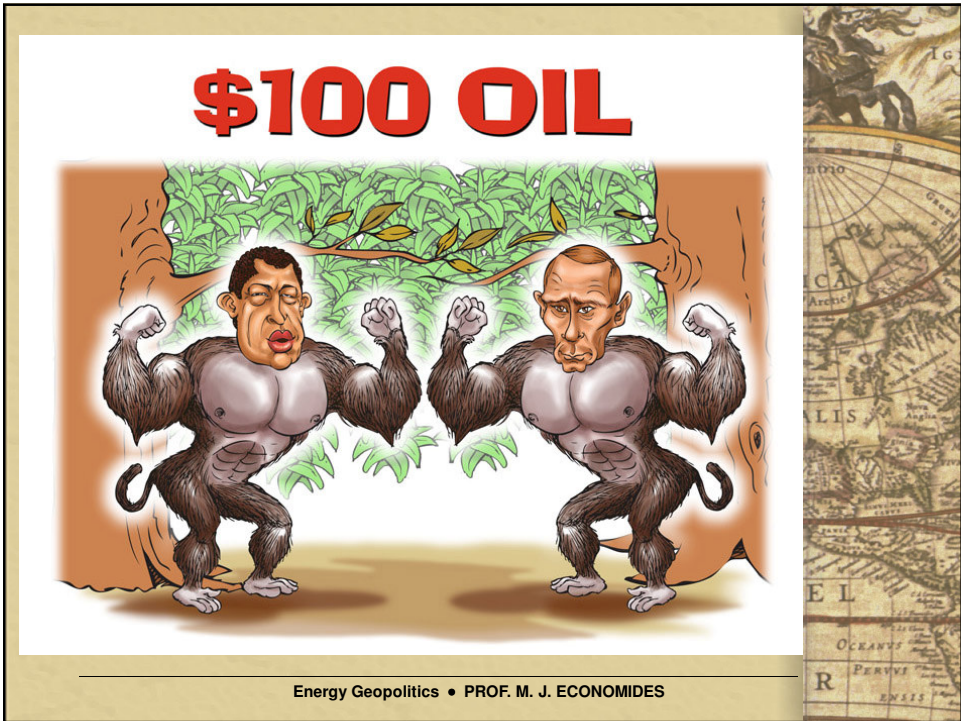


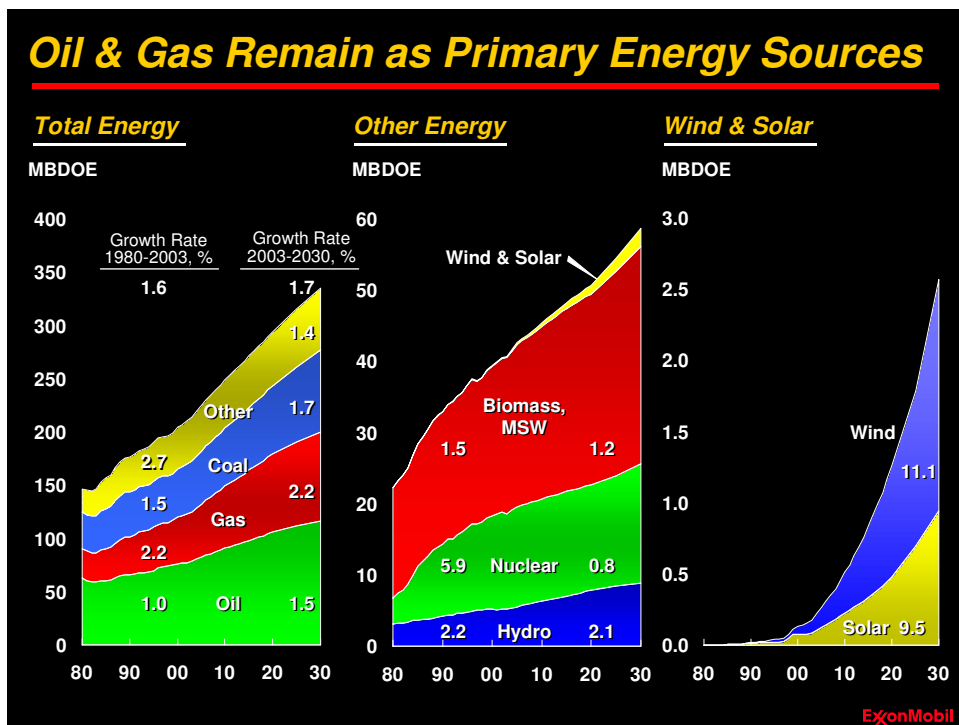
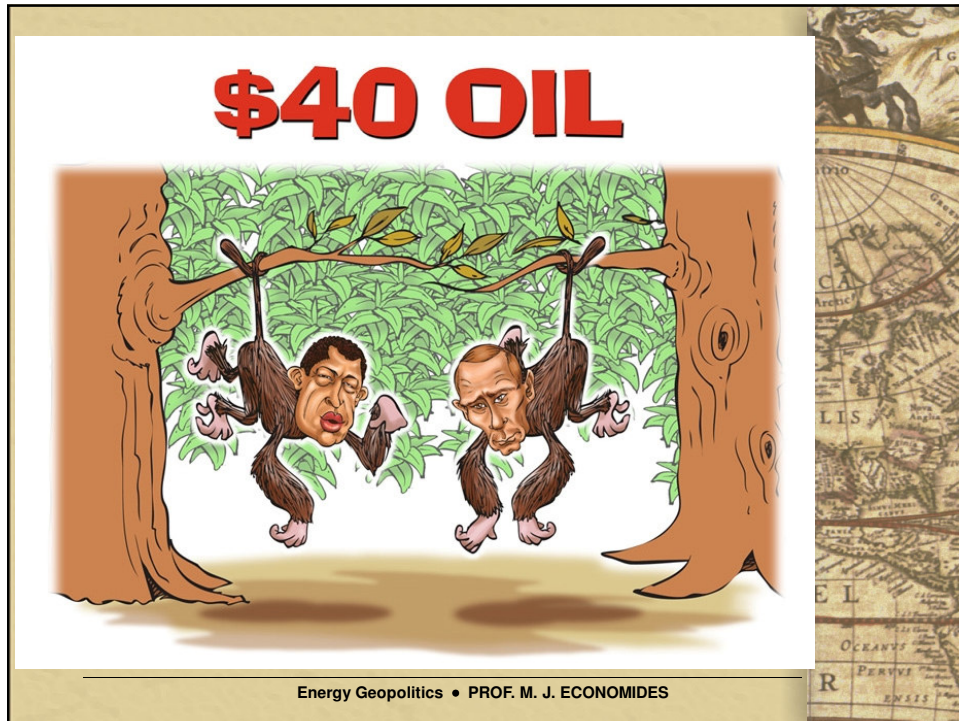
## **The Continuous Energy Crisis of the 21st Century**

