

# **Impact of Regulation on the Power Sector: Opportunities for Natural Gas\***

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## **Abstract**

Power generation using natural gas emits less carbon dioxide and other air pollutants than other fossil fuels. Growing environmental and climate change concerns have resulted in an increasing number of energy and environmental policies. Certain emission regulations have already been implemented - Renewable Portfolio Standards, non-attainment zones, Best Available Control Technology, Maximum Achievable Control Technology - to name a few. These have had positive and negative impacts, depending upon your perspective. Other policies are being discussed, which also affect investment decisions, bringing risks and uncertainty into projects, and making some technologies more expensive and riskier than others.

The growing abundance and accessibility of natural gas is leading to worldwide shifts in energy policies and in particular power sector shaping regulation. Factors include new global transportation options, like LNG, and new resources of shale gas. Lower natural gas prices and corresponding overall lower fossil energy costs tend to defer energy conservation efforts and stimulate natural gas produced power and encourage retirement (or curtailment) of aging coal-fired generation. In addition, natural gas is the primary fuel to backup renewable sources of energy such as wind, and hence, with more wind farms installed there will be a corresponding increased demand for natural gas. The surprising result of the analysis is that lower natural gas prices appear not to be the primary driver shaping the generation portfolio. Instead, imposed regulation and incentives - including those affecting return on investment - and expected future emissions regulation play a more significant role in determining the energy and technology mix.

We will review key policies and regulations having an impact on the power sector, namely electricity prices, investments in new generating capacity, and choice of fuels. The analysis of command-and-control policies versus market-based instruments will be presented, with a discussion on the inefficiencies in policies' formulations. The impact of fuel prices and expectations about future

policies will also be explored. Results argue for a careful examination of key attributes required to align policy options that are intended to increase efficient natural gas use with those designed to lower overall greenhouse gas and other emissions.

### **Website**

Energy Information Administration, Annual Electric Generator Report: Form EIA-860, 2008, Website accessed 5 July 2011, <http://www.eia.doe.gov/cneaf/electricity/page/eia860.html>

# Impact of Regulation on the Power Sector: Opportunities for Natural Gas

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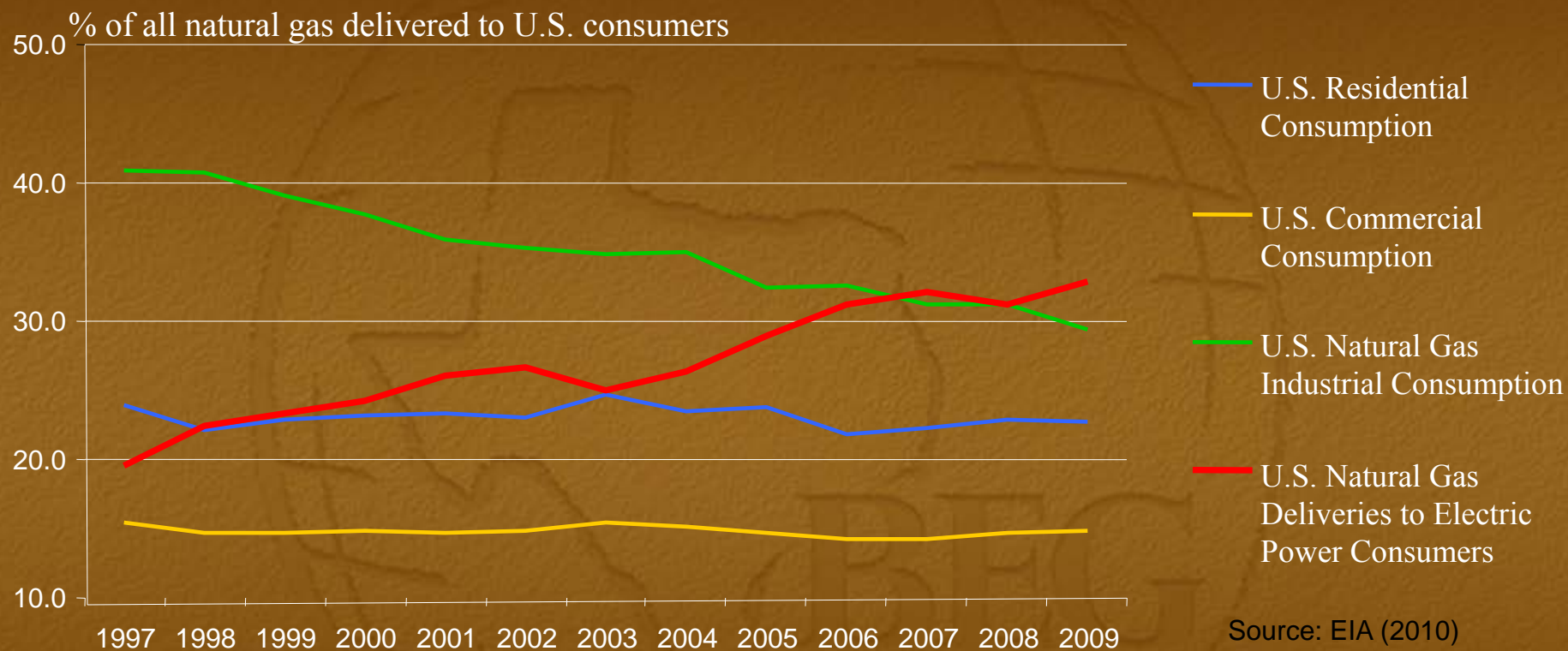
AAPG, Natural Gas Forum  
April 12, 2010

