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The Role of LNG In Meeting U.S. Energy Needs - Critical Questions for Policy-Makers

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Core Message

- U.S. energy markets face unprecedented challenge – both in the immediate future and throughout next 10 to 15 years
 - Electricity, natural gas, oil and coal
- No current federal or state effort to develop comprehensive response
 - Alan Greenspan has repeatedly emphasized potential seriousness of problem
- By default, super-majors' effort to massively expand LNG imports only major initiative to respond to **huge** emerging natural gas supply deficit
 - Attempt to expand imports clearly should be *part* of solution
- ***BUT – depending upon massive expansion of LNG imports to meet most of incremental energy supply requirements of U.S. economy for next two decades = extraordinarily risky bet***
- Given severity of emerging natural gas supply deficit, long-lead time to implement major energy infrastructure projects, time is of the essence
 - Every month that goes by without beginning to aggressively pursue multiple paths to alleviate crisis puts U.S. in a deeper hole, further exacerbates risks

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Unprecedented Supply Gap

- At this point, clear that ***unprecedented gap exists between amounts of natural gas needed to fuel needs of U.S. economy and maximum supplies likely to be available from North American sources at any time in foreseeable future***
 - I.e., a basic building block upon which success of U.S. economy has long depended ***will soon be missing***
- Stems from:
 1. Shift to natural gas as near-exclusive fuel to meet incremental electricity needs of U.S. economy
 - Delayed impact of Clean Air Act requirements enacted long ago
 - 20-year period required to work off huge generation surplus left over after oil price shocks of '70's
 2. Rapid aging of conventional sources of supply in U.S. and Canada
 - Particularly severe in shallow waters off Gulf Coast (until recently, most important U.S. source of new supply)
 - Majors now increasingly exiting or scaling back North American operations



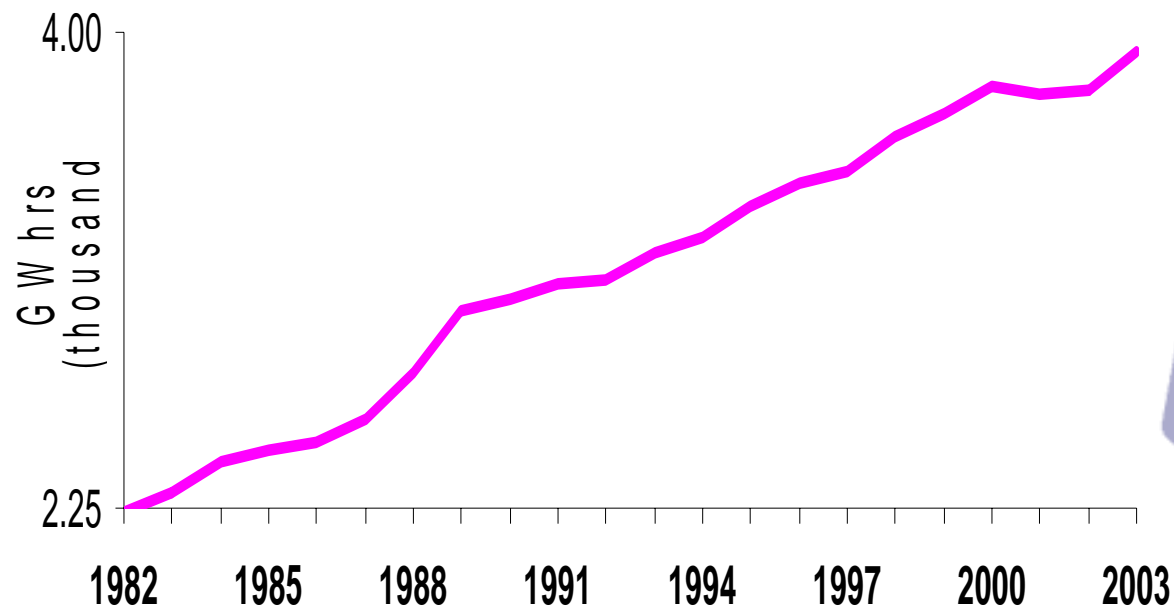
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Electricity=Lifeblood of Economy

- Demand for electricity generally increases every year

Electricity Consumption Grows Every Year





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Engine of Economic Growth

- Since 1980, U.S. electricity consumption has grown by more than 75%
- Even with increased energy efficiency, requires 0.70 to 0.75% increase in electricity production to achieve each 1% growth in GDP
 - Electricity production accounts for an increasing percentage of U.S. energy supply every year
- If no longer feasible to expand supplies of electricity, growth of U.S. economy likely to be brought to a halt
- Will require many years to change over infrastructure sufficiently to change dramatically relationship between electricity consumption and economic growth
- Even with increased efficiency, electricity production currently projected to increase 30% over next 15 years



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Rapid Year-Over-Year Growth

- **Revival of economy has led to strong year-over-year growth in electricity demand:**

Recent Weekly Electricity Production Comparison to Year-Ago Levels

Week Ended	2004 Output	2003 Output	Difference	% Increase
5/15/04	71,274 GWhrs	66,969 GWhrs	4,305 GWhrs	6.4 %
5/22/04	72,121 GWhrs	65,582 GWhrs	6,539 GWhrs	10.0 %
5/29/04	74,168 GWhrs	65,544 GWhrs	8,624 GWhrs	13.2%
6/05/04	71,304 GWhrs	67,528 GWhrs	3,776 GWhrs	5.6 %
6/12/04	76,995 GWhrs	71,232 GWhrs	5,723 GWhrs	8.0 %
6/19/04	81,105 GWhrs	72,836 GWhrs	8,629 GWhrs	11.4 %
Average	74,487 GWhrs	68,281 GWhrs	6,206 GWhrs	9.1 %