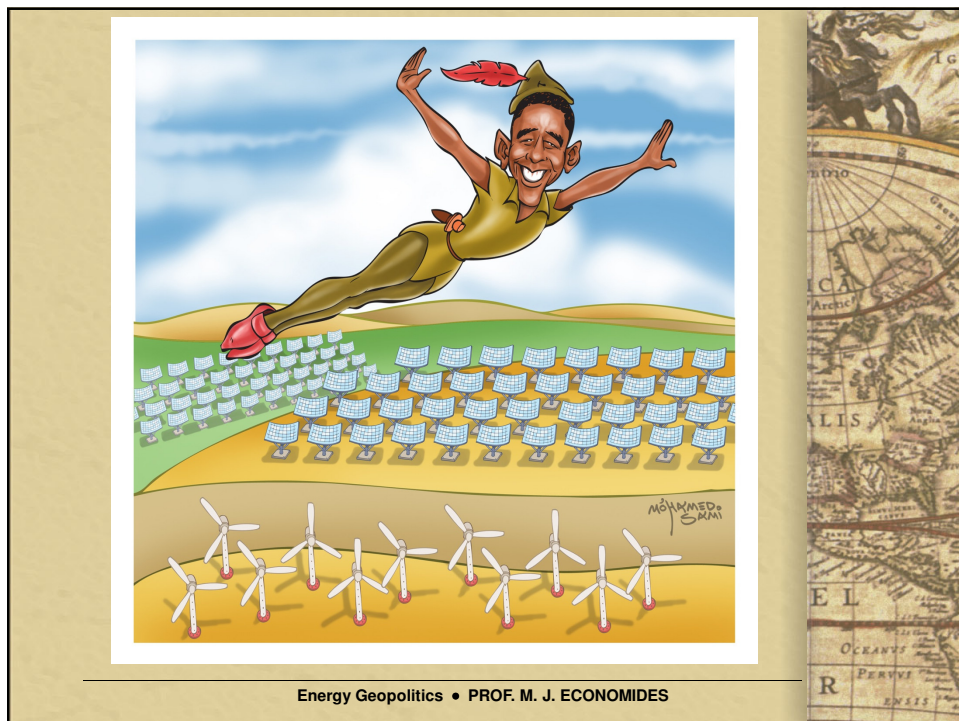
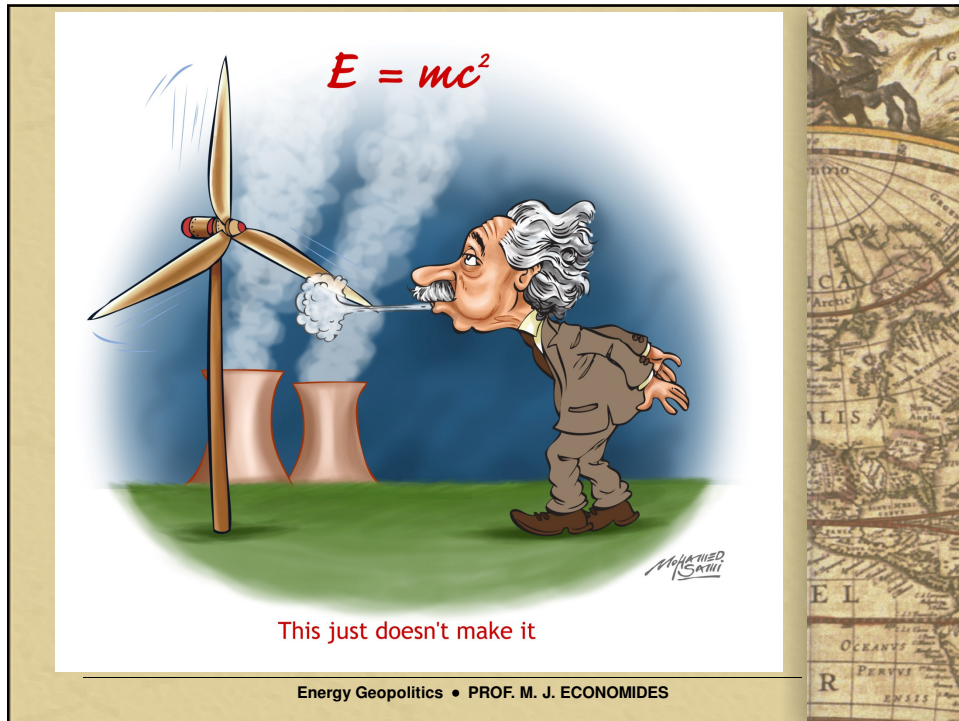
- ✓ **Oil almost \$150, then fell to below \$40...  
headlines rule ... "crisis"**
  - ✓ OPEC has little excess capacity "behind the valve", Venezuela, Nigeria, Iraq
  - ✓ China still grows in economy and energy
- ✓ **Saudi Arabia world regulator**
- ✓ **Last March I predicted \$100 for early 2011 before the North African turmoil.**