# Plan of the presentation

Natural gas plays increasingly important role in the U.S. energy balance. The consumption of electric power steadily grows. The merits of natural gas enable it to increase its absolute and relative share in the power generation.

- Background
- What is affected and targeted by regulation
- What regulation can do
- What one can expect
- Issues left – imperfectness of the world

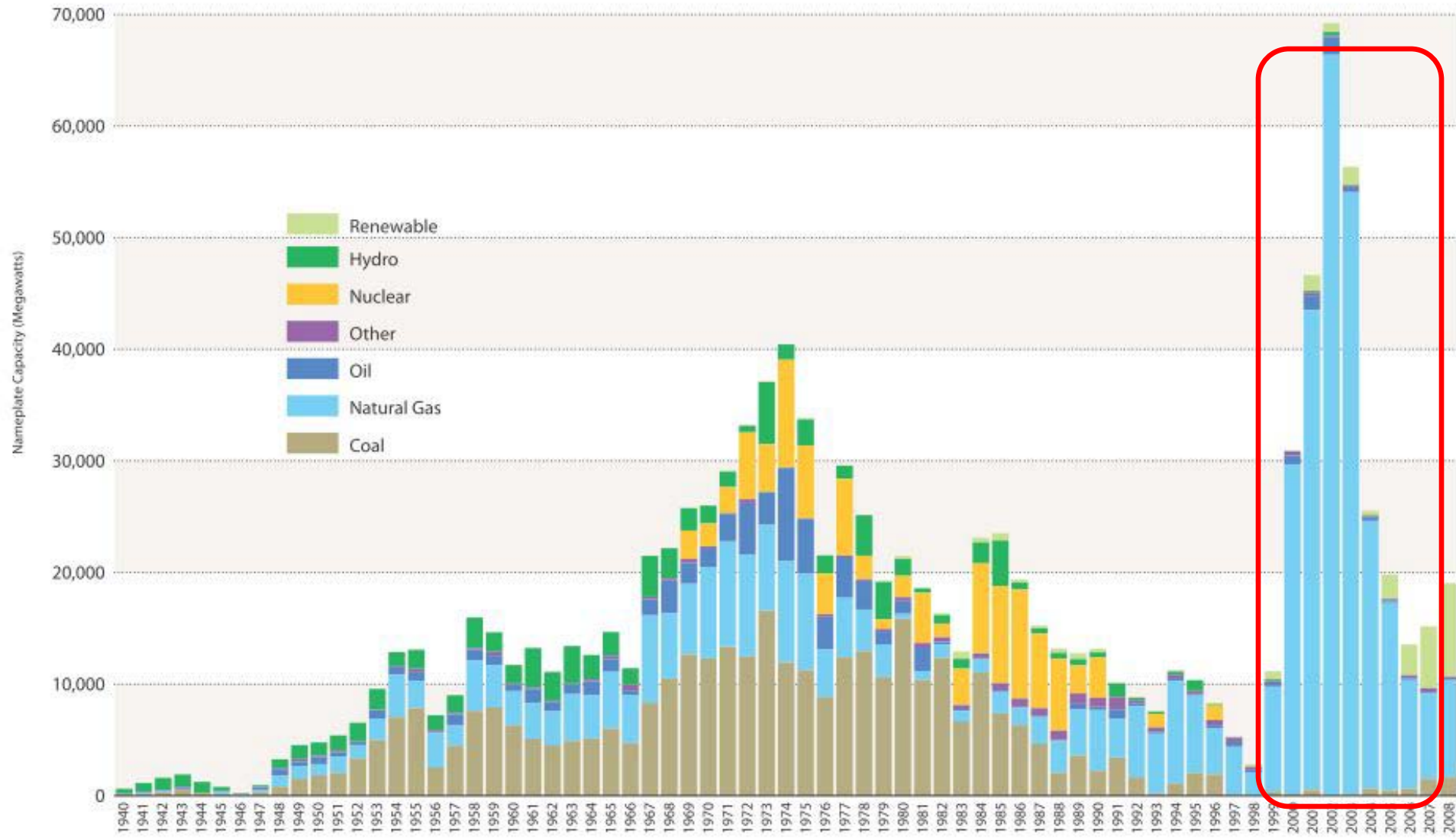
# Natural Gas Consumption



Electricity consumption in the U.S. is projected to grow from 3.7 bn kWh in 2009 to 4.9 bn kWh in 2035, increasing about 1.0 % annually (AEO2011).

FIGURE 4

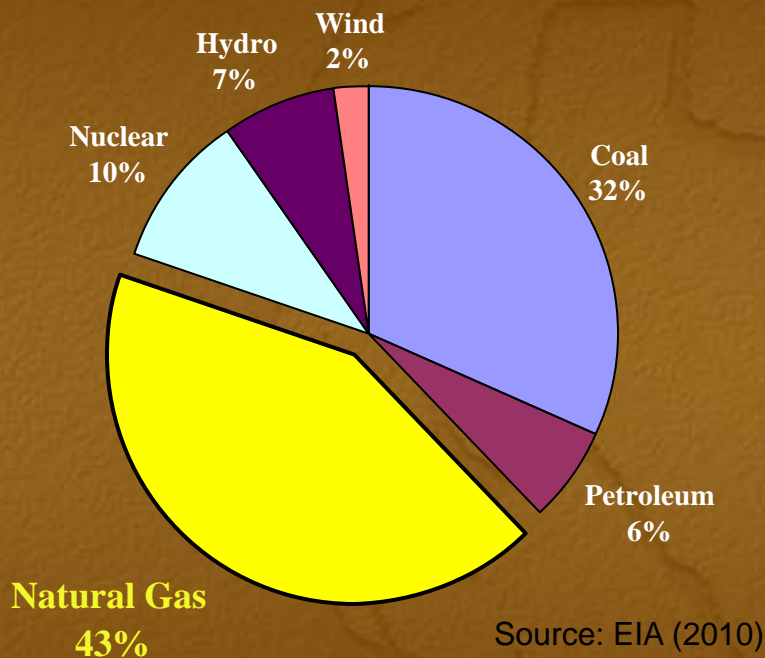
U.S. Electric Generating Capacity by In Service Year



