Economic Approach to Energy Issues

Lessons
for
Northeast Asia's Young Leaders

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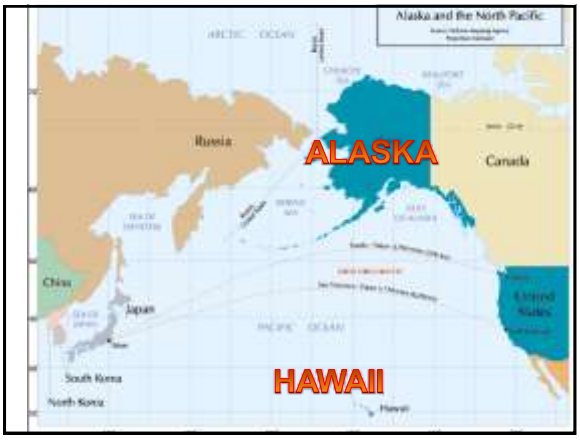
- Arctic Research Consortium US Board member; Scott Polar Research Institute, University of Cambridge (UK); Institute of Social and Economic Research, University of Alaska; University of Hawaii, Alaska Pacific University
- Director and CFO, gold exploration company; small-scale developer (practical business experience)
- Economist and Consultant specializing natural resource economics (Russia, Mongolia, UK, US)
- Fitch-IBCA, credit ratings
- Education: Dartmouth College (USA); Jesus College, University of Cambridge (UK)



Chukotka is the Russian region closest to the United States and Alaska. Since 1992, one of 87 equal subjects of the Russian Federation

The Chukotka Autonomous District

- **Located in extreme Northeast of Russia**
- **Area is 737,700 square kilometers, twice the size of Japan, or France and the UK combined**
- **Population 56,000, of which, 17,000 Native people**
- **More than half of area located north of the Arctic Circle**
- **Extreme climactic conditions, with permafrost**

Changes for Chukotka
Roman Abramovich, Head of Chukotka Parliament

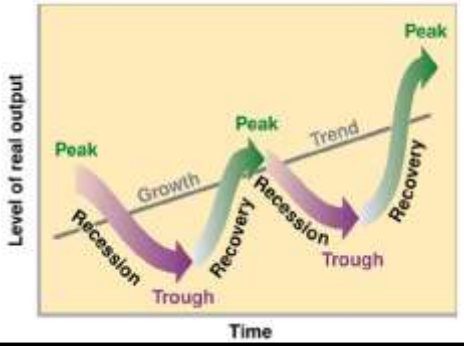
Why isn't this Economic Crisis like 1933?

FOREIGN TRADE…A GLOBAL ECONOMY

What happens during a Recession?

- Correction in asset prices – mostly done?
- Liquidity crisis – getting resolved?
- Insolvency – in some sectors…
- Complete collapse? Seems not yet…
- Prices (overall, energy, commodities)– it depends
  - Deflation
  - Inflation
  - Stagflation (rising prices, stagnant economy)
- Unemployment – already up in the US…

Business Cycle



Energy Plan is a "Green Plan"

- "Invest in alternative and renewable energy, end our addiction to foreign oil, address the global climate crisis and create millions of new jobs."

"New Energy for America" From US Policy Statement

- Help create five million new jobs by strategically investing **$150 billion over the next ten years** to **catalyze private efforts to build a clean energy future**.
- Within 10 years save more oil than **we currently import from the Middle East and Venezuela** combined.
- Put 1 million Plug-In Hybrid cars -- cars that can get up to 150 miles per gallon -- on the road by 2015, cars that we will work to make sure are built here in America.
- Ensure **10 percent of our electricity comes from renewable sources by 2012, and 25 percent by 2025**.
- Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050.

$150 Billion?????

- "Help create five million new jobs by strategically investing **$150 billion over the next ten years** to **catalyze private efforts to build a clean energy future**."

What is the real scale of the problem?