NATURAL GAS • PROF. M. J. ECONOMIDES













Sunday, Sept. 1, 2002    Houston Chronicle    ★★    7D

---

## 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 150 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.

Energy Geopolitics • PROF. M. J. ECONOMIDES

# Golfing for Hydrogen

**YAHOO! FINANCE** Search - Finance Home - Yahoo! - Help

Welcome, pelewis [Sign Out] Money Manager - My Yahoo! View - Customize

**Financial News**

Enter symbol(s) Basic Get Symbol Lookup

**Press Release** Source: WCI Communities, Inc.

**Golfers to Drive the Hydrogen Highway**

Tuesday April 6, 10:09 am ET

**Developer WCI Communities Embarks on One-Year Hydrogen Fuel Cell Research Project at Venetian Golf & River Club**

VENICE, Fla.--(BUSINESS WIRE)--April 6, 2004--Golfers driving the fairways at WCI's (NYSE:WCI - News) Venetian Golf & River Club are helping pave the way for what many believe will be the energy source of future generations: hydrogen.

ADVERTISEMENT

With the Country's dependence on fossil fuels hitting an all time high, and consumers paying the price at the gas pump with prices approaching the \$2.00 mark, the recent installation of a hydrogen fuel cell at the Venetian Golf & River Club in Venice, Florida marks the first partnership of its kind between Florida Power & Light Company (FPL) and a builder-developer for fuel cell research in the State of Florida. Other partners have included governments and universities.

**Related Quote**

WCI 23.22 +0.33 News

**Related News Stories**

- ADVISORY:Media Advisory - Earth Day Feature - Business Wire (1:30 pm)
- WCI Announces Annual Shareholders Meeting - Business Wire (Tue Apr 20)
- WCI COMMUNITIES INC Files SEC form 8-K: Financial Statements and Exhibits - EDOAR Online (Fri Apr 16)
- WCI Reports Record Quarterly Orders and Backlog - Business Wire (Thu Apr 15)

Energy Geopolitics • PROF. M. J. ECONOMIDES

# Bovine Brain Power > Mad Car Disease?

**US cattle brains may be turned into biofuels-USDA**

File Edit View Favorites Tools Help

Address C:\D\WrdFiles\Corps\EOU\Wacky\US cattle brains may be turned into biofuels-USDA.mht

**YAHOO! FINANCE** Search - Finance Home - Yahoo! - Help

Welcome, pelewis [Sign Out] Money Manager - My Yahoo! View - Customize

**Financial News**

Enter symbol(s) Basic Get Symbol Lookup

**Reuters**

**US cattle brains may be turned into biofuels-USDA**

Monday May 17, 5:32 pm ET

By Richard Cowan

WASHINGTON, May 17 (Reuters) - Cattle brains and other remains that may carry the deadly mad cow disease would be turned into biofuels under a plan announced on Monday by the U.S. Department of Agriculture.

**Top Stories**

- Stocks Hit 2004 Lows on Iraq Oil Prices - Reuters (4:42 pm)
- Average Gasoline Price Tops \$2 a Gallon - Reuters (4:43 pm)
- Lucent Employees Charged by SEC - Reuters (5:41 pm)
- Oil Strikes High on Stubborn Supply Fears - Reuters (3:36 pm)

Energy Geopolitics • PROF. M. J. ECONOMIDES





Energy Geopolitics • PROF. M. J. ECONOMIDES

## The Ethanol Scam



Energy Geopolitics • PROF. M. J. ECONOMIDES

## Ethanol from Coal or Gas

- ✓ Celanese Corp. announced on Nov. 10, 2010 an “innovative technology to extract ethanol from hydrocarbon feedstocks” such as coal, natural gas and pet coke
- ✓ **This should kill corn based ethanol. It is both logical and necessary**
- ✓ American ingenuity at its best

Energy Geopolitics • PROF. M. J. ECONOMIDES

## Wind Power Exposed: Expensive, Unreliable and Won't Save Natural Gas



UK Ofgem: wind “grossly distorting the market”  
29.7% of cost for 1.3% of electric supply  
Load factor: 27.4%. Gas demand goes up

Energy Geopolitics • PROF. M. J. ECONOMIDES



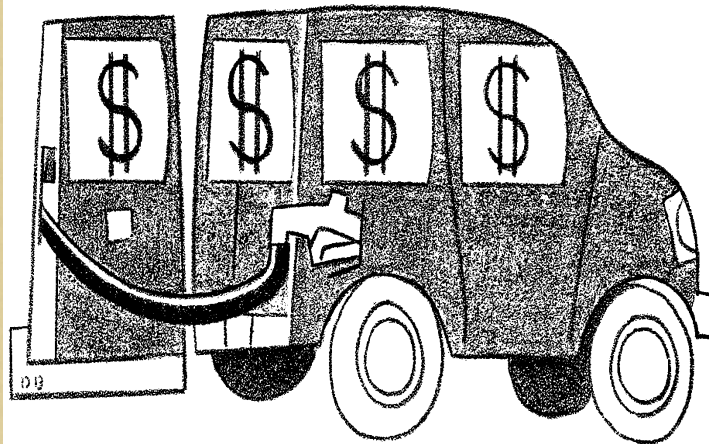
## Texas Wind

- ✓ **Installed capacity: 9,400 MW, #1 in the United States**
- ✓ **On February 2, 2010 at 9:50 AM, total wind output was 527 MW**
- ✓ **About 5.6 % of installed capacity**
  - ✓ (Clifton Andrews, Houston Chronicle, Feb. 7, 2010)

