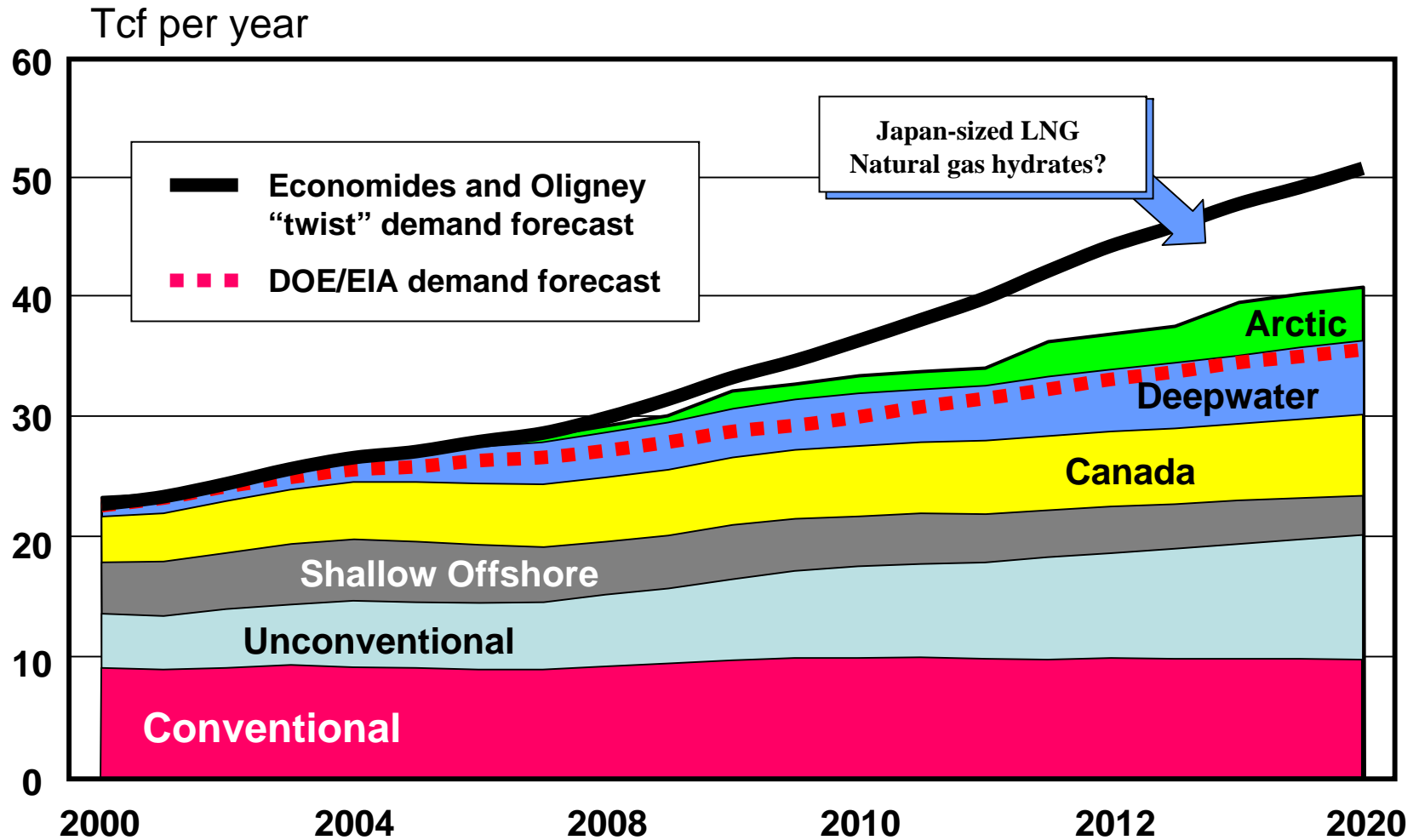




Photo Courtesy of BP



Announced  
June 12, 2001



Announced  
October 29,  
2003



**Shell LNG**

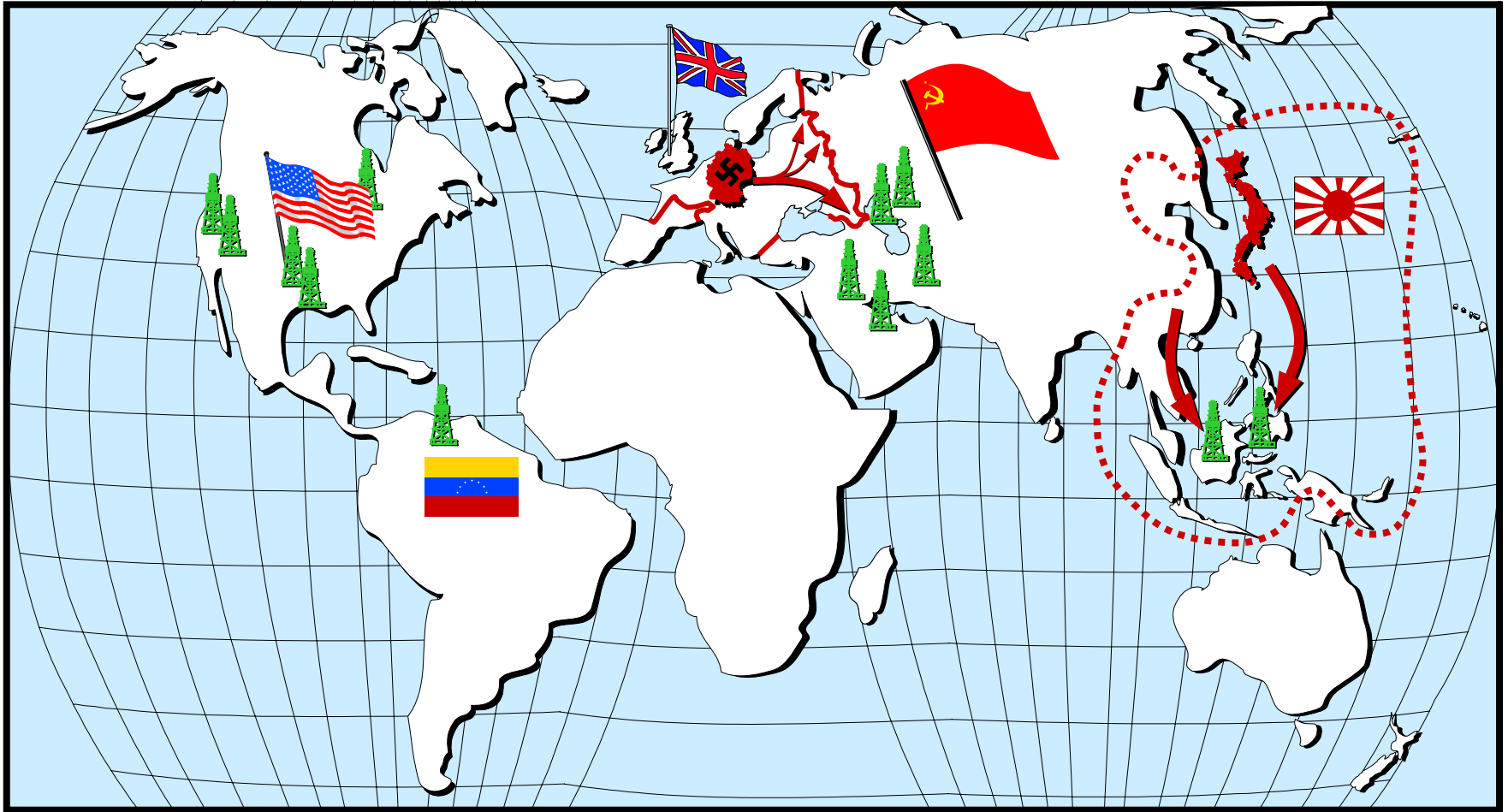
**Exxon Mobil** announced plans to build the nation's largest LNG import terminal for 2 BCF/d from Qatar to land-based locations at either Corpus Christi, Sabine Pass or Mobile, Ala. **October 15, 2003**