Source: EEI Weekly Electricity Output Reports

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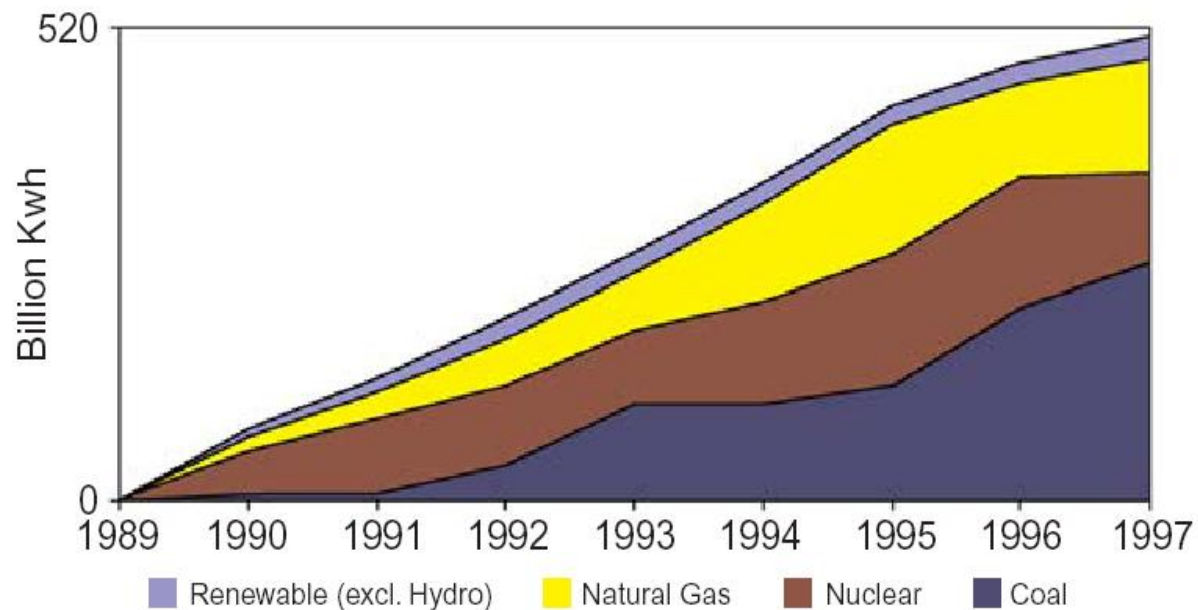
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Major Turning Point

- Prior to late '90's, possible to meet incremental electricity needs of U.S. economy primarily thru increased utilization of existing coal and nuclear units:

Source of Electric Generation to Meet Incremental Demand (1989-97)



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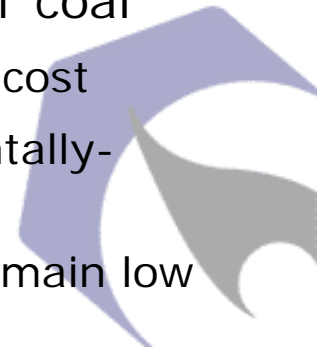
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Need for New Capacity

- By late 1990's, new capacity needed in every region of U.S.
- Industry in midst of far-reaching change
 - De-regulation of wholesale markets by FERC + statewide restructuring in states representing 2/3rd's of total U.S. load
 - Explosive growth of Independent Power Producer industry & power marketers
 - Darlings of Wall Street with 40:1 P/E ratios
- Developers strongly favored gas-fired capacity over coal
 - Shorter lead time and much lower (apparent) capital cost
 - Much lower permitting risk/perceived as "environmentally-friendly" choice
 - Widely believed supplies plentiful and prices would remain low



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Irrevocable Choices Made

- Result = abrupt shift in U.S. energy strategy
 - \$ 100 billion investment in new gas-fired plants, forfeiting opportunity to add more diverse mix at any time during this decade

Gas-Fired Generating Capacity Added Since 1999

Year	Additions	Total Gas-Fired Generation	% of Total US Capacity
1999	22,641 MW	201,979 MW	25.4%
2000	25,527 MW	227,506 MW	27.7%
2001	41,372 MW	268,892 MW	31.0%
2002	54,701 MW	323,593 MW	34.7%
2003*	60,488 MW	384,081 MW	39.0%
2004*	10,404 MW	394,485 MW	40.0%
Total Additions 215,133 MW			

* Includes plants currently under construction but excludes all planned additions that have not yet broken ground

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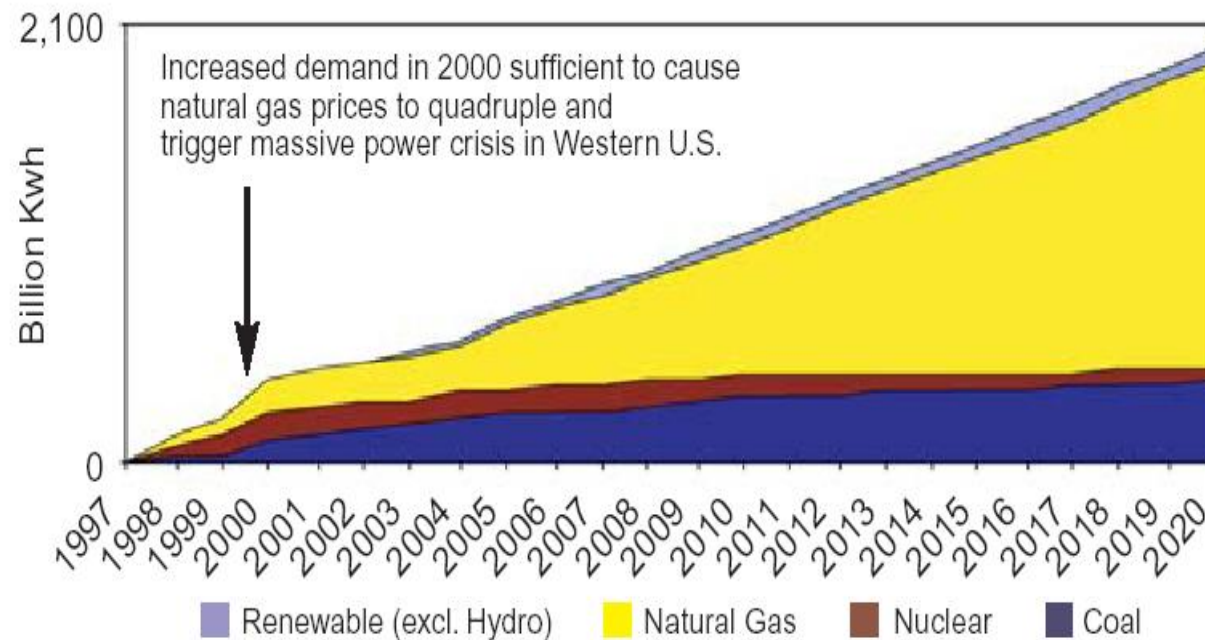
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Massively Increases Dependence