Energy Geopolitics • PROF. M. J. ECONOMIDES

### Outlook

Items on this page do not necessarily reflect the opinions of the Houston Chronicle



### Keep driving those SUVs — the oil will be there

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

**T**HE Organization of Petroleum Exporting Countries has announced a 700,000-barrels-per-day increase in production. This amounts to little more

than a temporary reprieve. Economides and Oligney are professors at the University of Houston, advisers to Fortune 500 companies, and authors of *The Color Of Oil: The History, the Money and the Politics of the World's Biggest Business*.

they play. "Chief, the oilman, OPEC's commodity is

press, Daimler Chrysler and Dell all have this in common.

In the energy business, arguably the most essential element of the emerging modern world, new-economy companies include the newly merged El Paso, Enron, Burlington Resources, Schlumberger and the revamped Halliburton.

**Energy  
Expert**



## Energy



AUGUST 26, 2002

www.time.com AOL Keyword: TIME

# TIME

# HOW TO SAVE THE EARTH

HBXBDJLX\*\*\*\*\*CAR-RT LOT\*\*C-027  
00576 5534 160H TD 4205TX32 JUND4  
CHRISTINE ECONOMIDES 0029  
H04292  
11611 HABERSHAM LN P00254  
HOUSTON TX 77024-6405

The hot and wild weather is a sign of things to come. But fresh ideas and new technology can cool us down and make this a **GREEN CENTURY**





GREEN CENTURY

inside each  
ing. Because  
are all elec-  
own as "drive  
the mechan-  
instead, driv-  
d grip to ac-  
t to brake.  
providing  
esign they  
out, rather  
compromise  
Christopher  
of "design  
" at GM.



◀ **HOP ON!**  
**The Segway**  
**runs on 5¢ of**  
**electricity a**  
**day. Just lean**  
**forward, and it**  
**accelerates**

Americans' appetite for fast, powerful cars and roomy sport-utility vehicles (SUVs) makes it unlikely that they will ever settle for a two-seater the size of a golf cart that takes 17 sec. to go from zero to 60 m.p.h. (about twice as long as the typical car sold in the U.S.). Hence Detroit's preoccupation with fuel cells, which could ultimately clean up even the most monstrous SUV.

Making personal transport less damaging to the planet means looking beyond cars as well. "If you could wave a magic wand and make

**Robotic Lawn Mower** Here's how being eco-friendly can make your weekend easier. While two-stroke weed whackers are horrible for the planet (releasing a billion tons of hydrocarbons into the atmosphere each year), the robomower runs on a rechargeable battery—and it does your lawn for you. Just put down a perimeter wire so it knows where to go, sit back and enjoy the silence. [www.friendlymachines.com]