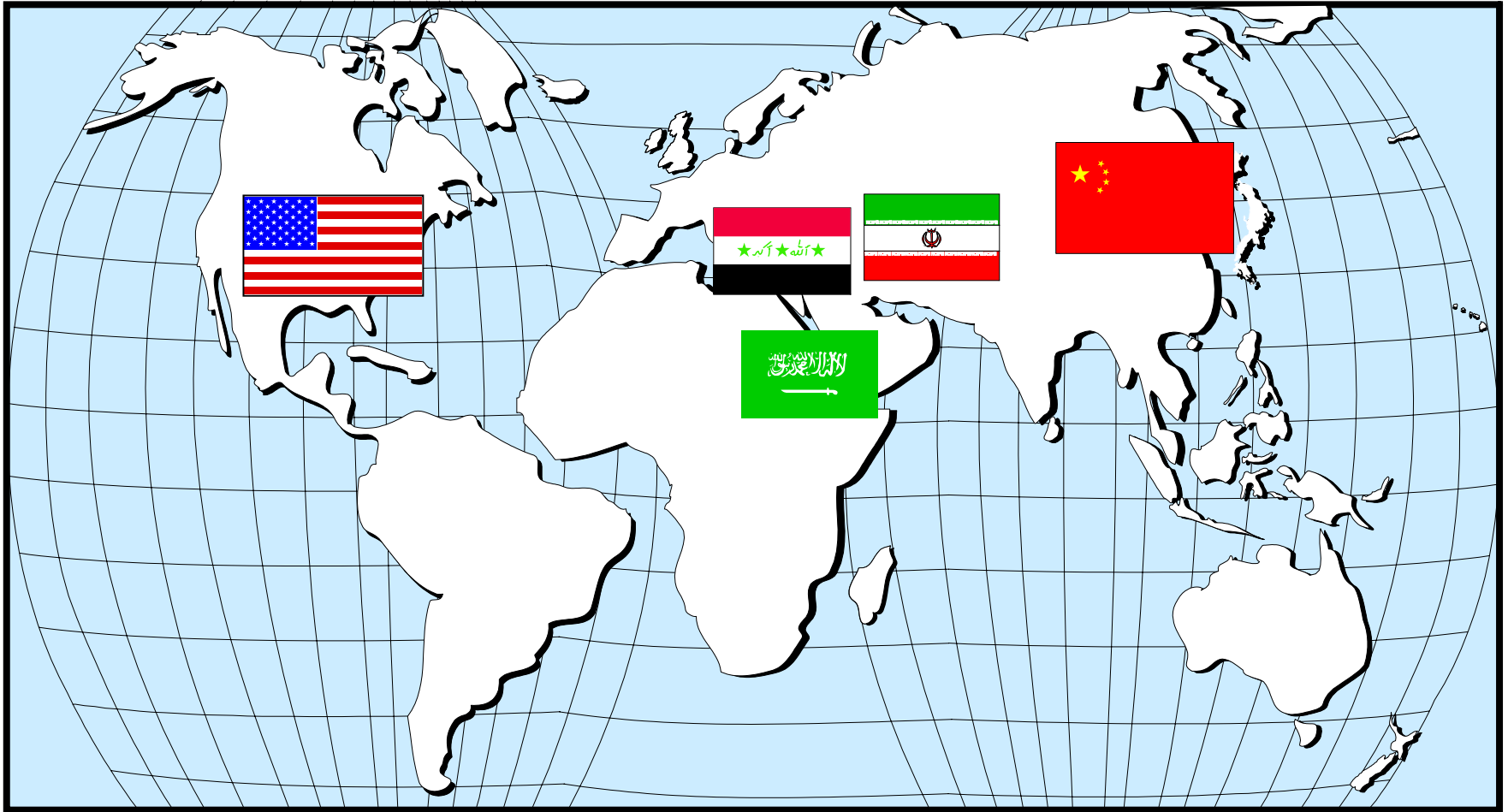


ΠΟΝΕΜΟΣ ΠΑΝΤΟΝ ΣΑΤΗΡ

# The Color of Oil is “Red”



# The Color of Oil is (still) “Red”



# The Middle East



# The Washington Post

## How Will We Manage the Oil?

By Michael J. Economides

Sunday, February 9, 2003; Page B07

*"Whoever conquers a free town and does not demolish it commits a great error and may expect to be ruined himself."*

-- Niccolo Machiavelli, "The Prince," 1513

With war against Iraq now almost certain, and assuming that we are still a country that abides by the rule of law, it is worth remembering that "legality of the war is irrelevant to effectiveness of the governing law." The 1969 Vienna Convention, which the United States prominently signed, describes the rules that a "belligerent occupier" must follow in administering an occupied territory. They are a far cry from Machiavelli's famous quotation.

This becomes important because of the accusation -- often repeated by Iraq and many others, including close allies of the United States -- that the purpose of the war is to take control of Iraqi oil. Such an act would in fact be a war crime, and avoiding it would be a formidable task, when one considers the Iraqi petroleum potential, oil's unique position in the Iraqi economy and the importance of reasonably priced oil to our own economy.

This is why past and present senior U.S. military commanders have voiced skepticism not about the result of the war, which is all but certain, but for what comes after. Occupation and subsequent management of a country are a hugely difficult problem.

This is what the Vienna Convention requires from the belligerent occupier: "The occupant must continue orderly government and may exercise control over and utilize the resources of the country for *that* purpose and to meet his own military needs."

"Services may be requisitioned, but workers cannot be forced to operate against their country, and are limited to providing *local needs*. They cannot be used for the general benefit of the occupier's homeland."

The words I emphasize are critical. Part of Iraqi oil can be used to pay for the occupation's military cost, but the rest of it must be used strictly for the benefit of the Iraqi people and the reconstruction of the country.

The meaning of this is simple; its accomplishment will be a nightmare. The United States military and the government back home, with a presumably uncooperative Iraqi population, at least at the beginning, and with many oil wells undoubtedly damaged by the war or premeditated sabotage, will have to quickly become one of the largest oil companies in the world.

It's hard to manage an oil company in the most peaceful of times and with some of the most skillful managers. Doing this right in the postwar Iraqi environment will be a breathtaking achievement. The fact that about 20 countries, from Russia to France to China, have interests in Iraqi oil production exacerbates the situation further. This situation will create economic, legal and technical problems, which have hardly been debated as the war drums deafen us.