- U.S. now dependent upon increased utilization of gas-fired units to meet virtually all of its incremental electricity needs

Expected Sources of Incremental Generation (1997-2020)



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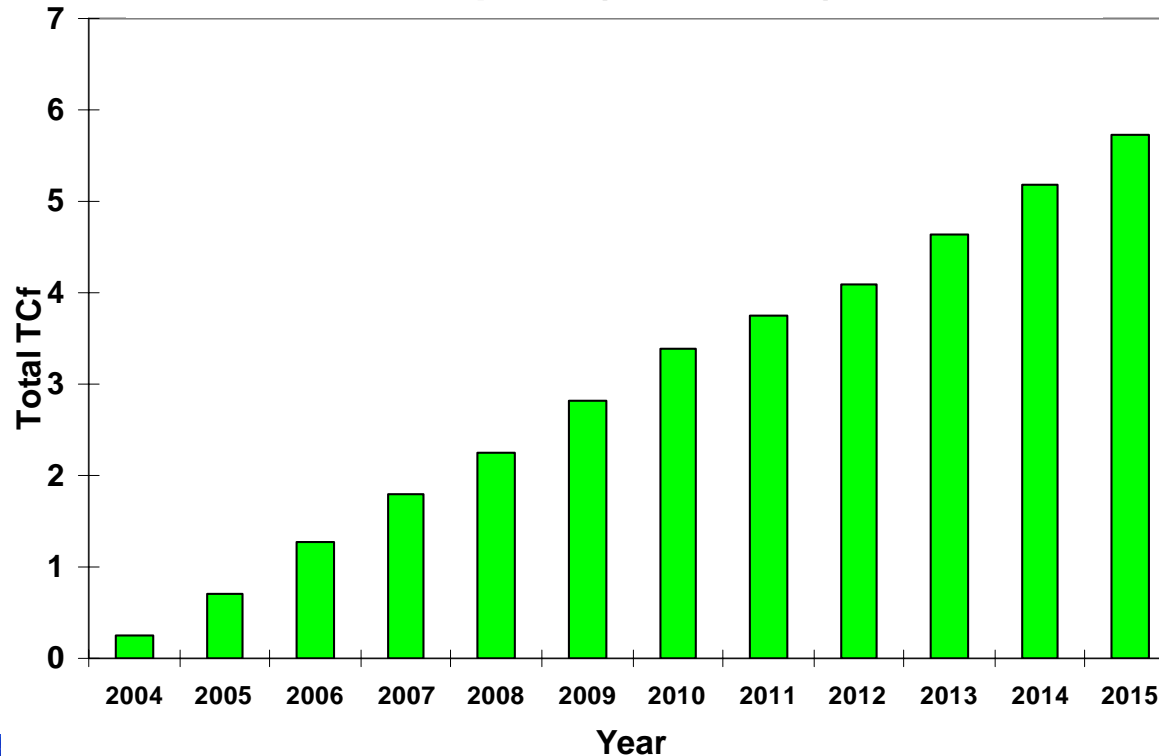
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Primary Driver

- Power sector consumption of natural gas nearly certain to increase every year

Cumulative Increase in Power Industry Natural Gas Consumption (2004-2015) vs. 2003



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Cumulative Increases *Huge*

- Increase likely to be > 3.4 TCf by 2010, > 5.7 TCf by 2015
 - No other current source of supply to meet incremental electricity needs of U.S. economy

Projected Increase in Power Sector Natural Gas Consumption

<u>Year</u>	<u>Increase</u>	<u>Increase vs. 2003</u>	<u>Total</u>
2004	0.275 TCf	0.250 TCf	5.486 TCf
2005	0.462 TCf	0.712 TCf	5.948 TCf
2006	0.563 TCf	1.275 TCf	6.511 TCf
2007	0.522 TCf	1.797 TCf	7.033 TCf
2008	0.460 TCf	2.257 TCf	7.493 TCf
2009	0.568 TCf	2.825 TCf	8.061 TCf
2010	0.568 TCf	3.393 TCf	8.629 TCf
2011	0.353 TCf	3.746 TCf	8.892 TCf
2012	0.353 TCf	4.099 TCf	9.335 TCf
2013	0.546 TCf	4.645 TCf	9.881 TCf
2014	0.546 TCf	5.191 TCf	10.427 TCf
2015	0.546 TCf	5.737 TCf	10.975 TCf



