

# **REINHOLD ENVIRONMENTAL Ltd.**



## **2012 APC Round Table & Expo Presentation**

July 16-17, 2012, in Baltimore, MD / Hosted by Duke Energy, Entergy,  
FirstEnergy, Southern Company & TVA

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# Is There A Future For Coal ?

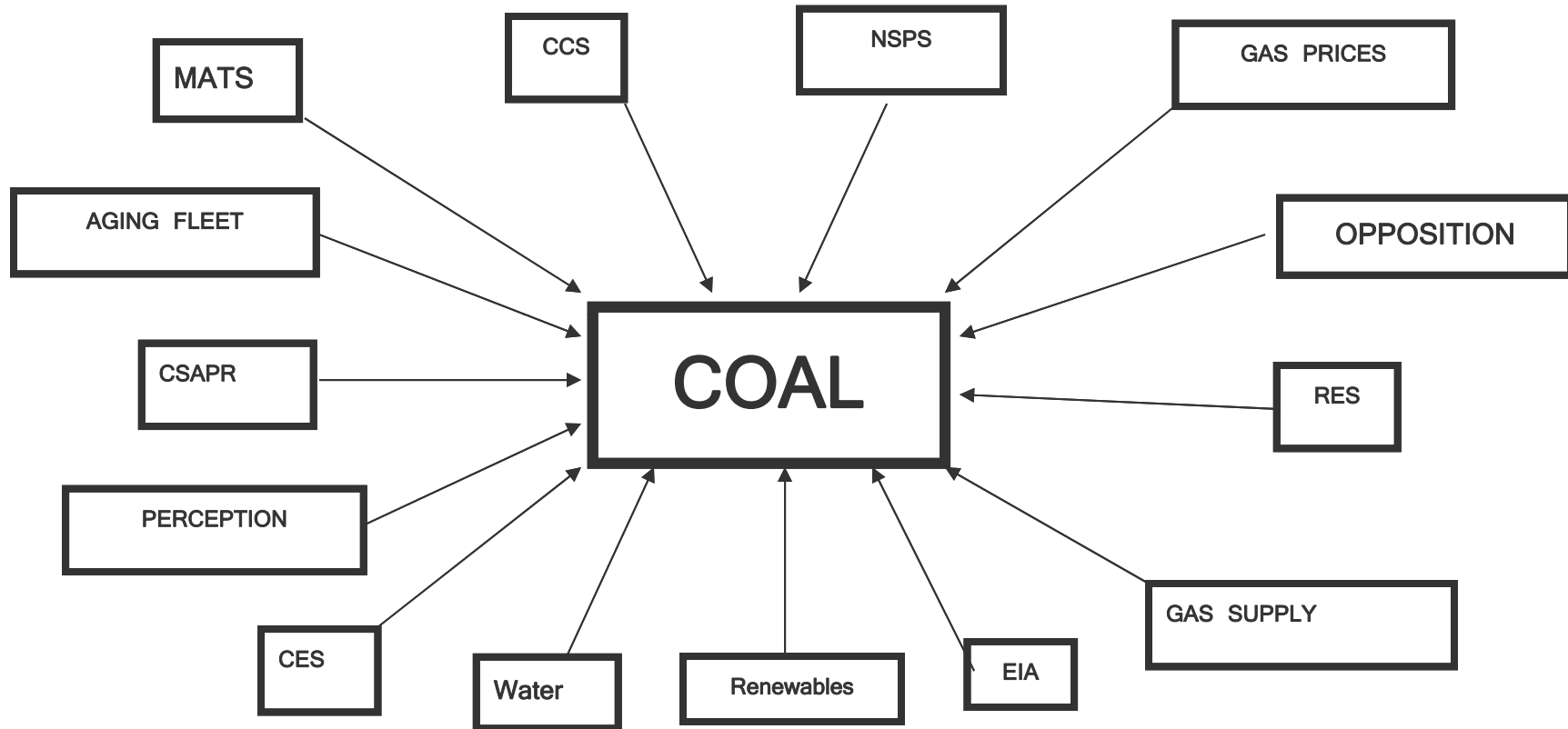
2012 APC/PCUG Conference

Robert G. Hilton

July 16, 2012

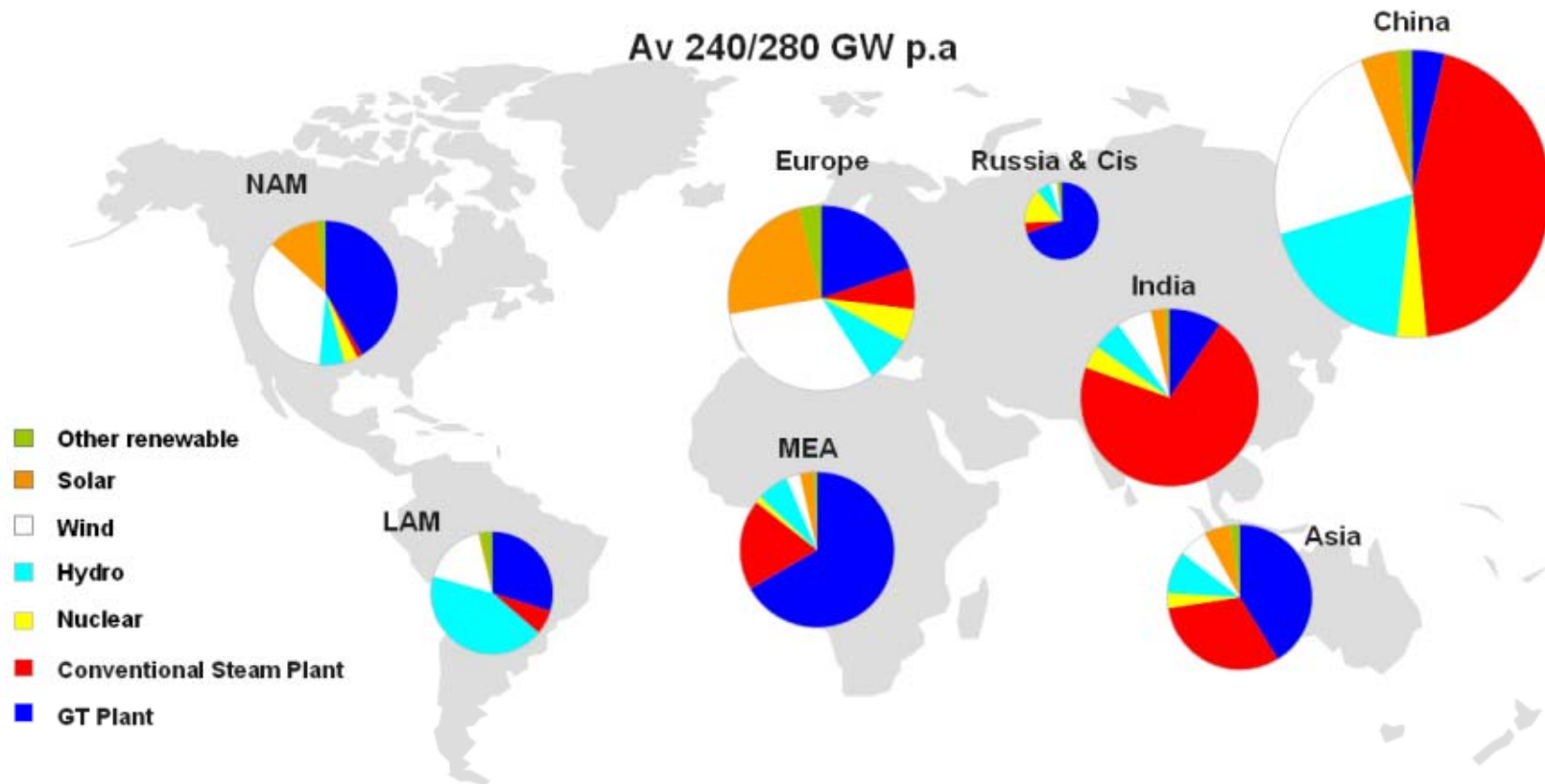
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# The Dilemma for Coal in the US