How will we run the Iraqi oil industry, which we must do, as it is the only income source for that population? Will we increase production by using technology not currently available because of the sanctions? Will we produce more oil to lower world prices, benefiting the United States and the rest of the developed world, already in a prolonged economic downturn, or will we produce less, for example obeying OPEC quotas, benefiting the Iraqi treasury, whose well-being will become our responsibility as the occupier?

There are even more vexing questions beyond the macroeconomic issues. Will our Iraqi oil managers choose drilling targets in difficult geologic structures currently impossible in a constrained Iraqi oil industry? Will they use complex wells, stimulation, drilling and measurement technologies? And would all this optimization and engineering fly against the Vienna Convention, which seems to suggest maintaining production without further exploitation, which would seem and indeed be for the benefit of the occupier?

And there is a final issue. Who will do all this? Petroleum engineers and roustabouts recruited from Houston, Midland and Oklahoma City, along with a sprinkling from Aberdeen, Scotland?

The 1991 Persian Gulf War had the fig leaf of respectability under the U.N. umbrella. Getting the Iraqi army out of Kuwait was easy, a discernible aim and painless. No war was declared and the niceties and ethics of modern warfare and behavior did not have to be tested. To invade Iraq, occupy it and manage it afterward is another matter, and I can only hope that the U.S. government, in addition to the military operations plan, also has a petroleum management plan.

The writer is a professor at the Cullen College of Engineering at the University of Houston and author of "The Color of Oil."

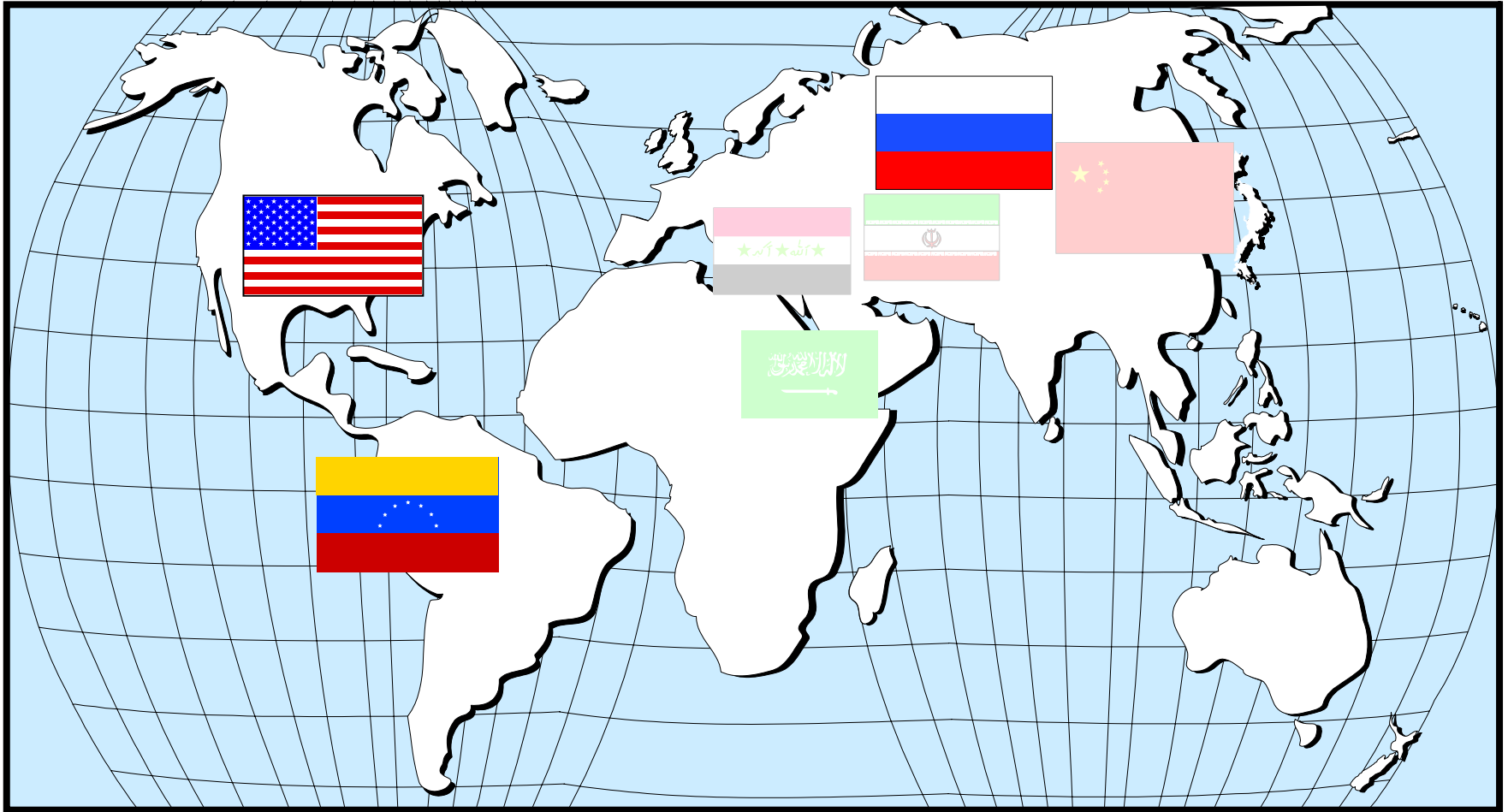
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# The Color of Oil is (a mitigated) “Red”



# Energy troubles in the pipeline from Venezuela

By **LUIGI SAPUTELLI**  
and **MICHAEL ECONOMIDES**

**W**HILE everybody's mind is on Iraq, Saudi Arabia and the Middle East, a potentially more serious crisis is brewing much closer to the United States.