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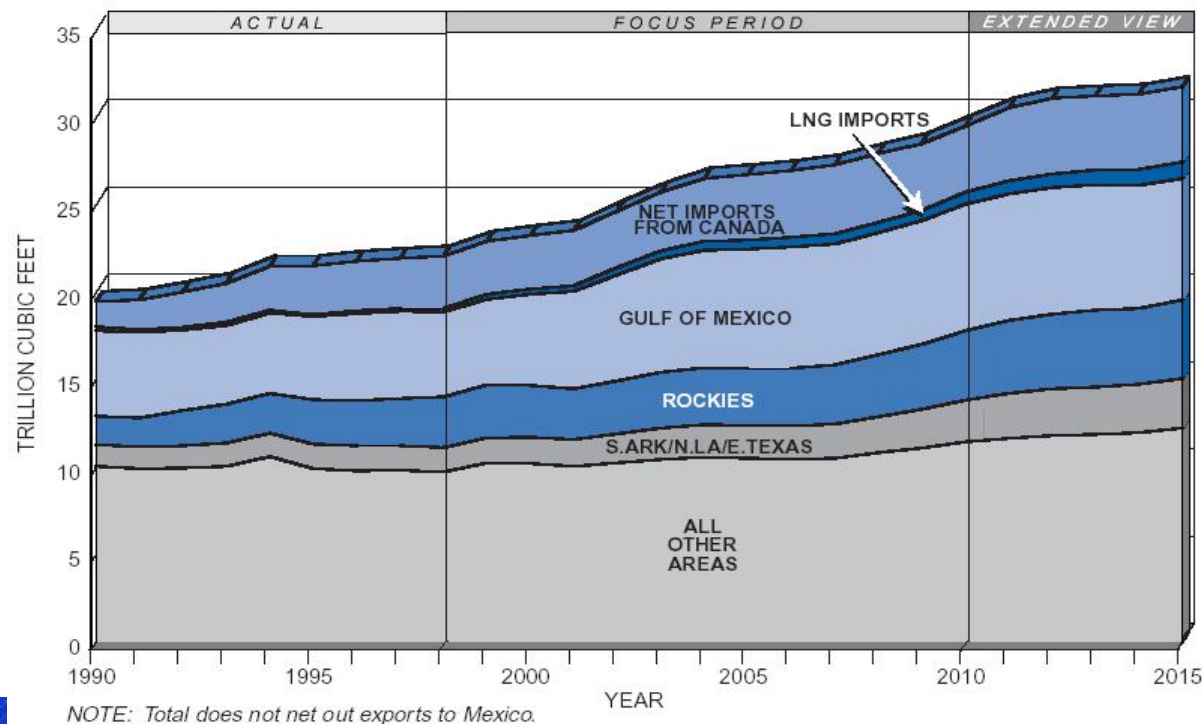
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Until Recently, Natural Gas Supplies Perceived as Plentiful

- December 1999 National Petroleum Council (NPC) Study forecast North American production increasing to 33.5 Tcf by 2015 with little or no increase in price

U.S. Natural Gas Supply by Source



NOTE: Total does not net out exports to Mexico.

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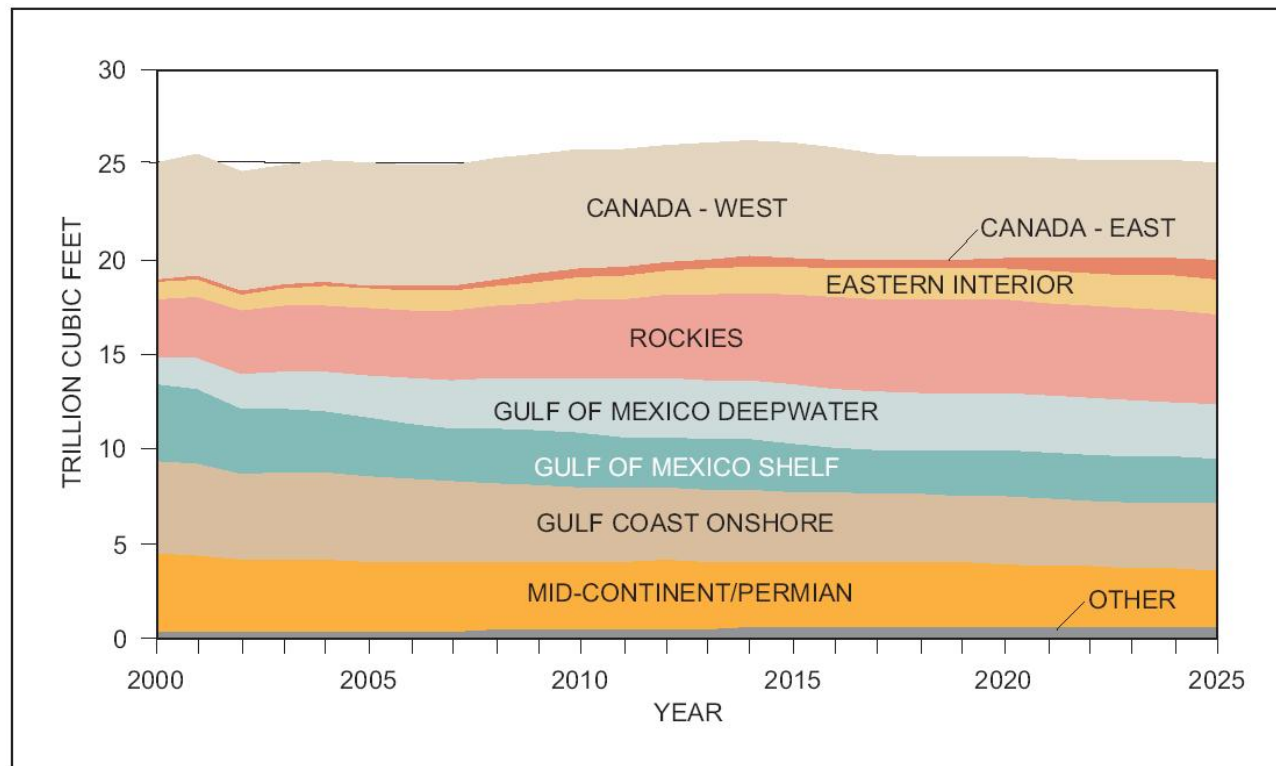
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Production Has Hit Impenetrable Wall