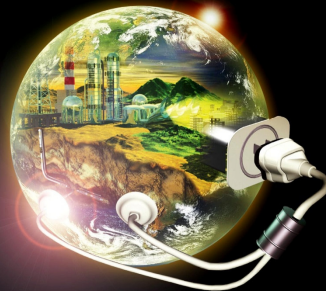




Energy Geopolitics • PROF. M. J. ECONOMIDES

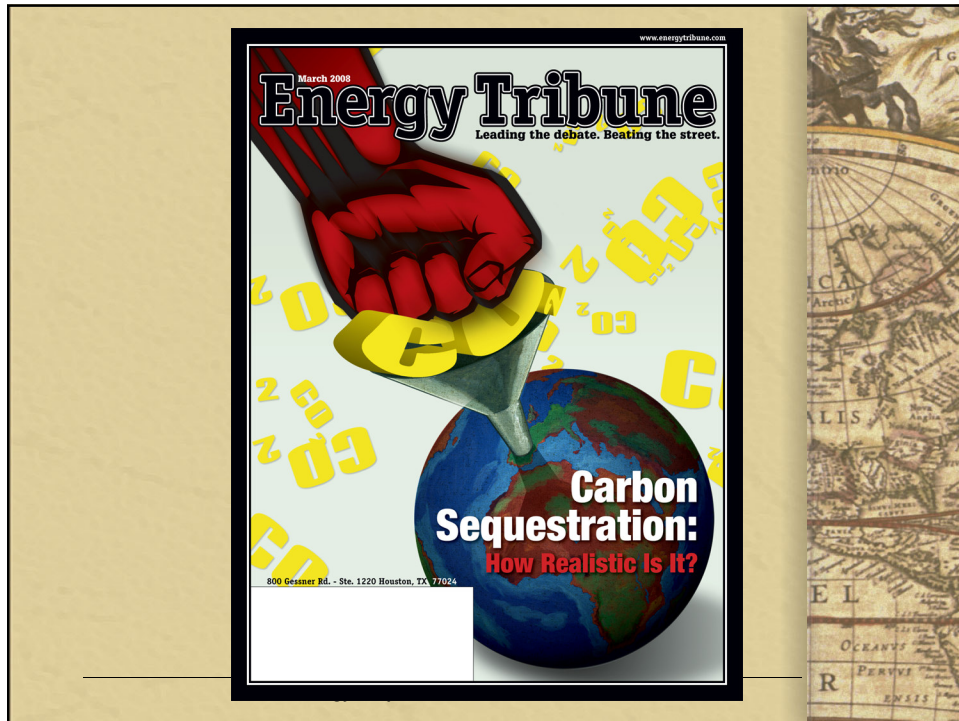
# ENERGY<sup>AND</sup> CLIMATE WARS

HOW NAIVE POLITICIANS, GREEN  
IDEOLOGUES, AND MEDIA ELITES ARE  
UNDERMINING THE TRUTH ABOUT  
ENERGY AND CLIMATE



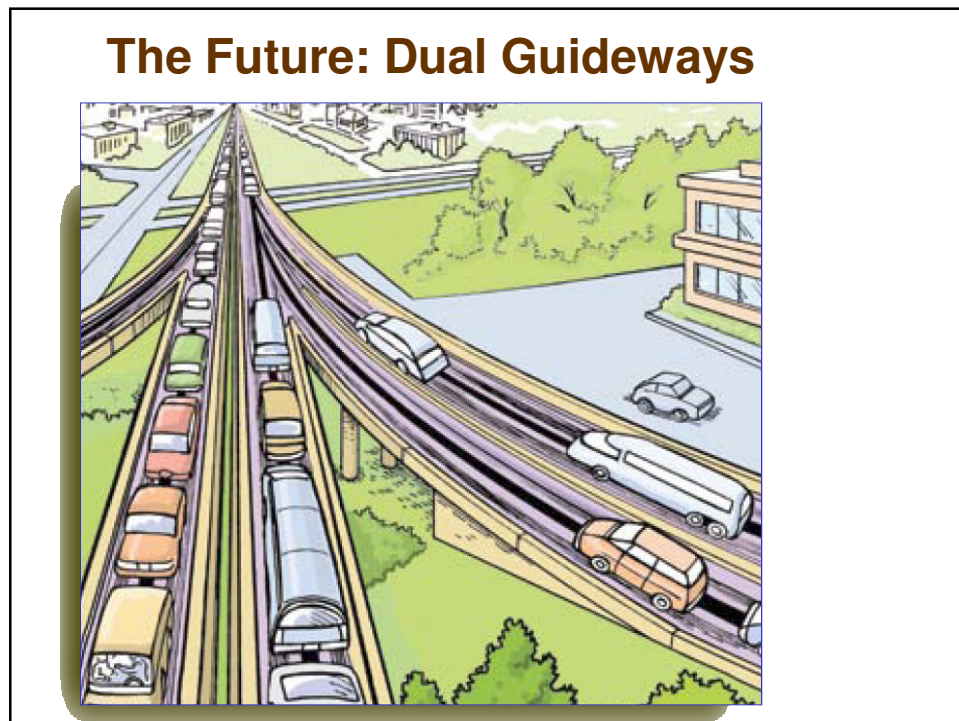
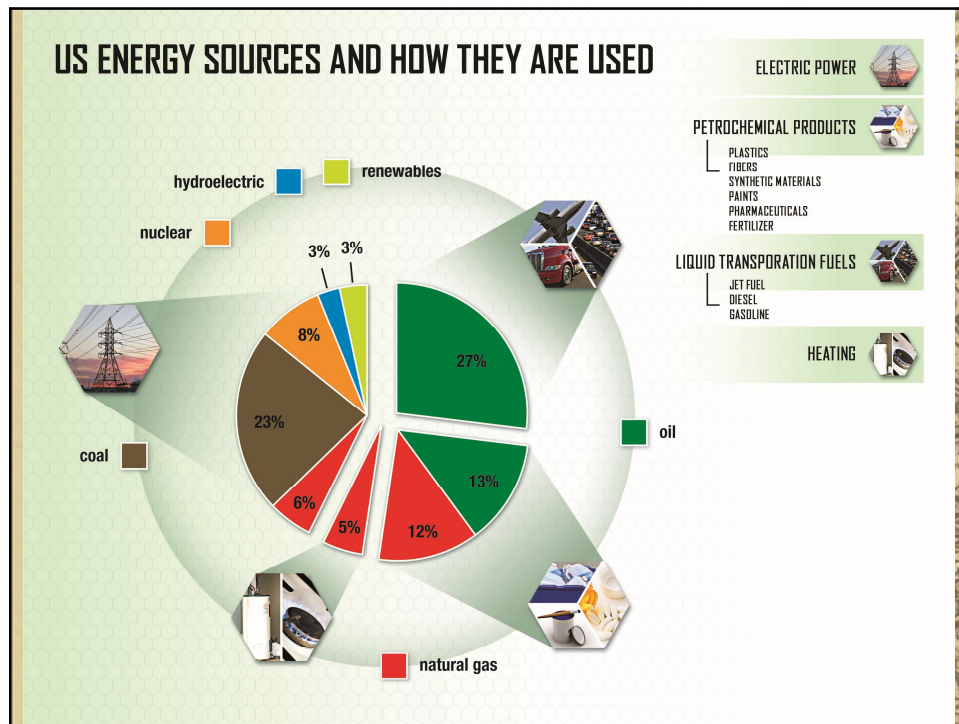
PETER C. GLOVER and MICHAEL J. ECONOMIDES





## The New Energy Economy

	<u>Carbon content:</u>	<u>Increasingly:</u>
• Wood (1800s)	High	• Clean
• Coal	Medium	• Energy intensive
• Oil	Low	• Technologically sophisticated
• Natural Gas	(Zero)	• Distributed
• Hydrogen (envisioned)		



## Natural Gas

- ✓ **International demand destruction is larger than was anticipated**
- ✓ **Because of LNG developments in Qatar, Egypt and Sakhalin 2, there could be 10 Bcf/d excess supply. Considerable impact on gas prices in Europe and the United States – Cheniere LNG**
- ✓ **\$5 gas for two to three years? Devastating impact on US shale gas**