# Global power market forecast – next 5 years

## New Power Plant Orders in GW p.a

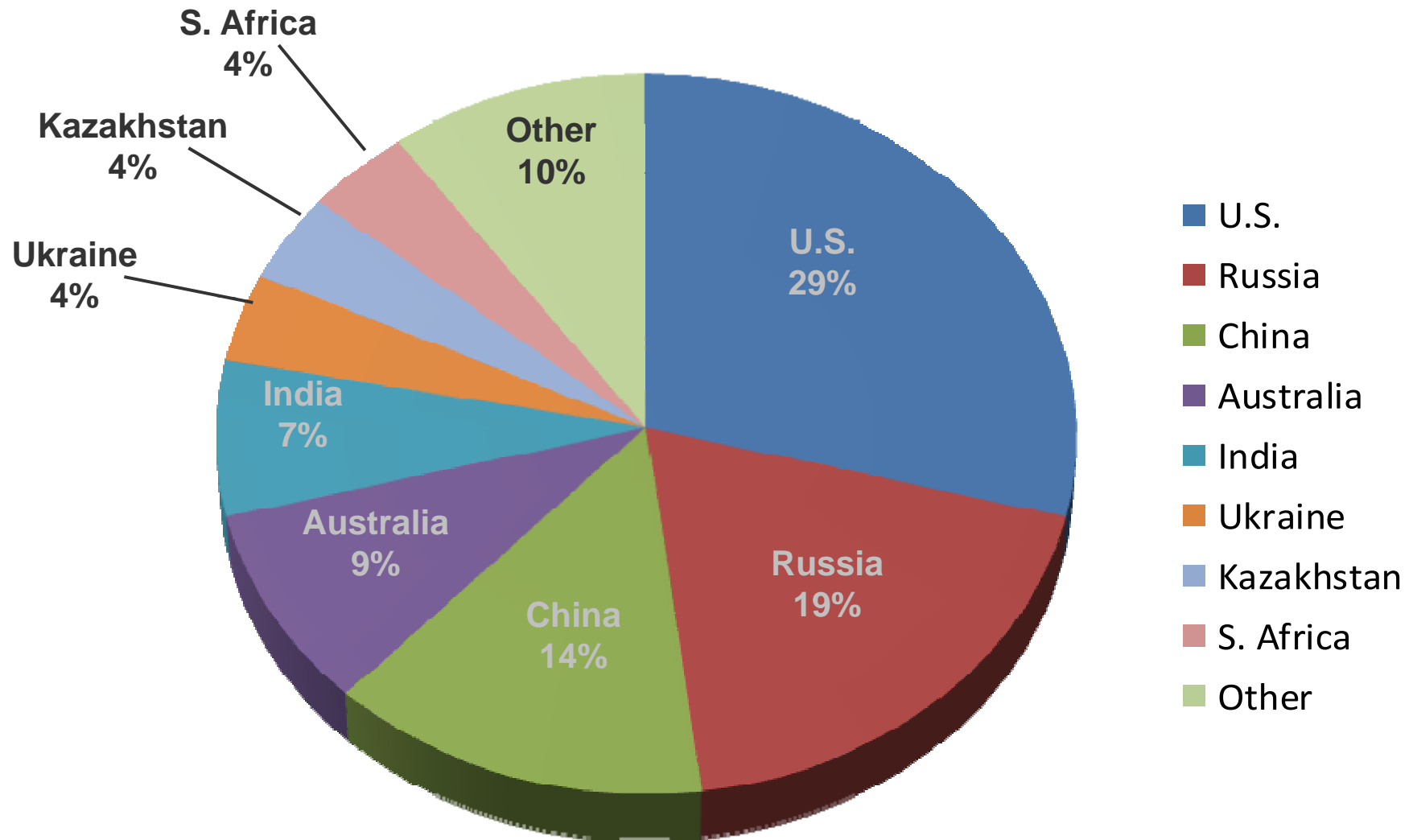


Source: ALSTOM MACA 2011

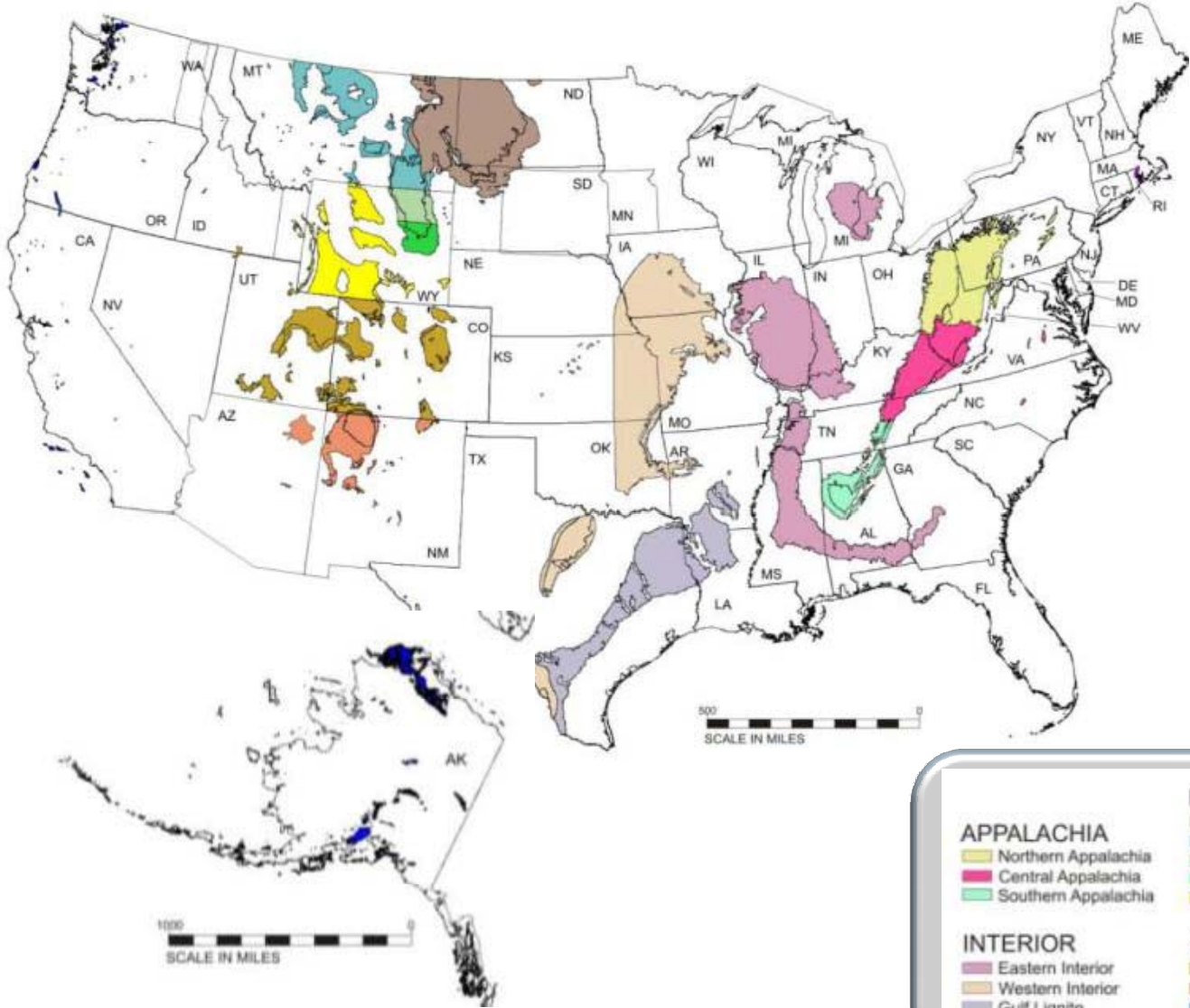
- ✓ Biggest demand in emerging economies
- ✓ Growing share of CO2-free all across the globe.