- EXAMPLE: $45.22 Billion profit only for Exxon Mobil for 2008
- $150 billion OVER TEN YEARS = $15 billion a year investment in a "clean energy future" seems to be a joke…

Major Integrated Oil Companies 2007

(Millions)

Company	Revenue	% Change	Net Income	% Change	% Return on Sales	% Return on Equity
ExxonMobil	404,552	7.1	40,610	2.8	10.0	33.4
Royal Dutch Shell	355,782	11.6	27,564	8.7	7.1	22.2
BP	291,438	6.2	17,287	-22.3	5.9	18.5
Chevron	220,904	5.1	18,688	9.0	8.5	24.2
ConocoPhillips	194,495	3.2	11,891	-23.5	6.1	13.4
Marathon	65,207	-0.4	3,956	-24.4	6.1	20.6
Amerada Hess	31,924	11.2	1,832	-4.6	5.7	18.8
Occidental	18,784	9.4	5,400	28.8	28.7	23.7
Murphy	18,438	28.9	766	18.8	4.1	15.1
Total	**1,601,524**	**7.1**	**127,994**	**-2.9**	**8.0**	**22.7**

Source: CRS Report for Congress **Oil Industry Profit Review 2007** Robert Pirog, Specialist in Energy Economics, Resources, Science, and Industry Division **April 4, 2008**

Independent oil producers 2007

(millions)

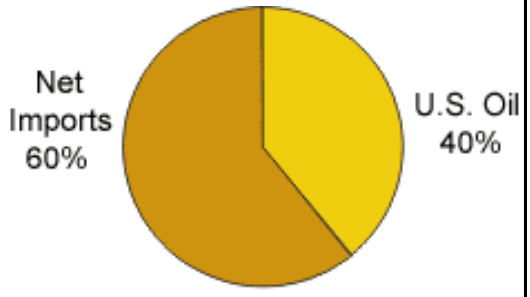
Company	Revenue	% Change	Net Income	% Change
EnCana	21,466	30.8	3,959	-30.0
Devon	11,362	16.3	3,596	26.8
Anadarko	15,892	55.3	3,778	-20.4
Apache	9,978	20.4	2,807	10.2
Chesapeake	7,800	6.5	1,229	-35.5
XTO	5,513	20.5	1,691	20.5
EOG	4,191	7.1	1,083	-16.0
Noble	3,272	11.3	944	39.1
Pioneer	1,833	22.2	373	-49.6
Newfield	1,783	6.6	450	-23.9
Total	**83,070**	**24.7**	**19,910**	**-12.8**

Source: CRS Report for Congress **Oil Industry Profit Review 2007** Robert Pirog, Specialist in Energy Economics, Resources, Science, and Industry Division **April 4, 2008**

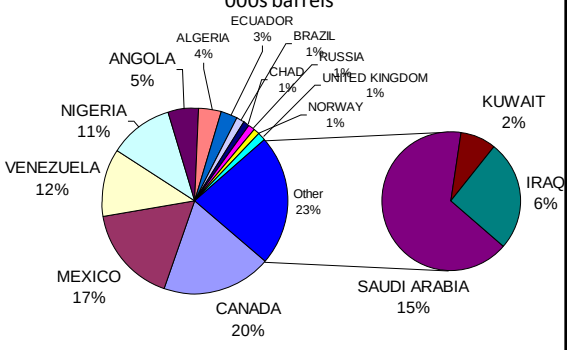
US POLICY: "Eliminate Our Current Imports from the Middle East and Venezuela within 10 Years"

- Increase Fuel Economy Standards.
- Get 1 Million Plug-In Hybrid Cars on the Road by 2015.
- Create a New $7,000 Tax Credit for Purchasing Advanced Vehicles.
- Establish a National Low Carbon Fuel Standard.
- A "Use it or Lose It" Approach to Existing Oil and Gas Leases.
- Promote the Responsible Domestic Production of Oil and Natural Gas.

US Energy Dependence



Source: Energy Information Administration



Even if it were realistic or desirable to eliminate imports from Venezuela and Mid-East – what would that percentage be?