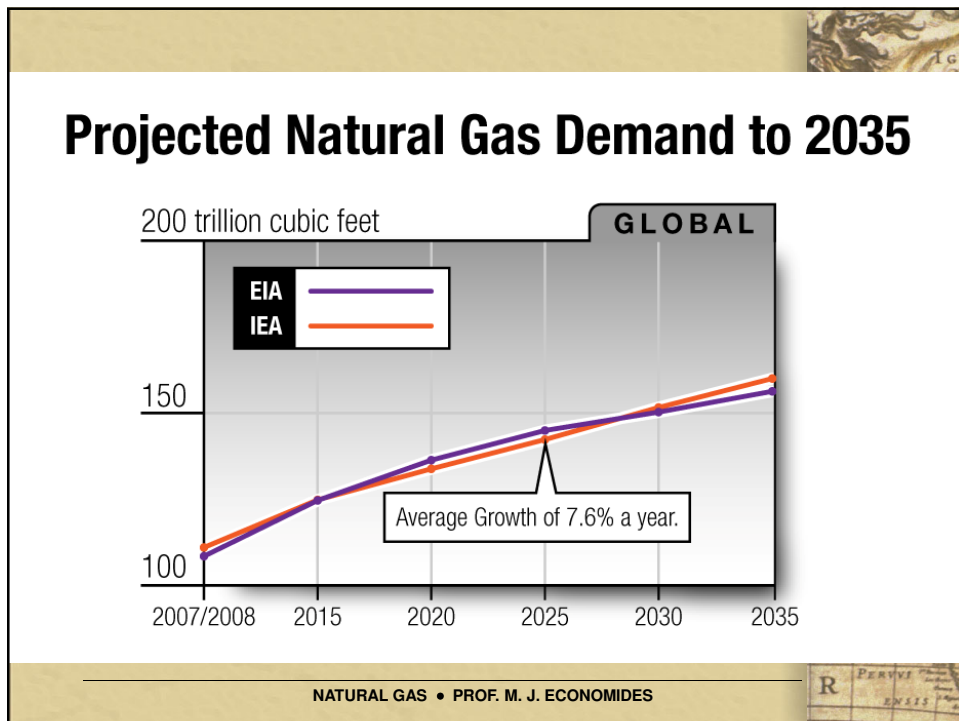
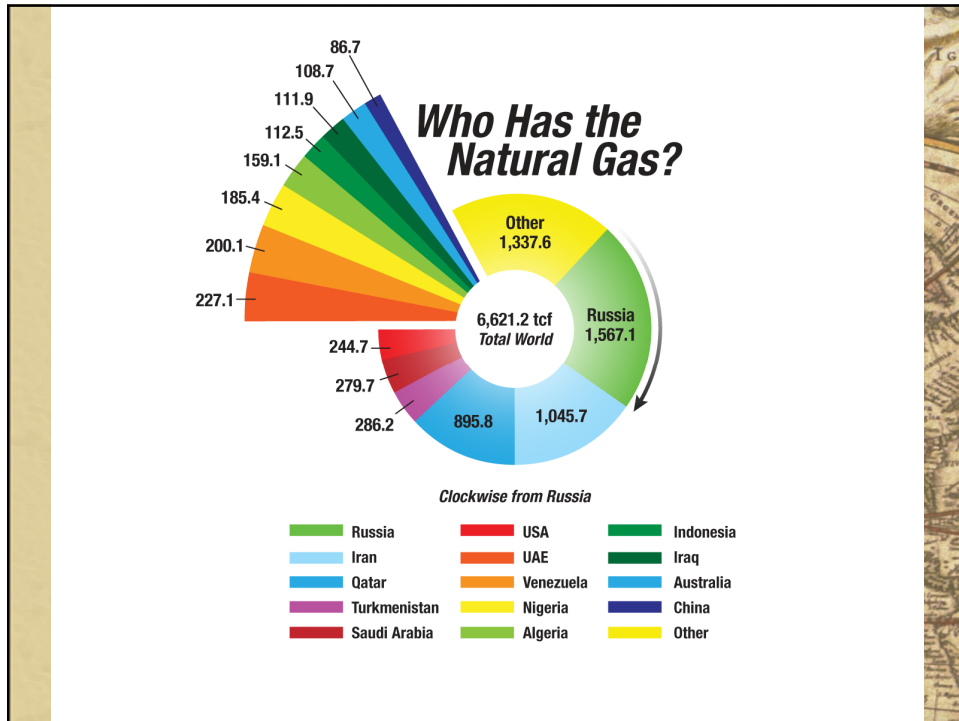
NATURAL GAS • PROF. M. J. ECONOMIDES

## Future Oil and Gas Prices

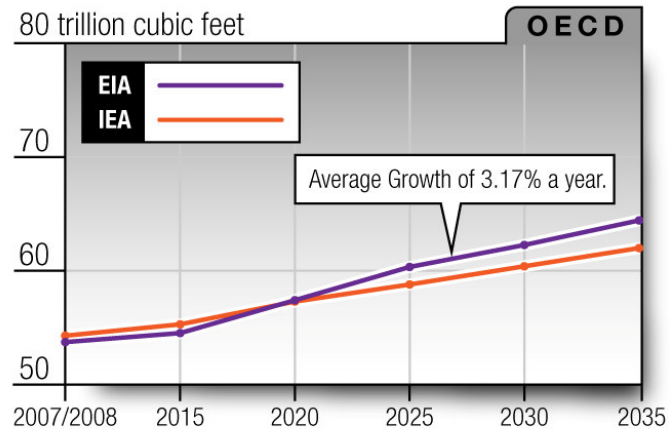
- ✓ **Major BTU disparity lasting decade(s)**
- ✓ **Because of technology challenges (and not just resource availability) and transportation robustness and homogeneity prices the world over will equalize**
- ✓ **\$8 for natural gas in three years ad-infinitum, \$100+ for oil**