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# World Recoverable Coal Reserves



# More than 200 Years of Proven Reserves



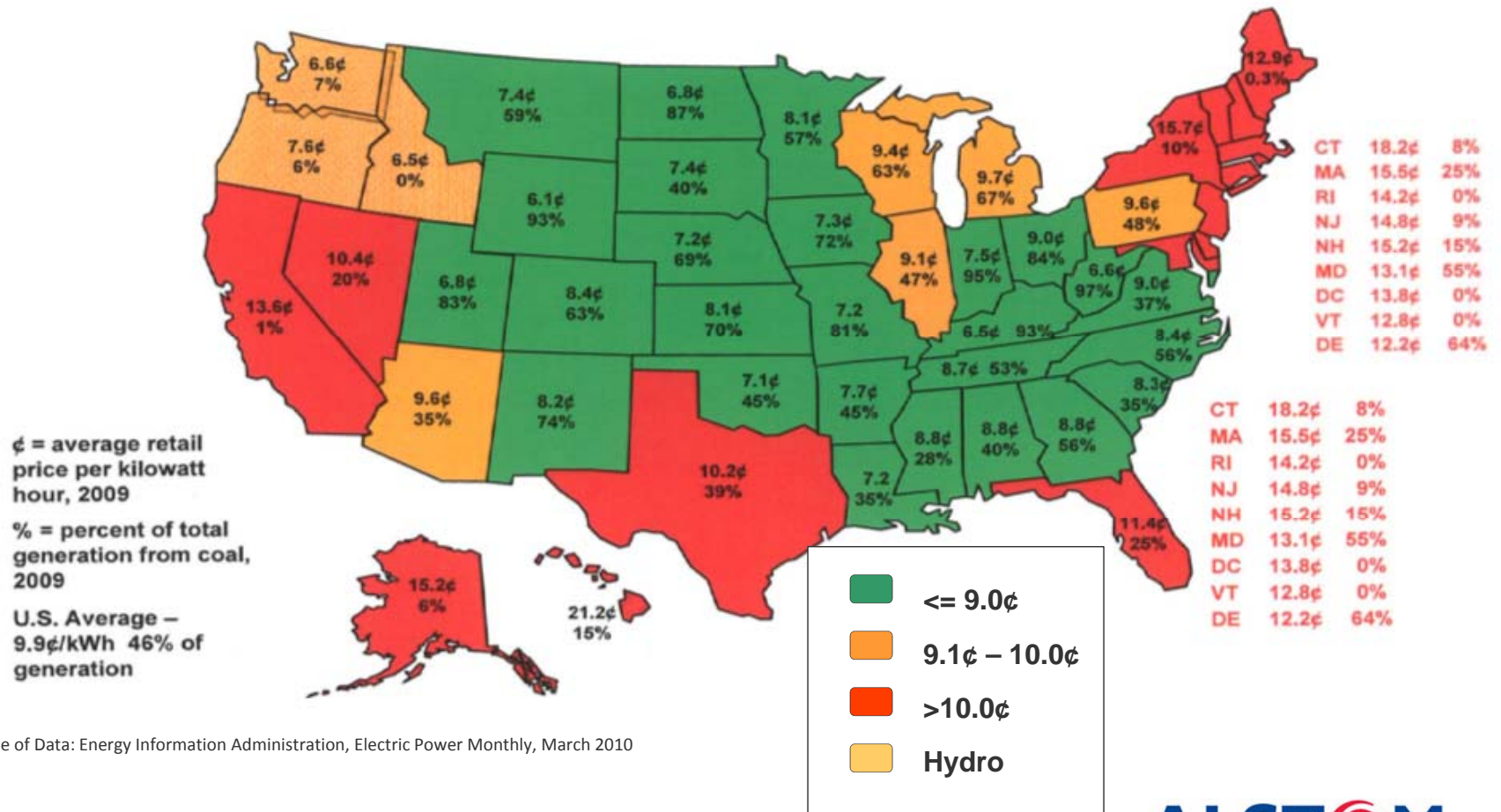
All-of -the-Above Strategy leads to a Matter of National Security