An indefinite-duration general national strike protesting the Hugo Chávez regime was launched in Venezuela on Dec. 2. This is the last in a series of one-day general national strikes and a continuous state of protest that marred the entire year.

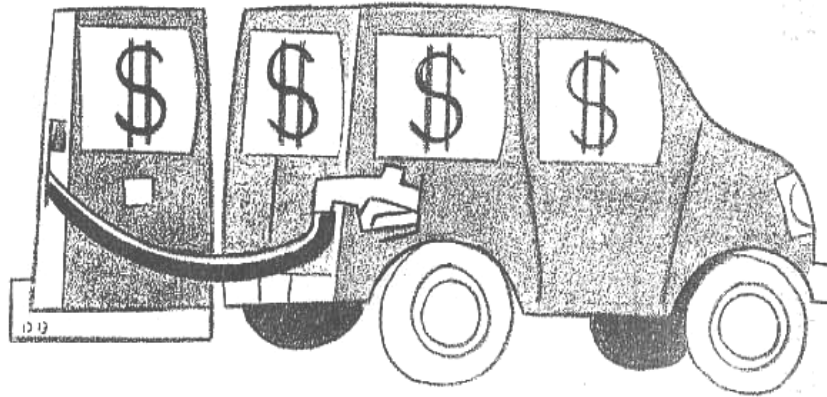
Chávez, a populist politician in the style of Eva Peron and an admirer of Fidel Castro type anti-Americanism and class-based politics has managed to polarize Venezuela between supporters and opponents in a way few other nations have ever observed. "Either you are with me or against me."

Critical to the outcome of the current protest would have been whether oil workers of the state oil company, PDVSA, would support the next general strike. After all, oil accounts for 80 percent of the nation's exports, 50 percent of the government's revenues and at least 25 percent of the entire national economy. The PDVSA workers went out in a huge way, paralyzing the nation's oil activities with enormous future implication. The impact of this decision on Venezuela and the United States is still unfolding.

It all started when armed forces were sent to the streets in place of the mutinous metropolitan police in Caracas. Troops were also sent to guard oil facilities and many other state-owned organizations, in an effort to pre-empt government opposition actions.

Events unfolded quickly. On Dec. 4, marine terminals throughout the Venezuelan coast stopped almost all crude and gasoline shipments. This affected the entire upstream and downstream supply chain. The El Palito, Jose and Paraguana refinery complexes, totaling 1.2 million barrels per day of refined products, were all shut down.

After a week of strike, virtually all Venezuela's industries have drastically reduced



Saputelli is an engineer for PDVSA, Venezuela's state oil company, on assignment in Houston. Economides, also a petroleum engineer, is a professor at the University of Houston.

or completely stopped operations.

Chávez has tried to mitigate gasoline and crude oil distribution by replacing oil workers with armed troops or urban guerrilla militants. But it would take a lot more than this show of force to operate the oil industry.

The effects of the strike are already cascading, and they are moving our way. Refineries in Curacao and along the U.S. Gulf Coast have not received their usual cargo shipments. Venezuelan oil storage in the Caribbean may ameliorate the shortfall for a few days, but it will take a long time to go back to normal.

An oil disruption of about 2.7 million barrels, of which 1.2 million is refined products, the overwhelming portion of which goes directly to the United States, will bring severe consequences.

No doubt, oil prices will go up and even higher — even if other countries such as Saudi Arabia attempt to cover the shortfall, the problem is more complex.

Venezuela's crude oil is far heavier than Middle East oils and refineries in the Gulf

of Mexico are designed for such feedstocks. The refineries using high conversion capacity (heavy oil cracking) will be negatively affected. Mexico will then monopolize the heavy oil supply in the Gulf Coast.

This will cause the differential price between light and heavy crude oils to narrow, significantly increasing the price of gasoline and other refined products that U.S. consumers will pay. This could be the least of our problems. Shortages could be devastating.

Chávez is a problem. His impact on the U.S. energy security and economy may in fact be more serious than Saddam Hussein's.

Last Sunday, an uncompromising Chávez declared the strike "criminal" and "insurrectional." He also warned that he would order his troops to "crush" political opponents.