NATURAL GAS • PROF. M. J. ECONOMIDES

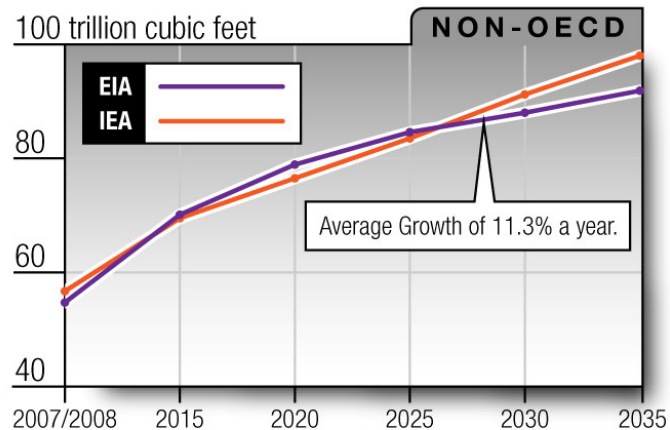




## Projected Natural Gas Demand to 2035



## Projected Natural Gas Demand to 2035





## LNG Tanker Underway

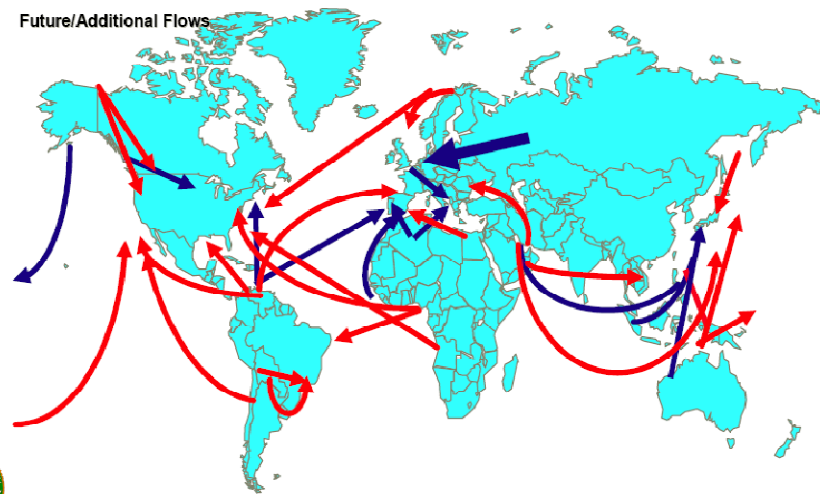


Photo Courtesy of BP

## Globalization of Natural Gas Trade

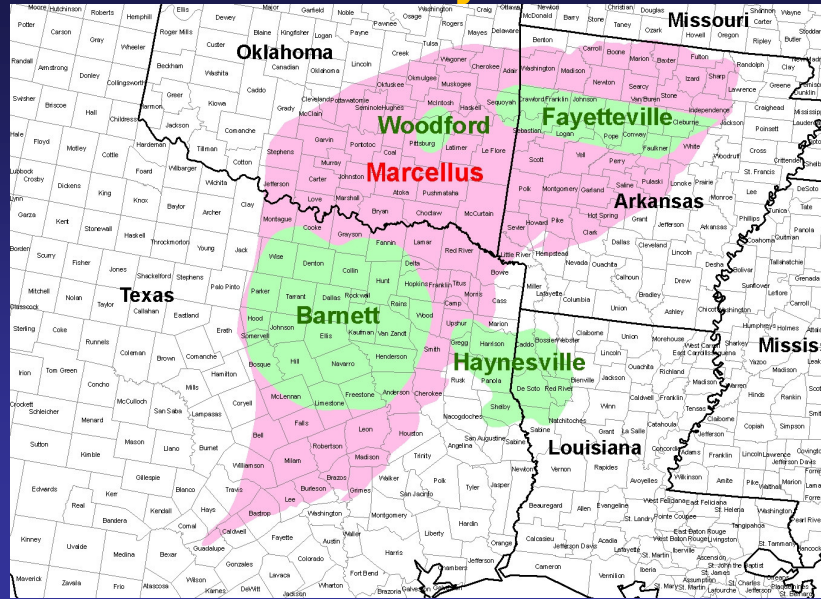
➡ Current flows

➡ Future/Additional Flows



Source: International Energy Agency

# Shale Gas Plays in the US



## What is Shale Gas?

- ✓ **Unconventional**
- ✓ **No porosity to speak of.... Essentially no permeability. Much of the gas is *adsorbed* on the rock surface.**
- ✓ **Creating massive area by drilling horizontal wells with multiple transverse fractures is the obvious way to produce. No other.**
- ✓ **Technology made shale gas a reality.**

NATURAL GAS • PROF. M. J. ECONOMIDES



# MARCELLUS

## SO HOW BIG IS IT???



DATE	AGENCY OR AUTHOR	RECOVERABLE (TCF)
2009	HISCOCK & BARCLAY	516
2008	IOGA OF NY	500
2009	ENGELDER	489
2008	DOE	262
2007	ENGELDER & LASH	168
2008	NCI	34.2
2006	USGS	31
2002	USGS	0.8 TO 30.7
2005	USGS	1.3

Courtesy Greg Wrightstone, 2010

## US SHALE IN THE WORLD



HOW DO THE MARCELLUS AND HAYNESVILLE COMPARE TO OTHER GAS FIELDS WORLD-WIDE?