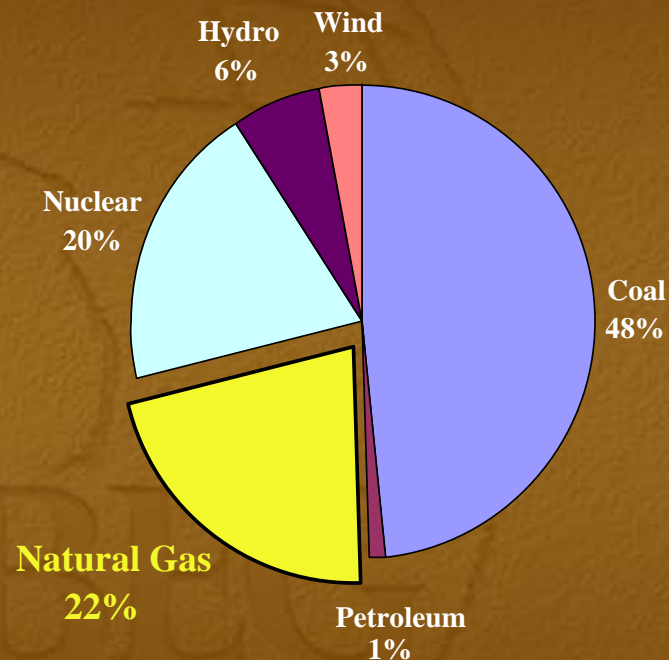
SOURCE: ENERGY INFORMATION ADMINISTRATION, ANNUAL ELECTRIC GENERATOR REPORT, FORM EIA-860 (2008).  
<http://www.eia.doe.gov/cneaf/electricity/page/eia860.html>