This attitude does not bode well for either Venezuela or the United States. Venezuela's economy has imploded in the past year and has scared away almost all foreign investment. For the United States, the Venezuelan situation is quite dangerous, coming at a highly inopportune time — just as this country may be embarking on a high-stakes war in the Middle East which itself will have unavoidable consequences for energy prices and supplies.

# Russian Oil and Gas

- **Oil Production\***

- **1995            6300**
- **2000            6550**
- **2001            7050**
- **2002            7700**
- **2003            7900**
- **2004 (Est.) 8680**

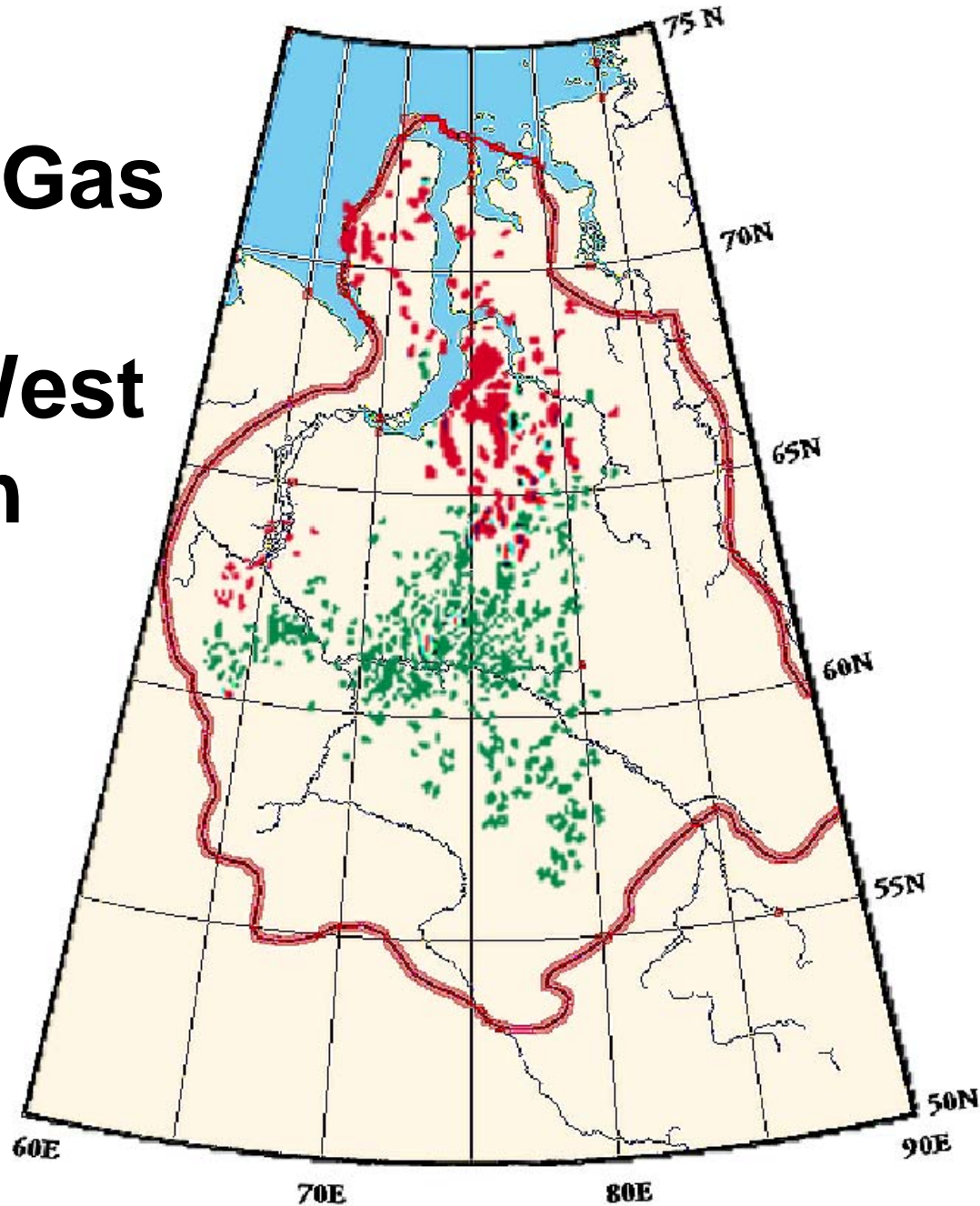
**\* (1000 barrels/day)**

- **Natural Gas\***

- **1995            57**
- **2000            56**
- **2001            55**
- **2004            57**