- 60 percent TIMES 35 per cent = 21 percent
- That means the US would have to increase its domestic production 2% to 4% a year over ten years

"There never was a good war or a bad peace."

US Policy Advisor Benjamin Franklin

A comparison of scale: How much did/does The War cost in terms of oil ?

Price per barrel	Total number of barrels	US imports per day	Days of 100% subsidy of foreign oil	Years of 100% subsidy of foreign oil
$150	5,333,333,333	10,055,153	530	1.45
$130	6,153,846,154	10,055,153	612	1.68
$100	8,000,000,000	10,055,153	796	2.18
$60	13,333,333,333	10,055,153	1326	3.63
$30	26,666,666,667	10,055,153	2652	7.27
$15	53,333,333,333	10,055,153	5304	14.53

If Americans were willing to spend billions and billions on The War – why don't we want to spend billions and billions on The Recovery?

The false dichotomy of Main Street versus Wall Street

Wasilla Main Street = Parks Highway

Capital Costs Changing American behavior

China

USA- how do you cut gasoline consumption?

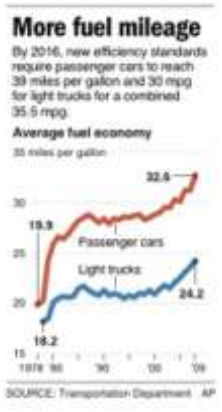
1. High fuel price OR
2. Lack of consumer spending

Europe

NEW CAFE Regulations

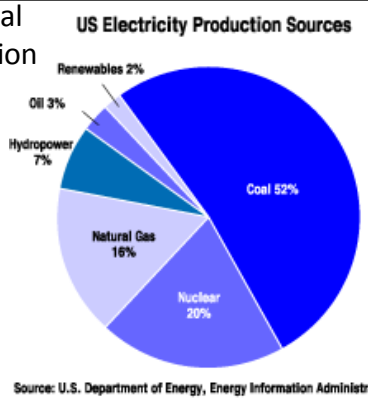
39 miles per gallon by 2016

$1200 per vehicle higher cost



Electric cars are "green"- but where does/will the electricity come from??

Electrical Generation



Electricity generation by fuel

- Coal continues as base fuel in US
- Natural gas is number two
- Environmental and Political pressure to increase share of Nuclear, petroleum and renewable fuels generation

Who will produce these cars?

Internal Combustion Engine Reliable Since 1885

PROBLEM OF EMISSIONS

Carbon Emissions and US Public

- Public will exists to reduce emissions that induce climate change.
- Public will for change in US policy on emissions
- However,

"Conservation" and environment

- Why do we need to conserve (preserve) for conservation's sake?
  - –Do we need oil for "future generations"?
- "Depleting non-renewable" resources to generate energy is NOT SYNONOMOUS with emissions of greenhouse gases.

Conservation: PHYSICAL REALITIES

- Energy cannot be created or destroyed – it can only be TRANSFORMED from one form to another

$$E=mc^2$$

SOURCES OF ENERGY AVAILABLE

- Nuclear Fusion (SUN: Main source)
  - Solar
  - Hydrocarbon fuel: coal, oil, natural gas (is all gas biotic?), ethanol
  - wind, hydro
  - fusion plants (future),
- Nuclear Fission
  - current nuclear plants
- Gravity
  - tidal and hydro (solar component))

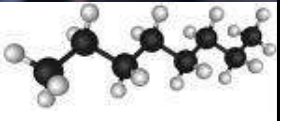
Hydrogen?

Hydrogen Basics

- Hydrogen is not primary fuel, but method of energy storage
- Hydrogen **does not** occur freely in large quantities.
- Two ways to create free hydrogen
  - Electrolysis
  - Reforming hydrocarbons (fossil fuels)
    - treatment of methane with steam
    - CH4 (g) + H2O + e > 3H2(g) + CO(g).
    - CO(g) carbon monoxide gas (greenhouse gas).
    -

What is the best way to store hydrogen?