<b>APPALACHIA</b>		<b>NORTHERN GREAT PLAINS</b>	
Yellow	Northern Appalachia	Brown	Dakota Lignite
Pink	Central Appalachia	Teal	Western Montana
Light Green	Southern Appalachia	Light Green	Wyoming, Northern Powder River Basin
		Yellow	Wyoming, Southern Powder River Basin
		Yellow	Western Wyoming
<b>INTERIOR</b>		<b>OTHER WEST</b>	
Purple	Eastern Interior	Yellow	Rocky Mountain
Orange	Western Interior	Orange	Southwest
Blue	Gulf Lignite	Blue	Northwest

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# Coal Provides Low Cost Electricity

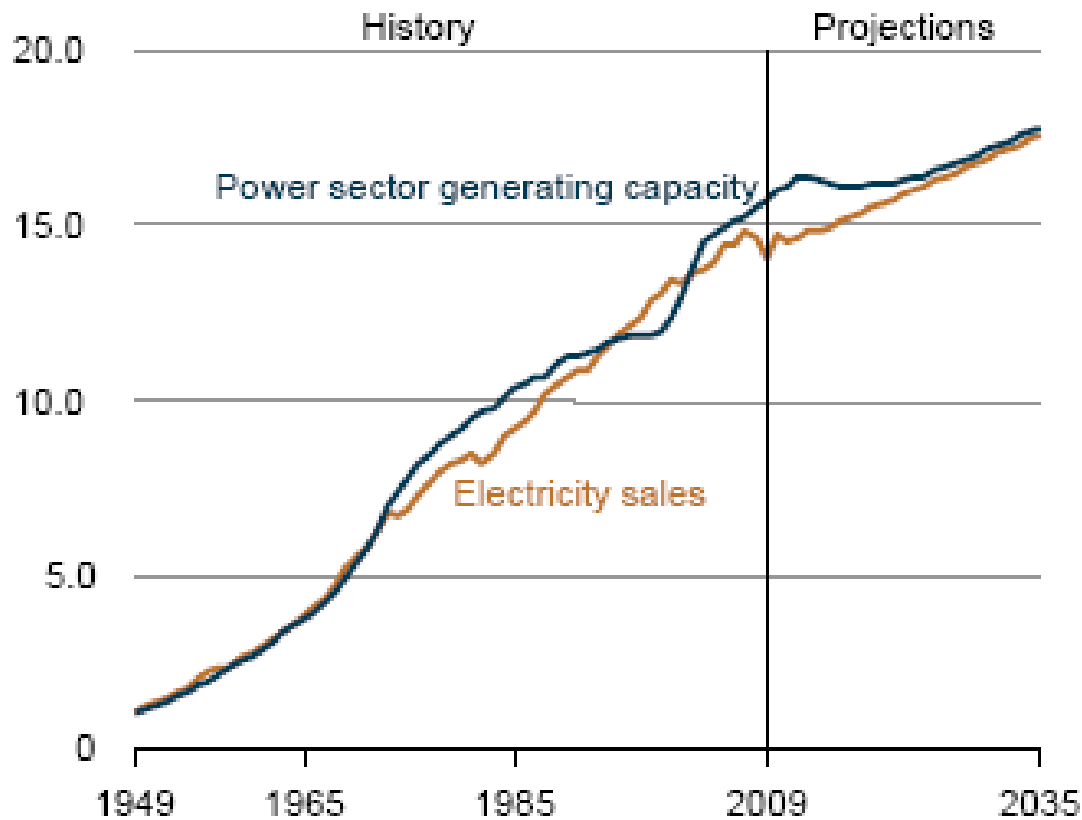
## Cost per kWh and Percent of Coal Power Sector Generation



Source of Data: Energy Information Administration, Electric Power Monthly, March 2010