# The U.S. Power Sector

Existing Capacity by Energy Source, 2008



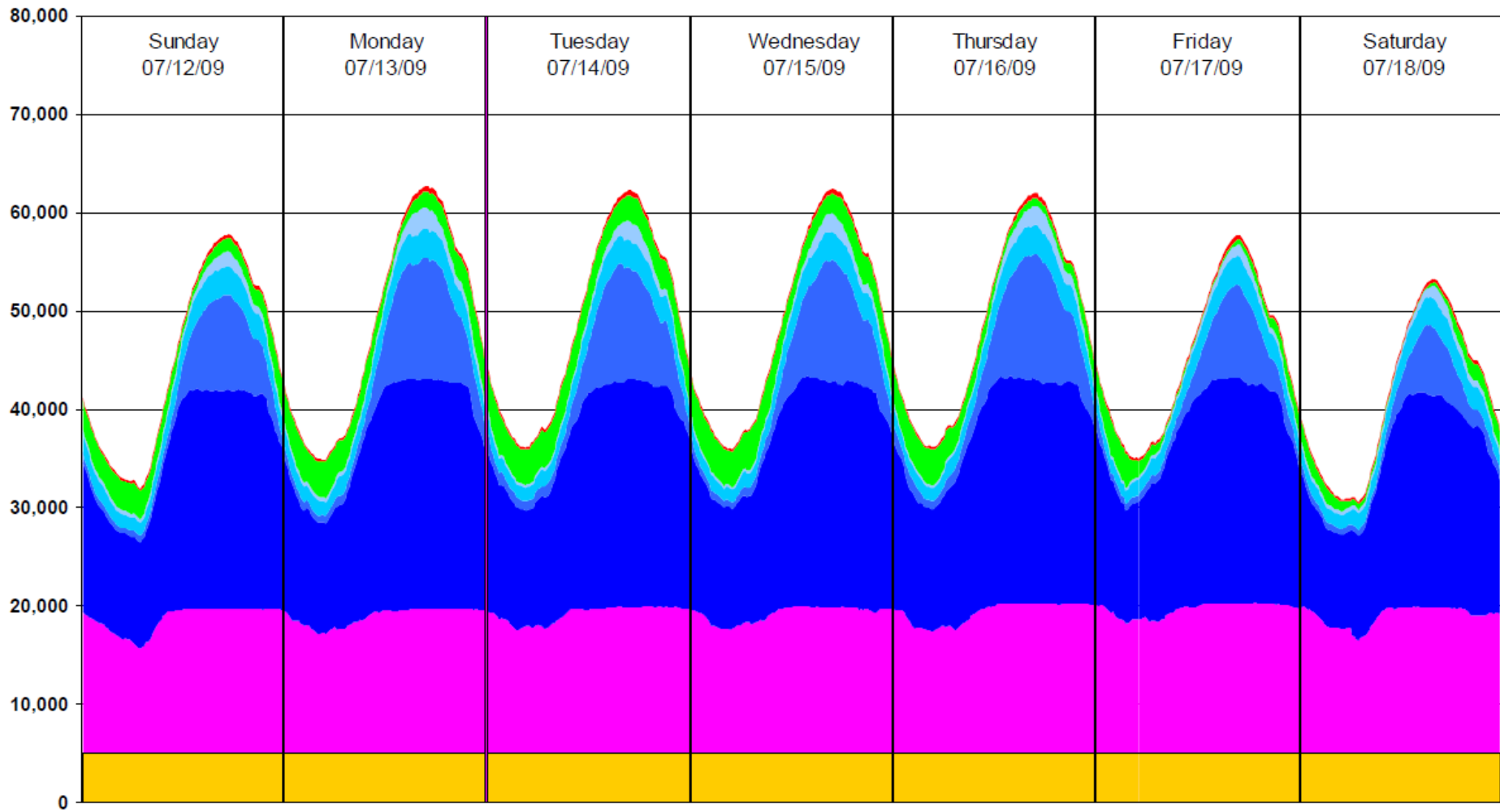
Net Generation by Energy Source, 2008



Capacity factor for natural gas generation is often below 50%.  
Investment and generation decisions are made individually and often are not socially efficient.