300 -500 Tcf

World's 10 Largest Gas Fields (2005)	
Source: IEA 2005	
Field Name	Tcf
1. North Field-South Pars (Iran)	1,400
2. Urengoy (Russia)	222
3. Yamburg (Russia)	123
4. Hassi R'Med (Algeria)	123
5. Shtokman (Russia)	110
6. Zapolyarnye	95
7. Hugoton	81
8. Groningen	73
9. Bonavenko	70
10. Medvezhye	68

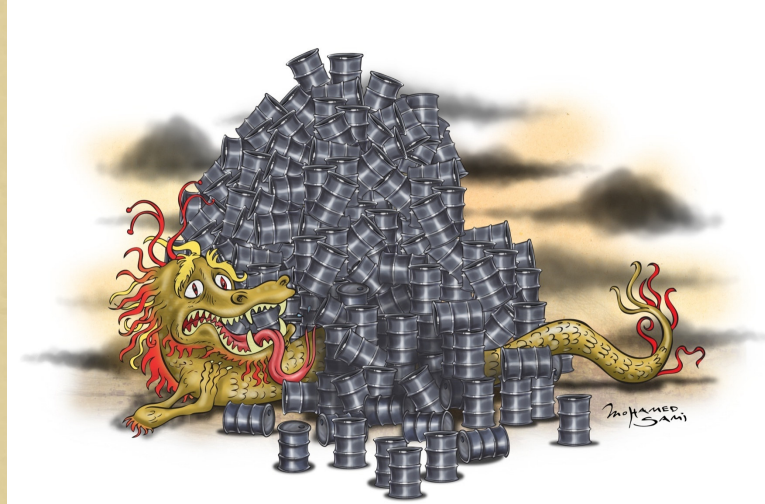
- NATURAL GAS • PROF. M. J. ECONOMIDES

[illegible]

- 21

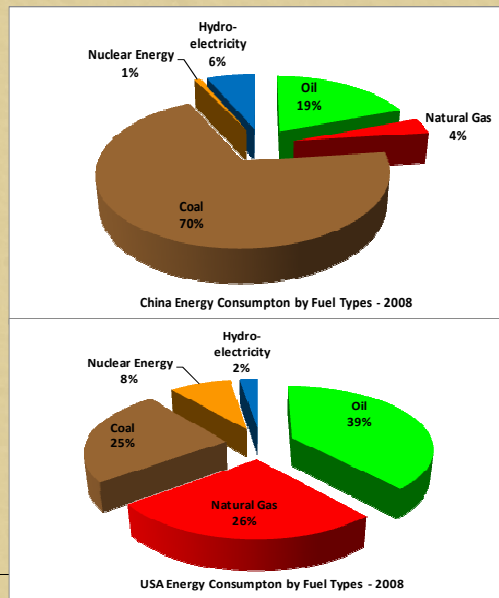


## Energy: China's Choke Point



NATURAL GAS • PROF. M. J. ECONOMIDES

## Energy Consumption by Fuel

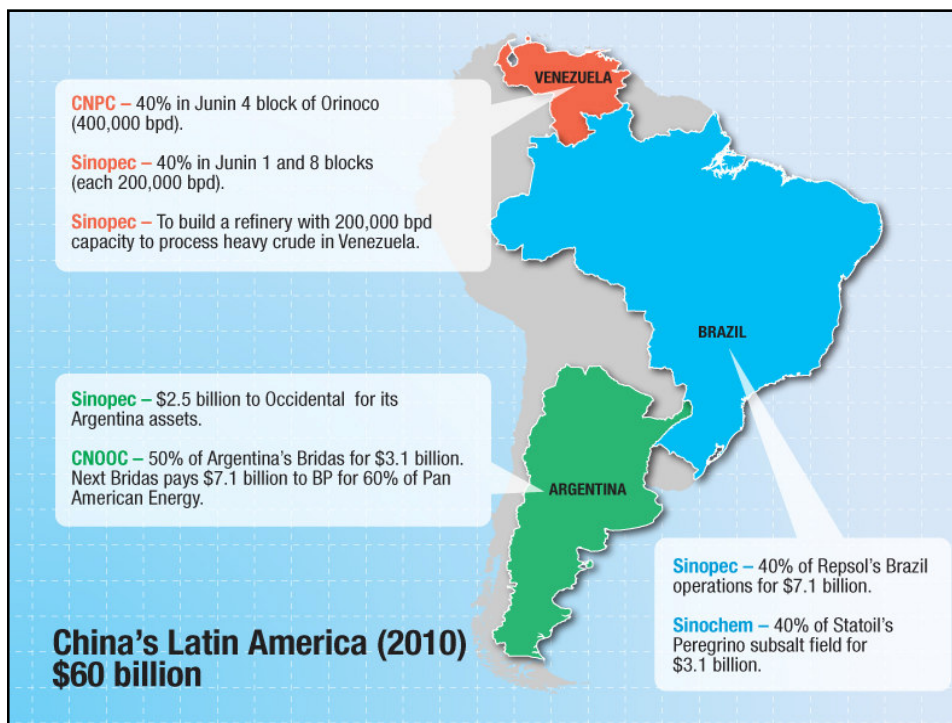


(Data Source: BP 2009)

## China Seeking Energy

- Energy will be China's choke point
- Has become recently very assertive, if not belligerent.
  - Sudan, Nigeria
  - Canada
  - Argentina, Venezuela
- China's energy future passes through Russia....

NATURAL GAS • PROF. M. J. ECONOMIDES



## China will probably lead



NATURAL GAS • PROF. M. J. ECONOMIDES