- NPC Study finds no longer realistic to expect *any* significant increase from “traditional North American sources of supply”



U.S. Lower-48 and Non-Arctic Canadian Gas Production by Region

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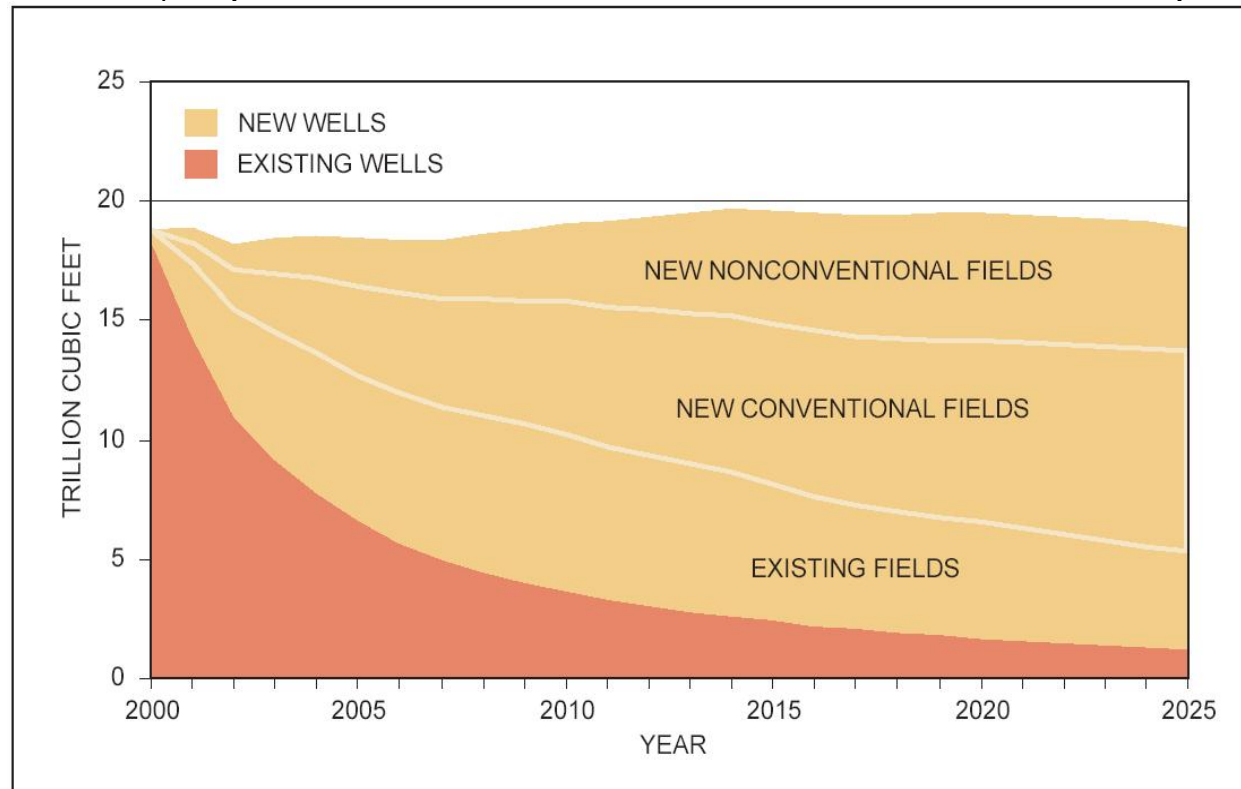
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Creates Staggering Void

- Estimated 2010 North American supplies reduced by 6 Trillion Cubic Feet in 48 months
 - In Btu's, equivalent to 1 ½ X current Middle East oil imports



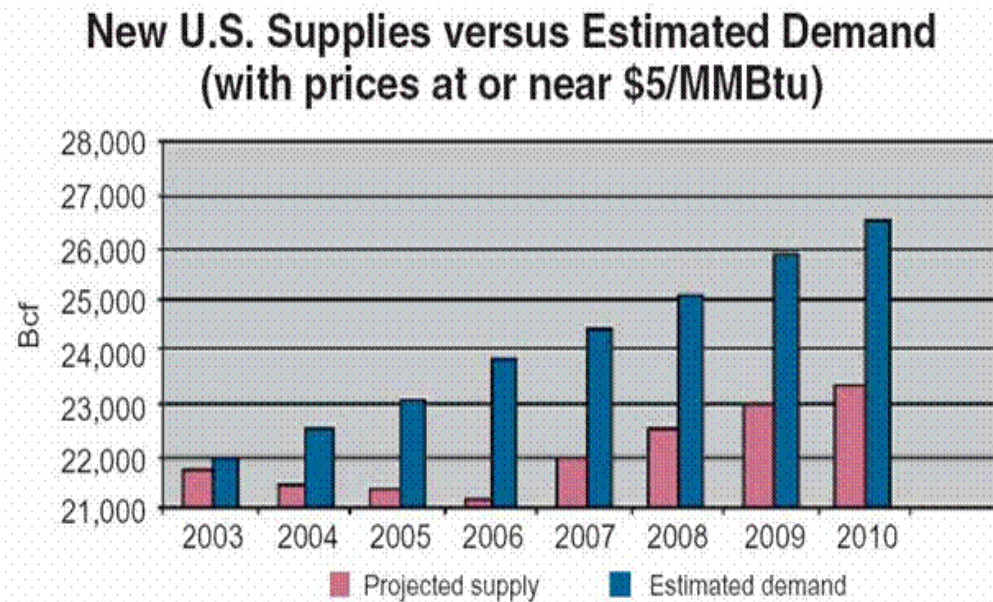
Lower-48 Production, Existing and Future Wells

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Major Energy Challenge Facing U.S.