# Peak Summer Week Generation, ERCOT

■ Nuclear ■ Coal ■ CombCycle ■ GasSteam ■ PrivateGas ■ GasTurbine ■ Wind ■ Other

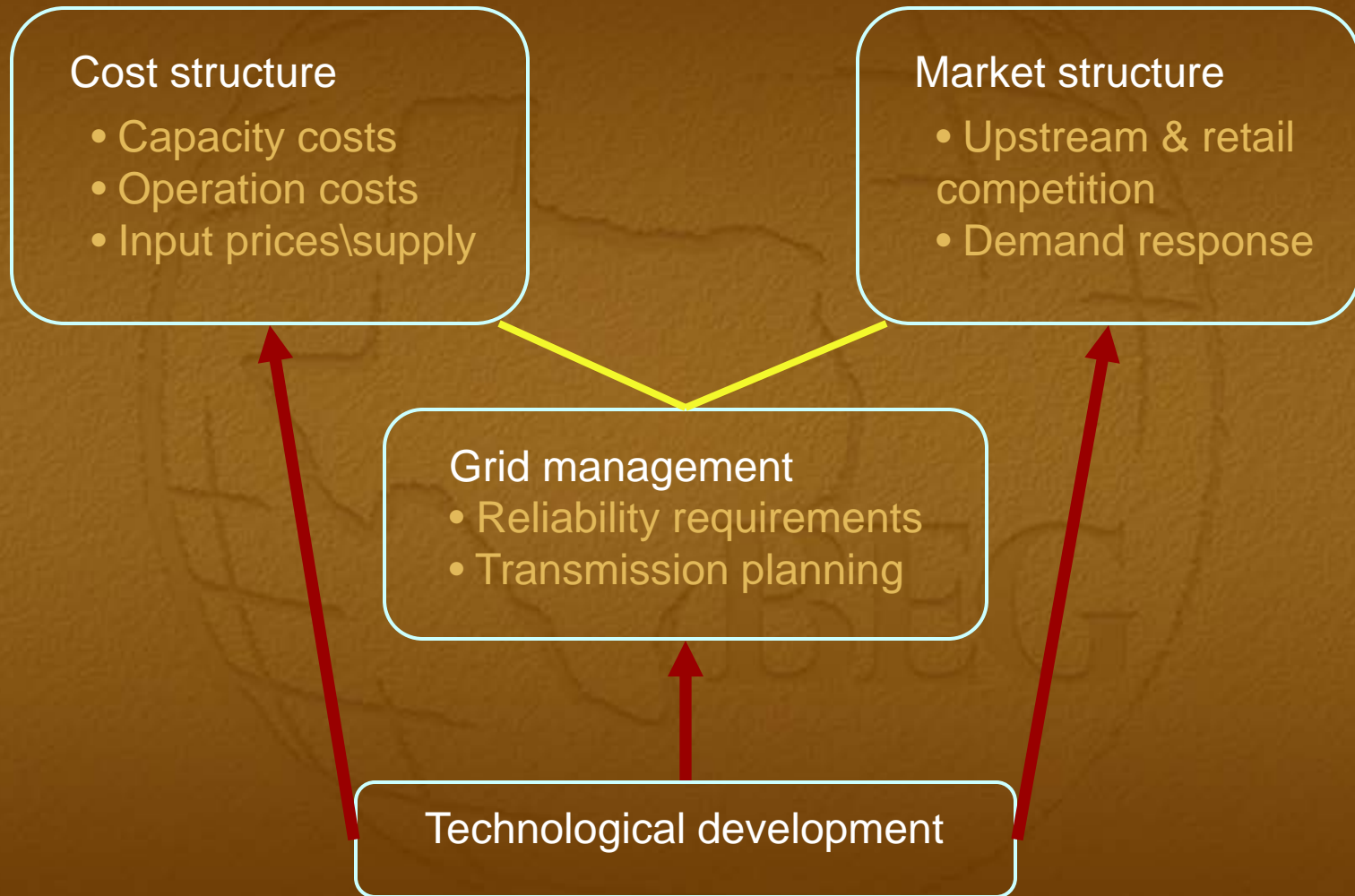




# Taking natural gas seriously

- *President Obama*: announced a plan to cut U.S. oil imports by a third by 2025 “with an ongoing focus on incentives to increase the use of natural gas“ (March 2011).
- *Legislature of the State of Kansas*: “.. the intent of the legislature that 20% of the megawatts of generating capacity installed in this state after January 1, 2020, use natural gas. [The] commission shall establish a natural gas energy credits trading program.”
- *Public Utility Commission of Texas*: “to encourage to use natural gas as their primary fuel source [the] commission shall institute a natural gas energy credits trading program to ensure that 50% of all new generating capacity [,] installed after January 1, 2000, uses natural gas as its primary fuel.”
- *Electrical Association of Philadelphia*: “Convert from another fuel source and install a natural gas furnace or boiler to make natural gas your primary heating fuel and you receive a rebate ”