# DOE/EIA projected growth of U.S. electric sales and generation capacity (1949=1.0)

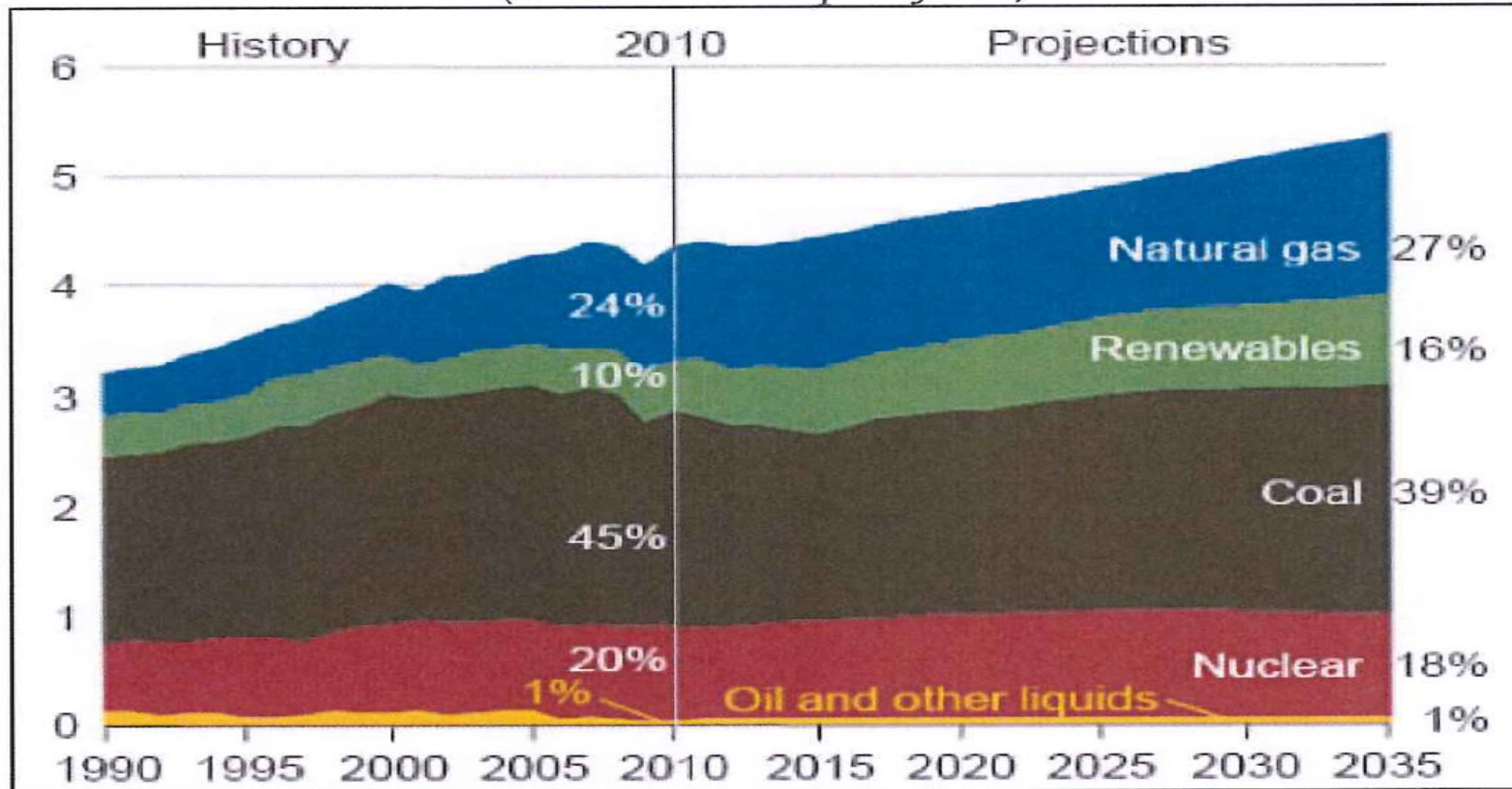
**Figure 80. Electricity sales and power sector generating capacity, 1949-2035 (index, 1949 = 1.0)**



Source: DOE/EIA Annual Energy Outlook 2011.

# US Generation by Fuel

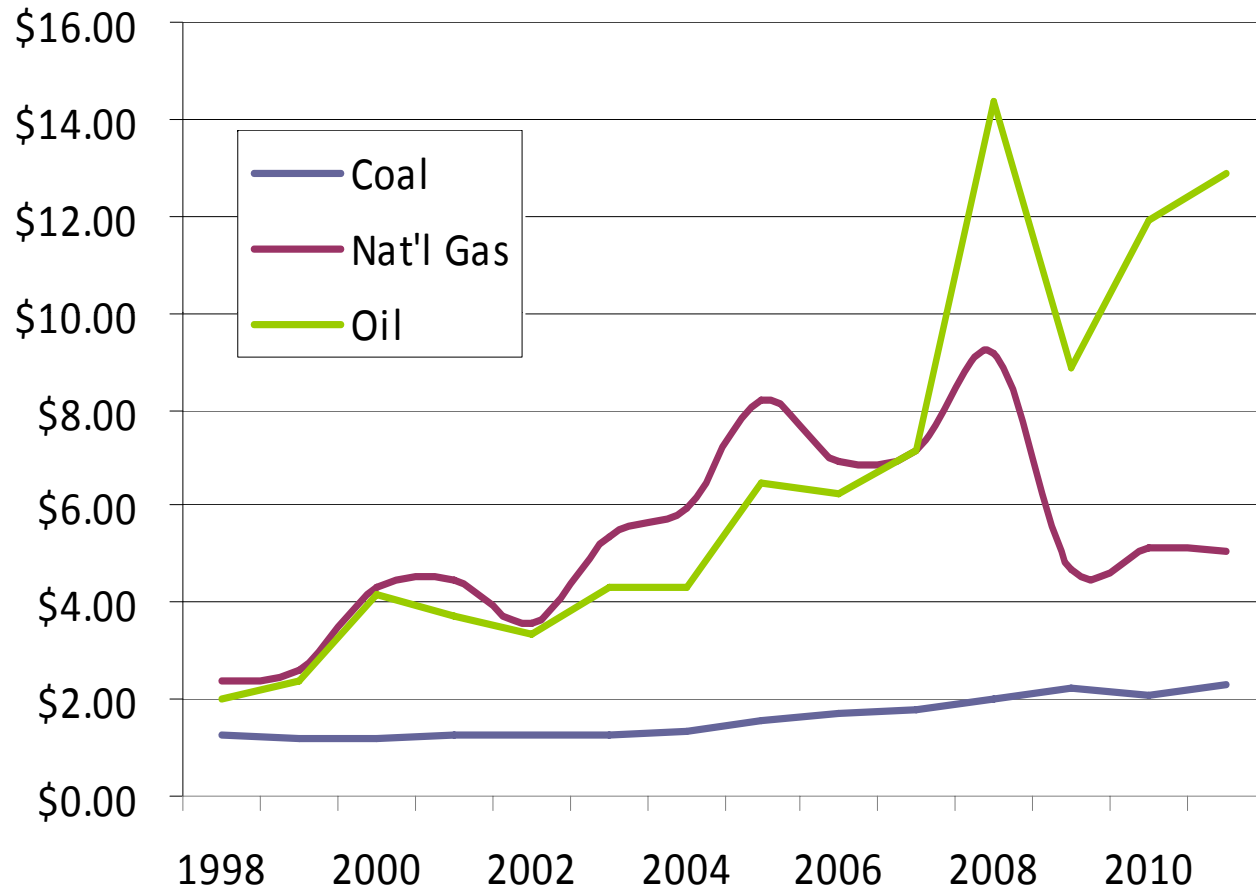
Electricity Generation by Fuel  
 (1990-present (actual), 2010-2035 (projected))  
 (trillion kWh per year)



Source: EIA, Annual Energy Outlook 2012, Early Release Overview.