H_2 or as a Liquid in combination with Carbon????



FORMS OF ENERGY FOR USE and STORAGE

- We know how to USE energy
- Better understanding ENERGY STORAGE may be the breakthrough needed for our energy PROBLEMS…

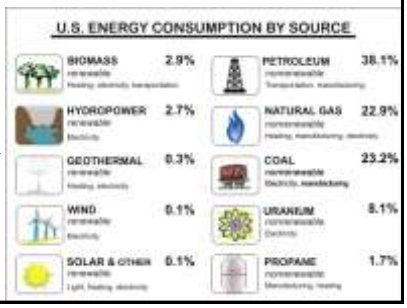
Liquid Hydrocarbons remain one of the most effective methods for transporting and storing energy

Capital Investment in New Energy Sources, New Energy Infrastructure or New Energy Technology

- A promise of an upward trend demand in energy, infrastructure and technology
- A promise of an upward trend in prices, that is represented by greater demand
- OR much greater volume of demand with falling prices – the process of commoditization.

LONG-TERM REALITIES

- INVESTMENT IN ALTERNATIVE ENERGIES AND NEW TECHNOLOGY

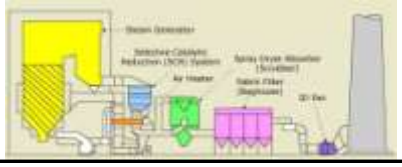


Investment in Alternative Energies

- Problem if prices of traditional fuel is low – what is the incentive??
- Government funding potentially competes with investment for conventional fuels and creates distortions to the markets.
- Dampens anticipated long-term prices for conventional fuels – but what is real outcome.
- What role does economic crisis and investment climate play in reality of such investment…

"Clean Coal" Technology

- Carbon Capture
- Using supercritical and ultra-supercritical steam to reduce coal consumption at the plant
- USA – 0 China- more than 40



Technology

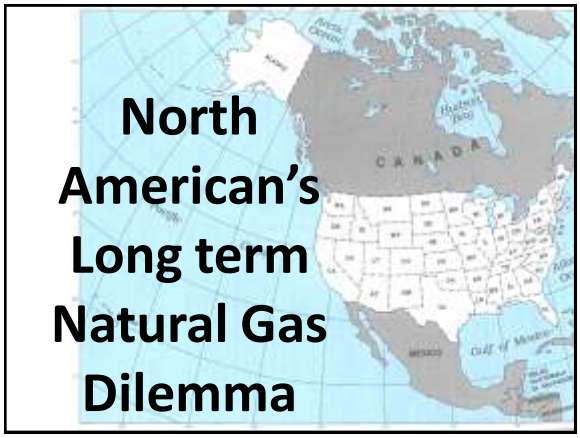
- Need recognition of the LONG TIME TO IMPLEMENT from idea to mass use
  - –At least 3 years from idea to proto-type
  - –At least 3 years from proto-type to pilot plant
  - –At least 2 years from pilot to mass use of technology
  - –Elections cycles are much shorter…

Where does new technology come from?

- Large corporation R&D
- Universities and research institutes
- Government laboratories (including military and space programs)
- Entrepreneurs

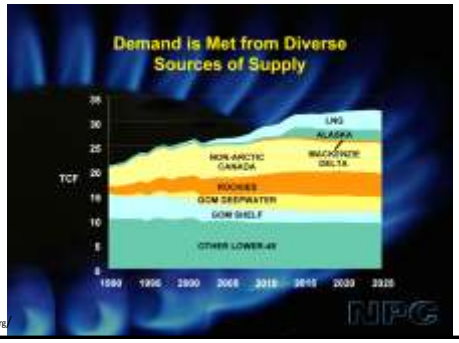
White House Policy
Reduce our Greenhouse Gas Emissions 80 Percent by 2050

- Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050.
- Make the U.S. a Leader on Climate Change.