- Challenge = how to fill 50 Tcf + gap over next 10 to 12 years





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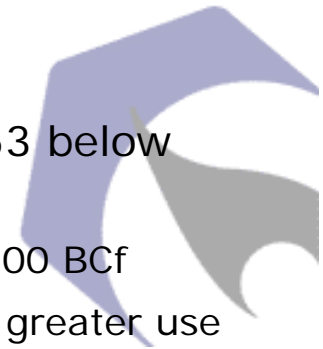
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Temporary Reprieve

- Recent \$ 6.00/MMBTU prices just hint at what is to come
- Just 150 to 250 BCf of additional weather-driven demand has separated us from explosive increase in prices – i.e., *at least* \$ 8.00 to 10.00/MMBTU, perhaps much higher
- Dodged bullet at least 4 times in the last 12 months
 - Urban center temperatures in June and July of last year mildest in 30 years
 - Gas-weighted HDD's 113 below normal last fall
 - Winter 4.7 % below normal, 5.3 % below last year
 - This past spring = 3rd mildest in past 108 years
- During past heating season, total gas-weighted HDD's 353 below norm
 - "Normal" would have increased gas consumption by 450 to 500 BCf
 - Colder than normal easily could have led to 1 Tcf or more of greater use



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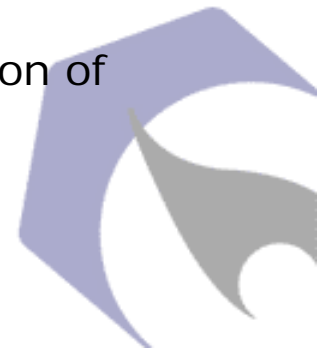
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Options Exist

- NPC recommends 7 major actions:
 1. Slow growth in electricity demand
 2. Add oil-burning capability to existing electric generating and industrial boilers
 3. Accelerate construction of new oil-fired and coal-fired generating units
 4. Authorize drilling in restricted areas
 5. Streamline permitting on Federal lands
 6. Enact federal legislation needed to support construction of Alaskan natural gas pipeline
 7. Facilitate large scale increases in imports of LNG



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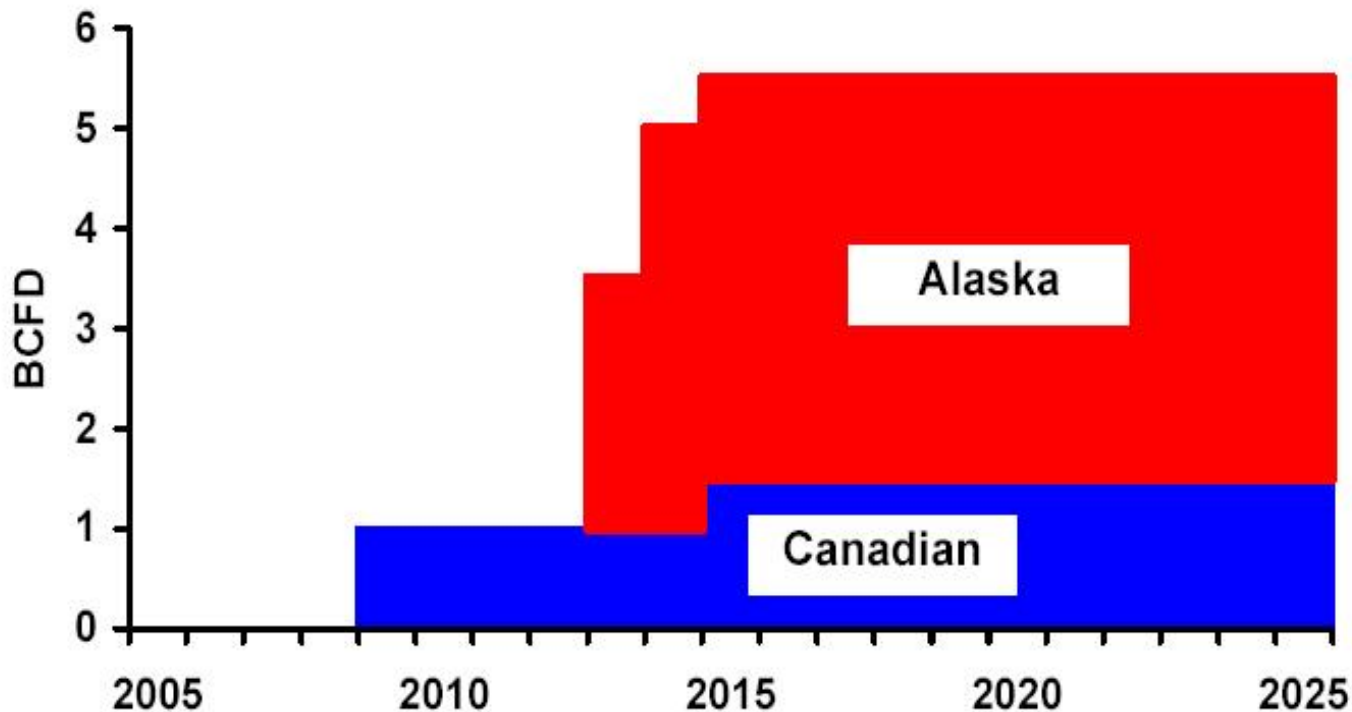
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Alaskan Gas At Least a Decade Away

- 2014 -2015 = Earliest Potential In-Service Date
 - Likelihood of meeting = slim to none

Arctic Production Profile



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Current Status

- Massive expansion of LNG emerging on *de facto* basis as cornerstone of U.S. energy strategy for the next decade

Option	Status
Energy conservation	No action to implement
Add oil burning capability	No action to implement
Build new oil and coal fired-capacity	Some consideration of coal
Drilling in restricted areas	Generally opposed
Stream-lining of permitting	Limited progress
Support for Alaskan pipeline	Legislation blocked thus far
Expand imports of LNG	By far main focus to date