**\* (BCF/day)**

# Oil and Gas Fields In the West Siberian Basin



# Gas Reserves by Country, 2004

## (Oil&Gas J.)

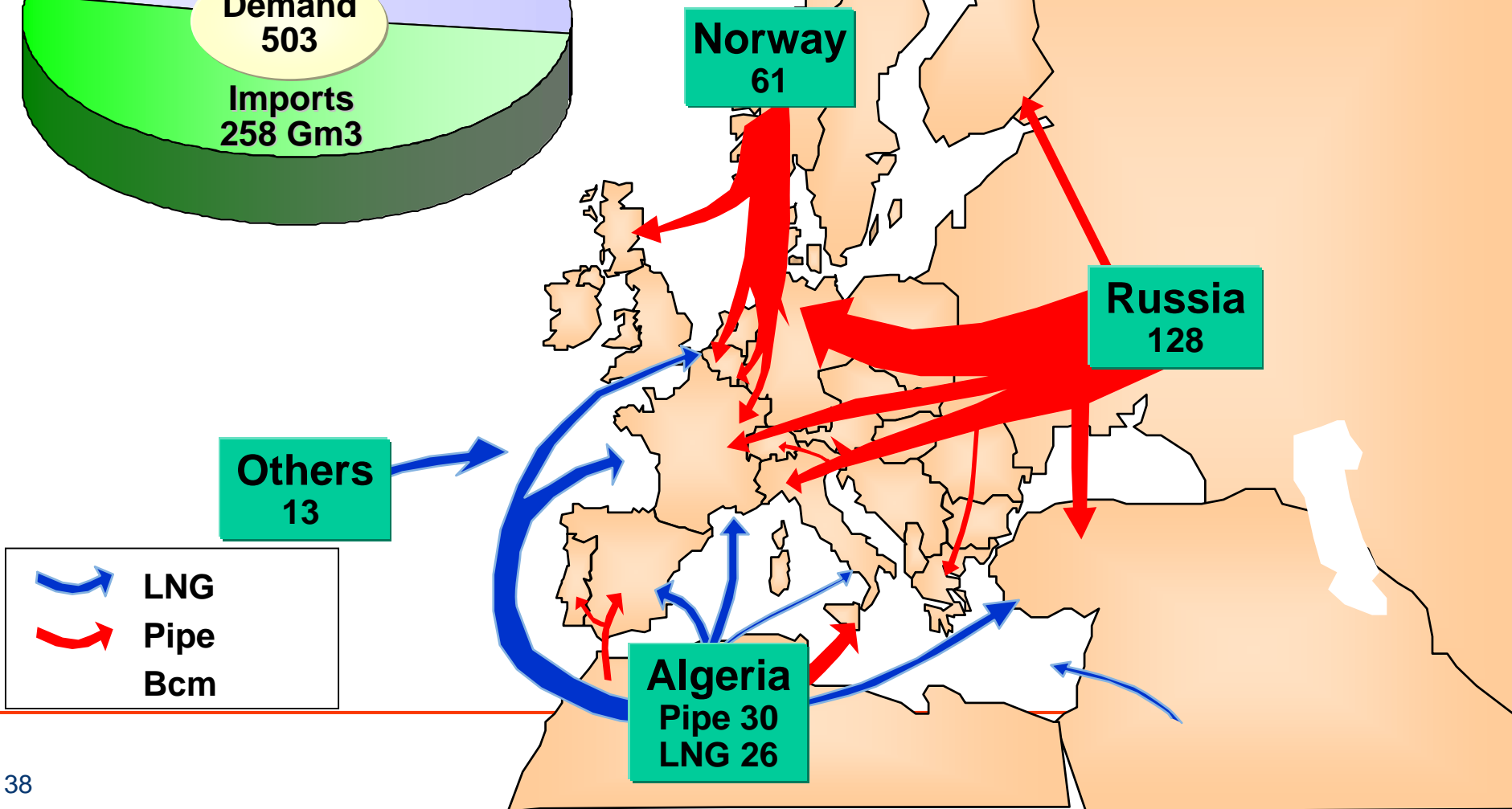
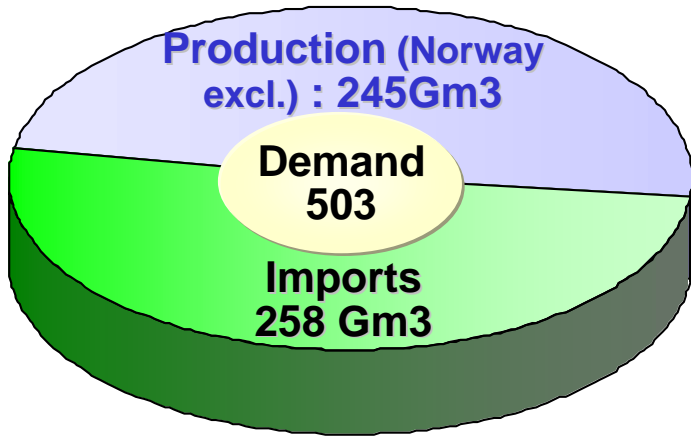
- Top gas reserves by country, TCF
- World reserves: 5504 TCF