North American's Long term Natural Gas Dilemma

How can North America resolve its need for natural gas as demand is likely to increase?



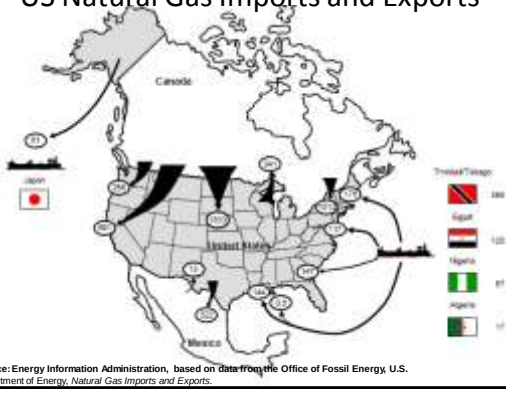
http://www.npc.org/

US has the "reverse" Japan problem

www.energy.ca.gov/lng/worldwide_asia_pacific.html

Pipelines in US

US Natural Gas Imports and Exports



Source: Energy Information Administration, based on data from the Office of Fossil Energy, U.S. Department of Energy, *Natural Gas Imports and Exports*.

Japan has 23 LNG import terminals and South Korea has three.

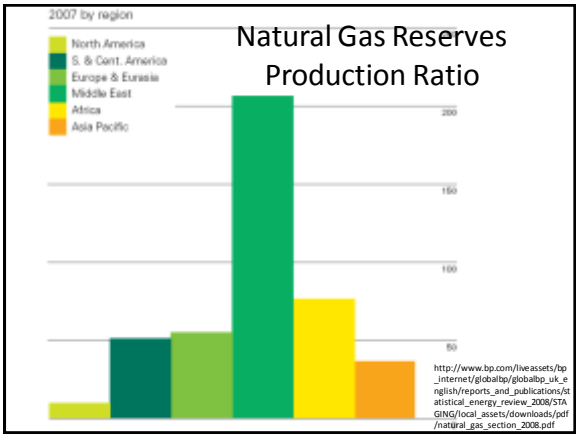
Why doesn't Japan have an internal trunk pipeline system like South Korea?

http://www.inpex.co.jp/english/business/japan/img/japan_map02.gif

NORTHEAST ASIA MARKET

Alaska already part of Northeast Asia's energy infrastructure
LNG to Japan since 1969

www.energy.ca.gov/lng/photos.html



Natural Gas Reserves Production Ratio

http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/downloads/pdf/natural_gas_section_2008.pdf

US Long-term trend natural gas prices

http://tonto.eia.doe.gov/dnav/ng/hist/n9190us3m.htm

Is the solution MORE LNG to US Markets?

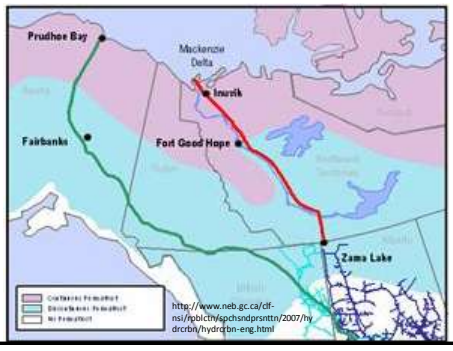
MORE LNG TERMINALS ARE NOT REALLY POSSIBLE, SINCE PEOPLE ON WEST COAST ARE AFRAID OF LNG