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Potential High Stakes Gamble

- Focus of public debate to date far too narrow
 - Siting of delivery terminals
 - Safety issues
- No question should and will be part of supply mix
- Primary issues =
 - What's realistic – in terms of both timing and amount ?
 - What are the potential costs and risks if we rely too heavily on imports of LNG as our primary strategy for closing the emerging natural gas supply gap?
- Stakes for U.S. are **huge**
 - May be single most important strategic issue facing energy industry + U.S. economy today
- But = issue not yet even on radar screen of public policy debate
- State Commissioners by far group most likely to put it there



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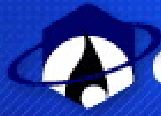
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LNG Attractions

- Major potential advantages:
 1. Large stranded natural gas reserves elsewhere in the world
 - Primarily in Qatar, Iran & Russia
 - Also smaller reserves available for development in Nigeria, Angola, Egypt, Norway, Australia, potentially other countries
 2. Potentially attractive all-in delivered *cost* to U.S. delivery terminals
 - \$ 3.70/MMBTU or less
 - Partially compromised if terminals can only be sited in Gulf
 3. Producers willing to enter into long term supply commitments
 - But commitment may be to marketer, *not* ultimate buyer

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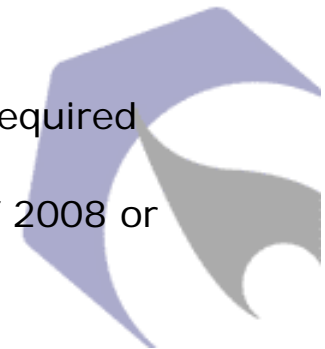
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Uncertainties and Myths

- But – many uncertainties remain
- Key facts to be aware of:
 - Only a limited number of new greenfield projects currently are under construction anywhere in the world
 - All or most of the output of most of these projects already committed to other markets
 - Other projects are not likely to be started until:
 1. Delivery terminals successfully permitted
 2. Definitive commercial agreements in place and financing obtained
 3. Place in line obtained for new tankers
 - This process could take years to complete
 - Once it has been, minimum of 48 to 54 months likely to be required before first commercial deliveries occur
 - Even the first tranche of “new” projects “targeted” for end of 2008 or 2009 may not come on line until well into the next decade
 - Second wave may not be completed until many years later



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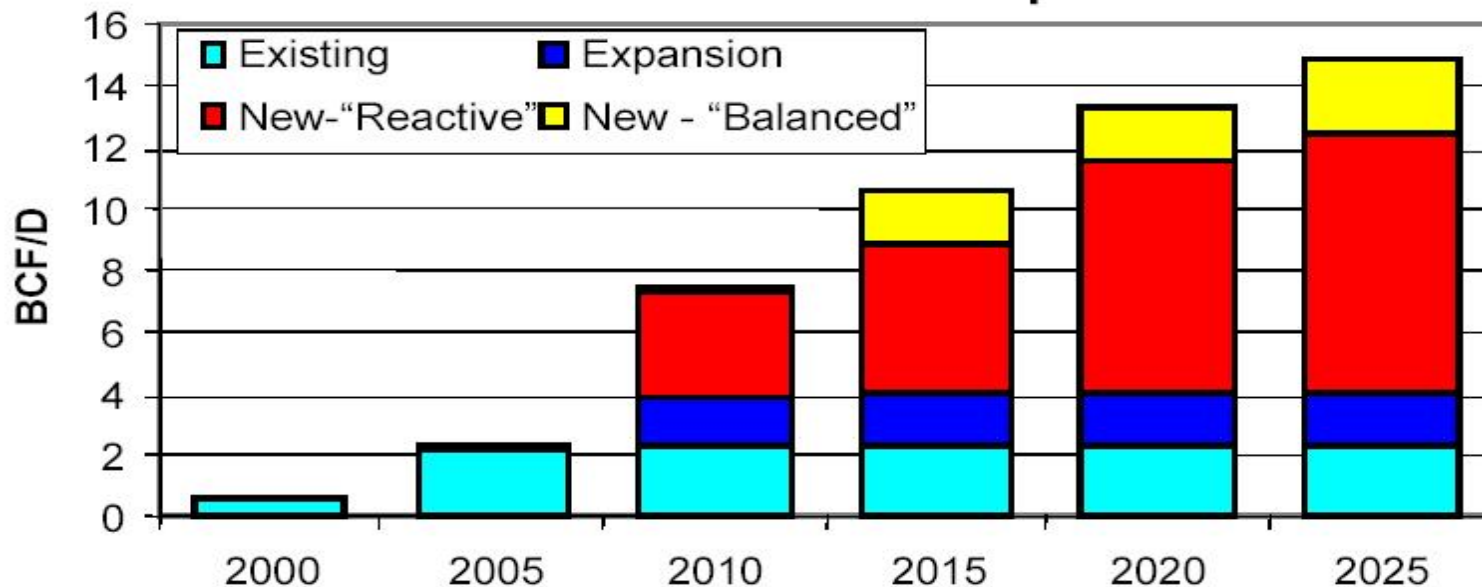
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Near-Term Contribution of LNG Also Limited

- Likely to take until at least 2009 to 2012 before imports of LNG will make a major contribution
- Even then, offsets only a portion of increased demand

North America LNG Imports



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Global Competition

- Just as significantly:
 1. Many countries likely to be competing vigorously for limited global supplies
 - Likely to include
 - Major European players (i.e., particularly Great Britain, France, Spain)
 - China, India & Korean
 - Trans-border gas supply expected to require \$ 3 trillion in new infrastructure over next 20 years
 - Realistically, will be many years before global supply catches up to global demand
 2. Naïve to assume that, at any time for many years to come:
 - Price will be set primarily based upon cost
 - Imports of LNG into the U.S. market will cover a large enough percentage of the U.S. supply gap to effectively constrain prices in the U.S. market