# Coal Provides Price Stability

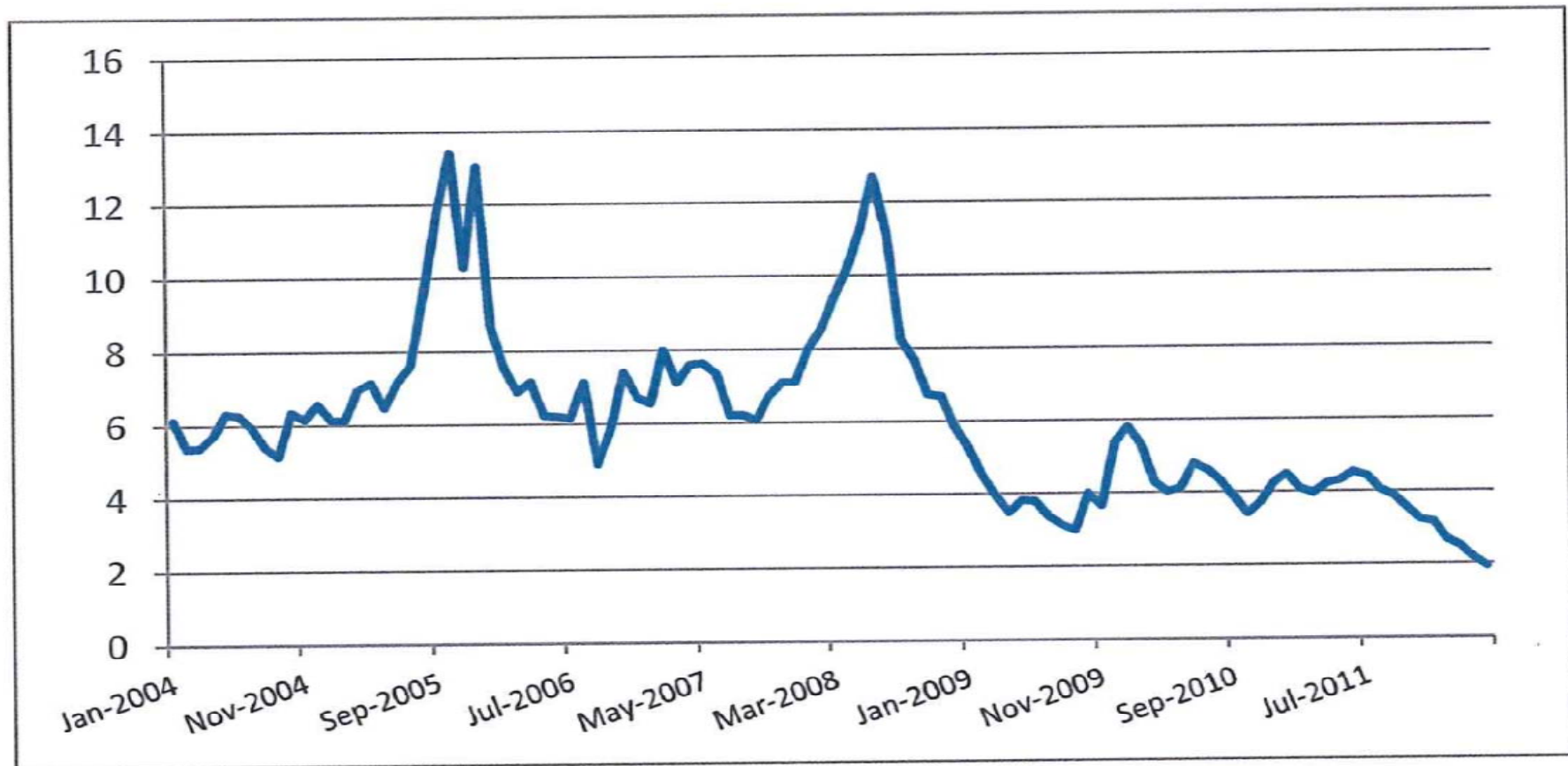
(\$/MMBTU delivered to utility power plants)



Source: DOE/EIA (2011 data are projections).

## Volatility of Natural Gas in the Last Decade

Natural Gas Prices – 2004 through April 2012  
(Henry Hub Spot Prices - \$/MMBtu (nominal\$))



Source: Energy Information Administration

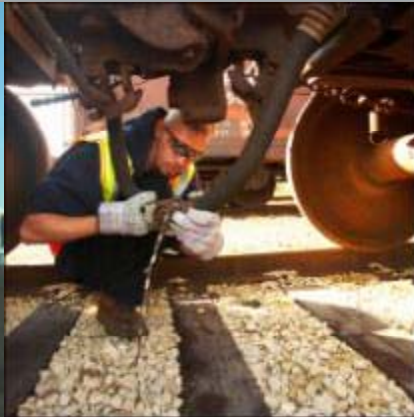


# The Value of Coal to The US Economy

# Coal Mining and Transportation Employment

	<i>Mine workers</i>	<i>Support Activities</i>	<i>Transportation</i>	<i>Indirect and Induced</i>	<i>Total Jobs</i>
Total Operations	93,000	64,000	61,000	372,000	590,000

**Mine Workers are in 28 states  
Coal-based generation in 47 states  
Transportation is in 49 states**



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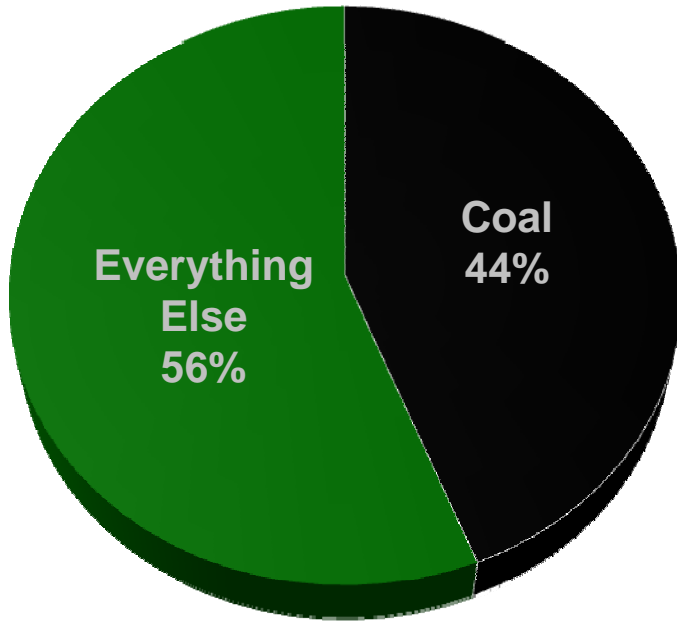
# Coal Is Critical to Transportation