1.	Russian Federation	1680
2.	Iran	812
3.	Qatar	508
4.	Saudi Arabia	224
5.	UAE	212
6.	USA	187
7.	Algeria	160
8.	Venezuela	148
9.	Nigeria	124
10.	Iraq	110
11.	Indonesia	93
12.	Australia	90
13.	Norway	77
14.	Malaysia	75
15.	Turkmenistan	71
16.	Uzbekistan	66
17.	Kazakhstan	65
18.	Netherlands	62
19.	Canada	60
20.	Egypt	60

# From a European perspective: Russian gas

## 2002 Gas Supply

Source : Cedigaz (y.c. Turquie)





KGB



**President Vladimir Putin**



**Komsomol President**



**At the US Embassy on July 4, 2003**



**Mikhail Khodorkovsky  
Yukos CEO**



# Khodorkovsky in Prison

(The Moscow Times, Nov. 13, 2003)



RUSSIA

# Messy Road to Energy Dominance

By MICHAEL J. ECONOMIDES  
AND RONALD E. OLIGNEY

**M**OSCOW — As Americans worry about Middle East oil supplies, a much bigger energy drama is playing out in Russia. That country now produces about as much oil as Saudi Arabia, exports about 4 million barrels a day and is unabashedly moving toward increasing production. When this is considered alongside Russia's probable dominance in the natural gas market over the coming decades, it becomes apparent that the most radical energy realignment in the world since the creation of OPEC and the 1973 Arab oil embargo is underway.

But the road to energy dominance is not proving an easy one. Late last month, the government of President Vladimir V. Putin arrested oil magnate Mikhail Khodorkovsky on charges of fraud and tax evasion. Last week, the government impounded his shares — some 44% of the total — in the country's largest oil company, Yukos.

With a net worth estimated at \$8 billion and labeled by some as "Russia's Bill Gates," Khodorkovsky was allowed during the Boris Yeltsin era to purchase Yukos for a relatively small sum in a controversial 1996 privatization deal. In recent months, ExxonMobil and ChevronTexaco have been among the U.S. oil companies bidding furiously to acquire a piece of

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Yukos.

Speculation is rampant about the government's motivation in arresting Khodorkovsky. The Yukos chief had made his interest in reforming Russia's political structure apparent. He donated large sums to opposition parties, and he has been mentioned as a possible presidential candidate. One theory is that it was these political actions that prompted his arrest.

Others speculate that the move is part of a government bid to renationalize the energy industry.

Whatever the reason, the Khodorkovsky arrest complicates Russia's energy future. The country's ascendancy in the energy world has been an important counterbalance to the power of the Organization of Petroleum Exporting Countries. Many in the West hoped it would also point

the way to a new-style Russian economy and society.

Two decades ago, the Soviet Union's overreliance on oil revenues for foreign currency contributed to its demise. The oil price collapse of the mid-1980s, following deliberate overproduction by Saudi Arabia, caused many internal fractures in the Soviet regime to become gaping holes, in part because of the country's almost

exclusive dependence on oil revenues for hard currency. Some have worried that, in the wake of a collapse in the industrial sector after the fall of communism, Russia is now more dependent than ever on oil. But oil is only half of the story. The bigger Russian future is natural gas.

Gradually, over the last 15 years, the world — led by the United States — has moved toward making natural gas its fuel of choice. This is proving to be a revolutionary, though technologically disruptive, transition. But the benefits will prove considerable. Natural gas is a far more efficient and cleaner fuel that lends itself to the miniaturization of the engines it powers. It has a large role to play as we attempt to wean ourselves from carbon fuels.

There are many signs of this shift, the most obvious being that nearly all of the power plants planned or under construction in the United States will run on natural gas. There is little chance that renewable energy like wind and solar power will play a significant role for decades, and perhaps not even then. Consequently, the United States will soon become a massive importer of natural gas in the form of liquefied natural gas.

With by far the world's largest reserves, perhaps as much as 40% of the recoverable natural gas on the planet, Russia will be in the driver's seat for generations to come. China, conveniently on Russia's border, has increased its energy demand by an astonishing 110% in the last decade, and its needs continue to rise.

All of this adds up to one thing: Russia's dominance in energy. That is why the world will be watching closely as Putin moves forward — both with his prosecution of Khodorkovsky and with his country's move to exploit its considerable energy reserves.





# China Keep the Lights On?

# China vs US Consumption

- **In the last decade China's oil consumption increased by 3.5 million barrels per day, the largest in the world by far.** (The US consumption increased by 1.8 million barrels per day)
- **If China were to use the same per capita consumption, as the US, it would require 80 million barrels per day** (more than the entire world use.)

# China and Russia

- **Energy will be China's choke point**
- **Expect a very assertive, if not belligerent, posture. This would be the normal expectation**
  - Geopolitically, seeking the same energy sources as the West
  - Domestically, embarking on massive nuclear development (with all its other ramifications)
- **China's energy future passes through Russia**



OIL  
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GAS

OIL  
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