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Huge Economic & Geopolitical Consequences & Risks

- Distant sources of supply largely beyond U.S. control
- Inherently vulnerable to:
 - Supply interruption
 - Terrorist attack at any point along the delivery chain
 - Exertion of political leverage against the U.S.
- Could lead to explosive tensions with Iran
- Heightens risk of international conflict in ways that may be difficult to predict
- Puts U.S. in direct competition with developing countries for increasingly scarce world energy supplies



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No Competitive Economic Advantage

- Marketers who control LNG supply also potentially will have huge pricing leverage in the U.S. market – both short and long term
- Price volatility – already high – could be greatly exacerbated as U.S. is played off against European and Asian markets on a global scale
- **Huge** implications for U.S. job creation and balance of payments
 - Could add \$ 50 billion/year or more to balance of payments deficit
- At same time:
 - Could – in fact *already has* – discouraged development efforts closer to home
 - May require structural changes in U.S. market and/or limit options for regulators
 - Does not offer *any* opportunity to provide U.S. industry with competitive advantage in competing in world markets, since cost for delivering LNG into the U.S. market will always be higher than for deliveries into the European and Asian markets

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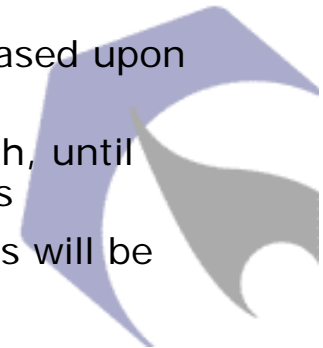
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Unanswered Questions

- At a minimum, therefore, at least for the next several years, uncertainties will remain regarding several key issues:
 1. How rapidly can global supplies of LNG and global delivery capability be ramped up?
 2. Given the potential growth rate in world-wide demand, how long will it take before world-wide supply catches up with world-wide demand (if ever)?
 3. In the interim, what share of newly available supplies are likely to be captured by U.S. buyers?
 4. Who will control the pricing of these supplies (e.g., producers, marketers, etc.)?
 5. To what extent, if any, will the pricing of these supplies be based upon these costs?
- The global LNG market currently is a relatively small market which, until recently has experienced relatively modest growth in recent years
- No one can predict with any certainty, therefore, how these issues will be resolved



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Bottom Line

- Most important energy policy choices of the past decade must be made soon
- Will these decisions be made as a result of a well-thought out, carefully considered decision-making process or instead made largely by default?
 - Experience of the last several years (including, in particular, the IPP/natural gas debacle that helped to create this crisis to begin with) does *not* suggest much basis for optimism
 - Policy-planning function appears to have almost entirely disappeared at both federal and state level
- What role, if any, should FERC and/or state regulators be playing in this process?
- Who else might fill the gap?



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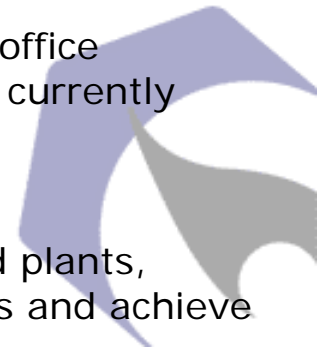
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Major Alternatives

- At least two major alternatives: an “LNG only” strategy or a multi-prong, Apollo type program to reduce our vulnerability to severe dislocations in the natural gas market
- Multi-prong strategy definitively should *include* increased imports of LNG where we can lock in long-term supply from dependable sources of supply with firm dates for commencing delivery and fixed or capped prices
- In addition, however, also should include an array of other programs, potentially including, for example:
 1. Intensive efforts to improve energy efficiency at commercial office building and retail shopping malls (where the greatest waste currently occurs);
 2. Crash efforts to accelerate deployment of renewables;
 3. Crash efforts to replace or repower older, inefficient gas-fired plants, modernize and expand the output of existing coal-fired plants and achieve large-scale deployment of coal gassificatin



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Major Alternatives (contd.)

4. Crash efforts to replace or repower older, inefficient gas-fired plants, modernize and expand the output of existing coal-fired plants and deploy coal gasification on a major scale
5. Major initiatives to reduce line losses on the existing T & D system



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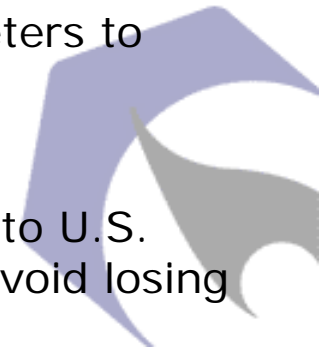
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Potential Advantages

- U.S. companies have the ability to directly control timing of implementation
- Many of the proposed measures (energy efficiency, some coal-plant upgrades, etc.) can be achieved with a much shorter lead time – and therefore can help moderate natural gas prices much sooner
- Geopolitical and terrorist risks much smaller or even non-existent
- Could lead to significant job creation in the U.S.
 - Over a period of years, \$ 100 billion or more in increased spending in U.S.
- Does not create ability on the part of producers or marketers to exert price leverage
- Does not exacerbate balance of payments problem
- Potentially could provide genuine competitive advantage to U.S. manufacturers (or at least allow these manufactures to avoid losing all of their historical advantage)



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Summary

- Overall, the potential economic and strategic advantages of a balanced strategy are **huge**
- Avoids the extreme risks of betting much of the future of U.S. economy for the next decade or two on an “LNG only” or “predominantly LNG” strategy
- However, will required concerted, coordinated national effort to achieve
- Right now, no one is pursuing
- Instead, we’re betting our economic future for two decades or more on an untried strategy with many risks and no material upside, other than the fact that it doesn’t necessarily require the same sort of leadership from government officials in order to implement

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