http://www.raceforcleanenergy.org/img/original/f6_nopipeline.jpg

http://www.bbidisplays.com/images/LNG-Pierce_Brosnan.jpg

LNG Terminal in BAJA CALIFORNIA, Mexico

Gas from Arctic Alaska and Canada

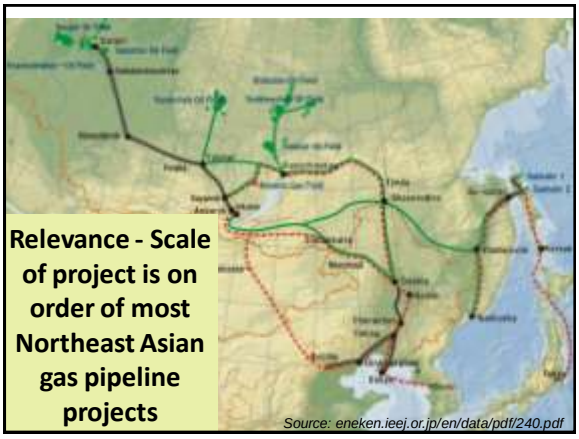


All about scale

- Alaska gas pipeline is now estimated as high as $40 Billion
- Proposed pipeline would initially be designed to carry 4.5 Bcf/d of natural gas at an operating pressure of 2,500 psig.
- Federal guarantee (2006) of $18 Billion for 80% is NOW TOO SMALL

How the North Slope and Mackenzie tie into US Natural gas transmission

http://www.transcanada.com/investor/annual_reports/2008/common/images/mda/pipeline_map-transmissions.png



Canada-US Movement of Natural Gas

http://www.neb.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/trnsprttn/trnsprttnsssmnt2008/trnsprttnssssmnt2008-eng.html

Canada-US Relations 1814-1850

WHERE WILL THE MONEY FOR ENERGY INFRASTRUCTURE COME FROM??

Ex-Governor Sarah Palin of Alaska

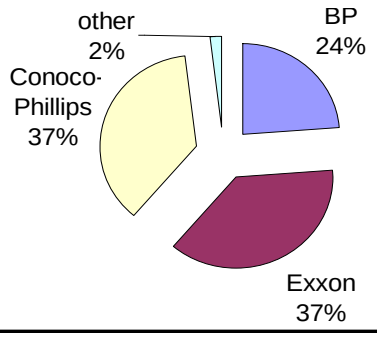
GOVERNOR PALIN and the GAS PIPELINE

- Alaska Legislature passes Law Alaska Gasline Inducement Act (AGIA) and approves TransCanada application - an energy transportation company - (2008).
  - Comes with $500 million from State of Alaska
- Legislation changed net profits tax from 22.5% to 25%
- Why not a contract with the producers (BP, Exxon, Conoco-Phillips)?

A Trans-Alaska –Canada Gas Pipeline needs "The Producers"

-This is recognized by TransCanada,
- NOT recognized by much of Alaska political leadership...

"The Producers" - North Slope Alaska Natural gas ownership



"Prioritize the Construction of the Alaska Natural Gas Pipeline." President Obama

www.ctv.ca

Potential of Methane Hydrates

By Laris Karklis — The Washington Post

Lessons for Northeast Asia

- Energy Infrastructure is constrained at the level of demand no greater than Year 2002 at historic prices (Average $15 real 1985).
- Governments are stressed by current commitments for economic crisis
- Private capital is risk adverse
- Natural Gas prices are down
- "Paradigm shift" in markets
  - Not opposed to the idea
  - But most of the time the fundamentals are the best explanation….

Will Russia change its strategy of excluding or reducing foreign investors, while funding its own development?

Why is multi-lateral worse than bi-lateral?
Why avoid Mongolia to
deliver Kovykta Gas to China?

North Korean Pipeline Corridor?

Robert Malthus –
Protect Fair Domestic Price

- It would be dangerous for Britain to rely on imported corn - lower prices since it would reduce workers wages and manufacturers would lose out due to the fall in purchasing power of landlords and farmers

David Ricardo
Comparative Advantage

- Free trade will allow Britain could use its capital and population efficiently to utilize the countries comparative advantage.
- Price is a tool for determining amount and mix of imports and domestic production.

More Ricardo…

- Main argument **against** trade and price control is that these policies are **ultimately COSTLY** to nation.
- Are government planners any better or worse at guessing prices than speculators ?

US Policy Advisor
Benjamin Franklin

"No nation was ever ruined by *trade."*

Avoiding the Managerial Revolution