Coal accounts for 1 in 5 railroad jobs and 1 in 4 revenue dollars

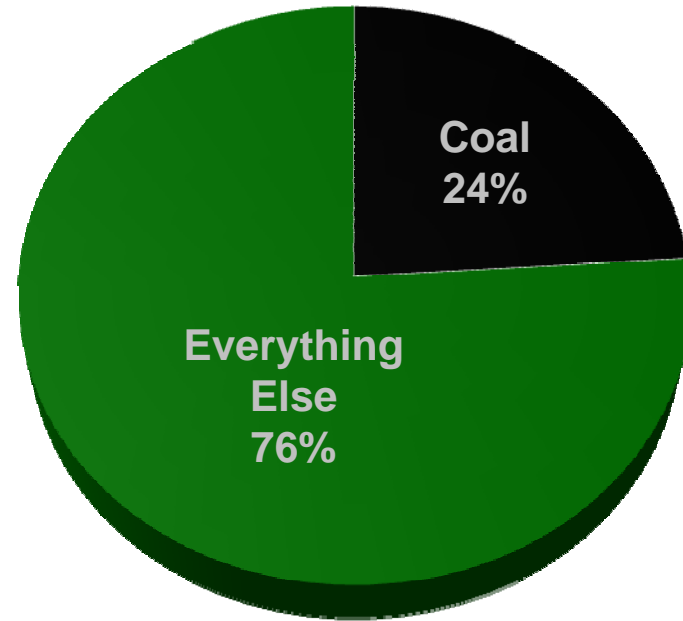
Without coal, the railroad network as we know it would cease to exist – costs for all other freight would increase dramatically



# Coal as a Percent of U.S. Rail Traffic



Tonnage



Gross Revenue

*Class I Railroads, 2010*

Source of Data: Association of American Railroads, AAR Freight Commodity Statistics

## Impact of Low Gas Prices

- Drop in Coal Generation – as much as 50% in less than one year
- Retirements– many planned any way
- Questioning the investment in retrofit of APC equipment
- Coal to Gas conversions

# Uncertainty

- Is Unconventional Gas the Future

  - Reserves announced and then down graded

  - Water and permit impacts

  - Chemicals Controversy

  - Seismicity

- Is Climate/Carbon Reduction a done Deal?

  - CCS not until 2020+?

  - Sequestration possible?



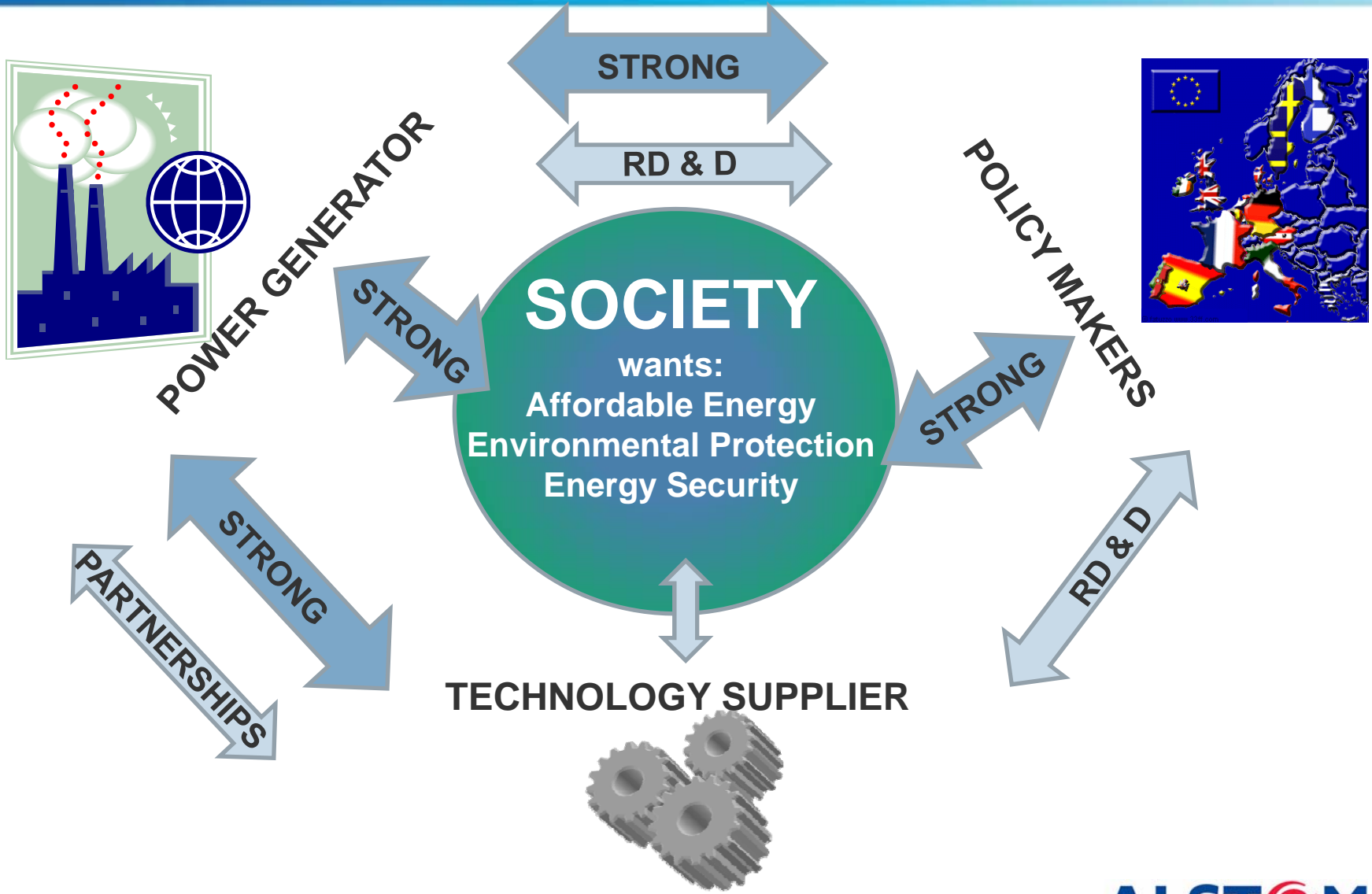
**So What Needs To Be Done?**

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# Suggestions

- The Industry needs to speak with one uniform voice
- Anti-coal efforts are well coordinated and financed
- We need to speed up technology development to market
- On a level playing field , coal is competitive
- Message about coal needs to be that it is clean and economical