# Key factors defining the fuel & technology mix

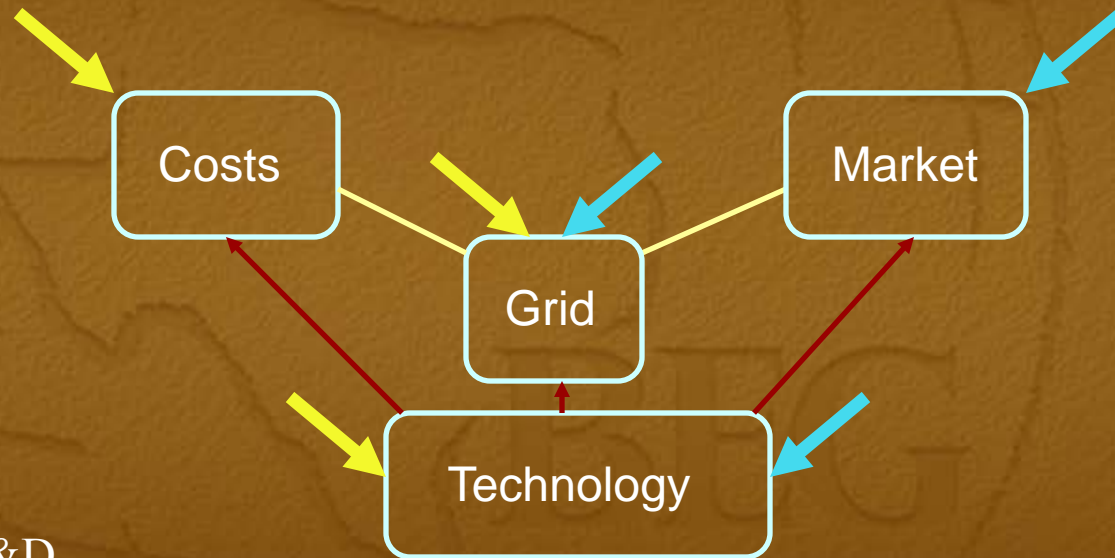


## Environmental regulation

- ✓ Direct financial incentives, e.g. tax credits
- ✓ Indirect system of incentives, e.g. Acid rain program or REC
- ✓ Command and control instruments, e.g. GHG caps, air pollution control

## Power market regulation

- ✓ Supply profile control, e.g. RPS
- ✓ Consumer choice programs
- ✓ Demand response measures



## E & E regulation

- ✓ Incentives to R&D&D for energy efficient technologies
- ✓ Incentives for conservation, incl. “demand peak shaving”
- ✓ Command and control over technologies

# Regulatory uncertainty

- Uncertainty about what kind of carbon (and other emissions and pollution) regulations might be imposed complicates matters
  - Producers are reluctant to invest in natural gas plants due to price volatility and (possible) supply uncertainty, but the possible regulation and future prospects induce them to diversify;
  - Uncertainty in policy is likely to cause delays and reduction in capacity investment in “dirty” power generation;
  - Delays in investments may result in capacity deficit, then to fill the supply gap quickly natural gas plants are likely to be built.

# Conclusion I

Producers may be prone to invest in natural gas fired generation, thanks to:

- Market incentives to build peak-load generation;
- Market incentives to build mid-load generation;
- Favorable environmental regulation.

Among the key drives are:

- ✓ Reduced upfront capital costs and likely lower operation costs;
- ✓ Lower impact of environmental policy uncertainty on future costs/benefits;
- ✓ Abundance of natural gas (domestically);
- ✓ Public acceptance (or public opposition to coal / nuclear)
- ✓ Generation portfolio diversification.

# Role of consumers

- The future of the power sector depends on investment decision of producers, their expectations about energy prices and regulation.
- Yet, it also depends on consumers' behavior
  - Approval of power plants building, based on their fuel preferences, risk attitude;
  - Stimulating power production from certain fuels;
  - Reducing peak demand;
  - Stimulating investments through “long-term” contracts.

# Conclusion II


Consumers are likely to stimulate the consumption of natural gas, due to:

- Desire to increase production of power from renewable energy sources;
- Environmental benefits and relative safety of production;
- Increased awareness of natural gas abundance and affordability;
- Conservation efforts;
- Lower regulatory uncertainty impact on future costs/benefits.

# Conclusion III: But world is imperfect

- Market failures may result from the presence of
  - Imperfect information;
  - Intermingled and/or not well defined goals of various policies;
  - Failure to coordinate among different regulatory and governmental bodies, e.g. FERC, EPA, state and regional authorities;
  - Persistent policy uncertainty;
  - Fuel and power demand / supply shocks.





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