# Multiple Key Energy Policy / Technology Interfaces...

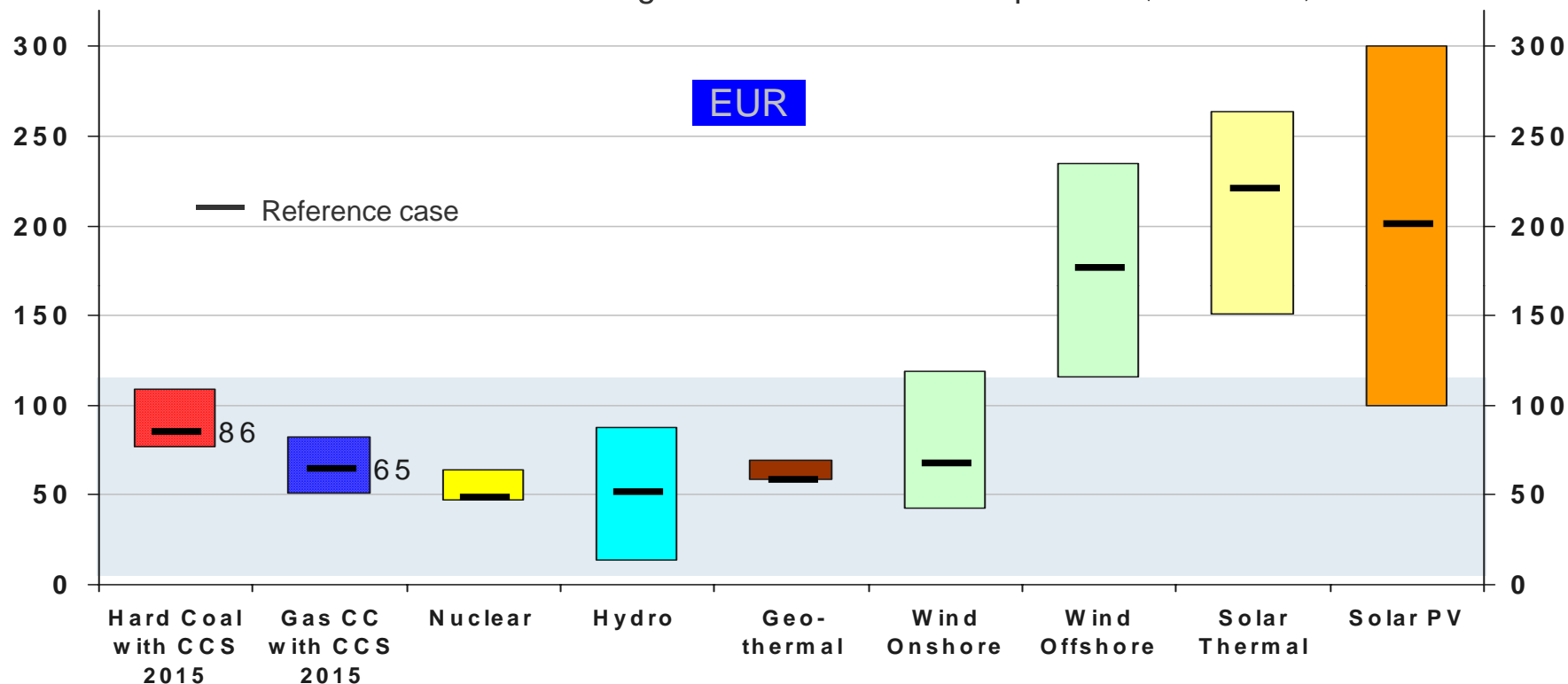


## Challenges

- **Develop equal consideration for all generation technologies**
- **Innovative, cost effective solutions for MATS and CASPR**
- **Accelerate the demonstration and cost reduction of CCS**
- **Demonstrate IGCC and continue to accelerate the development roadmap**
- **Deploy energy efficient technology to raise the fleet efficiency**
- **Work on Congress and permitting agencies to smooth the path for technology deployment and , where necessary , demonstration**

# CCS is competitive against other low-carbon technologies, in Europe by 2015

€/MWh CoE Low Carbon technologies over 2011-2016 period (New PP)



Source : Alstom analysis 2011. CCS Post amine 2015 costs, including on shore T&S and CO<sub>2</sub> price (Flue Gas Recirculation case for CCS Gas CC) - Cost for firming intermittent Power Generation not accounted

Under realistic assumptions and with a conservative variation range, CCS is competitive on coal and gas by 2015



# Challenges and Needs

Political / Policy

**Political will to establish global CO<sub>2</sub> targets**  
**Regional and National Energy Policies for CCS**  
**Robust regulatory frameworks**

Legal

**CCS Legislation (Capture, Transport and Storage)**  
**Permitting/consent regimes**  
**Capture ready requirements**

Environmental  
Health & Safety

**Emissions and waste standards for CCS (Capture technology)**  
**CO<sub>2</sub> specifications for Transport and Storage**  
**Storage site validation**

Economic

**Current power spreads do not support CCS**  
**CCS financial incentives**  
**Market mechanisms (Cap & trade, EPS, Carbon taxes, etc)**

Commercial

**CCS demonstration at commercial scale (bankability)**  
**Long term Storage liability**  
**Public acceptance**

# Conclusions

- Existing coal plants will be retrofitted as they can not be shut down given lack of new plants being permitted.
- Retrofit of existing plants attractive given projected cost of new PC or IGCC base load plants– Impact of new Gas Capital costs?
- New plant costs will not be significantly increased to comply with MATS and CSAPR regulations
- Permitting of new plants will be mired in uncertainty until proper guidance on CCS in the interim period
- Permitting will remain difficult until the industry handles the perception of coal as dirty and expensive, and gas as cheap and plentiful
- Coal needs a level playing field with all generation technologies



**Does Coal Have A Future?**

**It Is Up To All of US!!**

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