

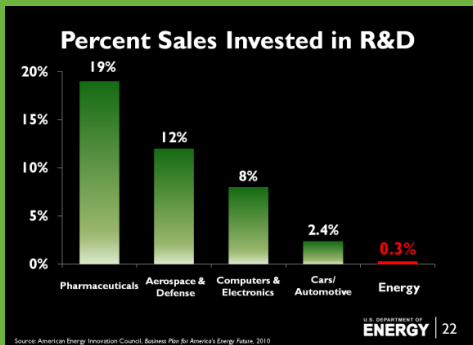


*Using less. Doing more.*

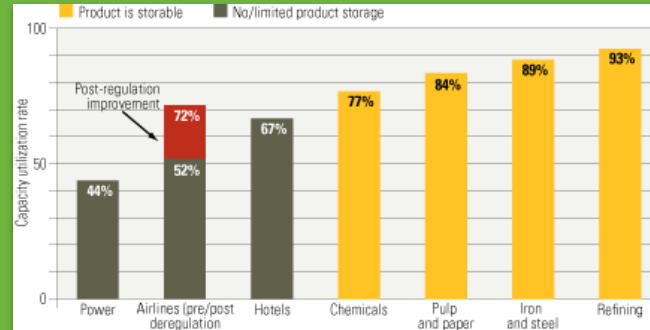
# Power Generation for a Clean Energy Future

Alliance to Save Energy  
Great Energy Efficiency Day: Part 2  
October 3, 2012  
Dr. Dan E. Arvizu, Laboratory Director

# Energy Sector Challenges



R&D Investment Drives Innovation

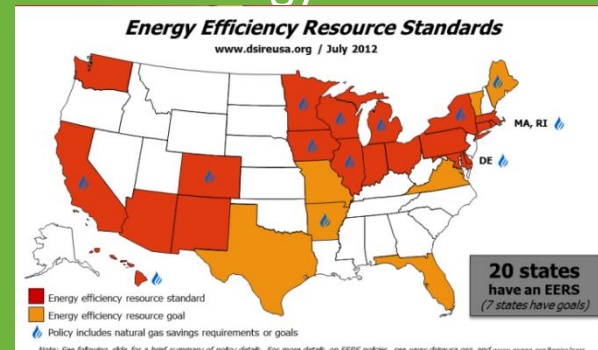


Asset Utilization

Capital Intensive with Long Life Cycles

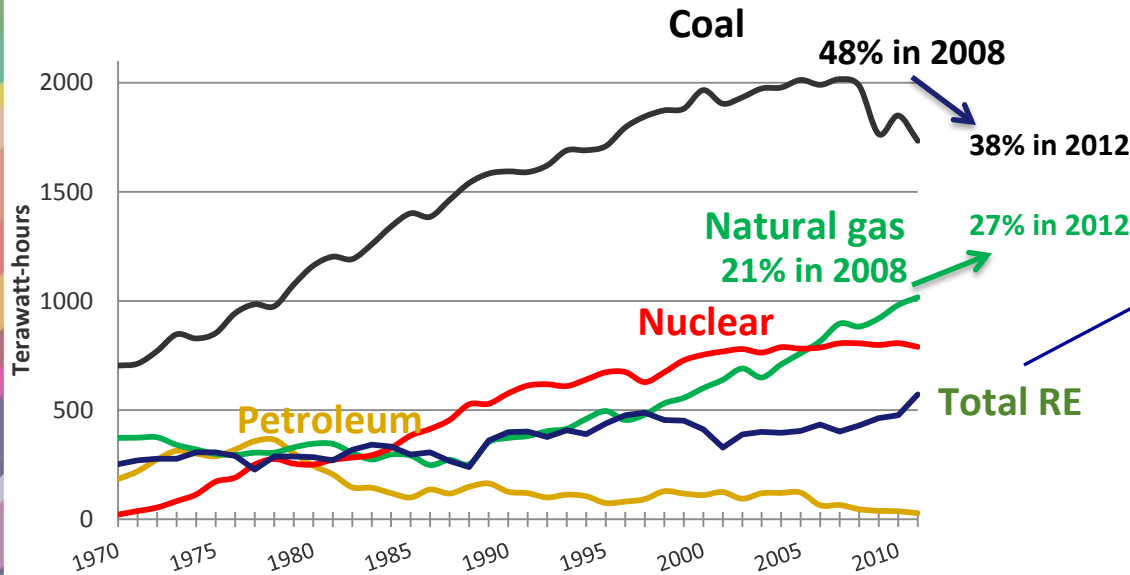


National Strategies Driving Energy Market

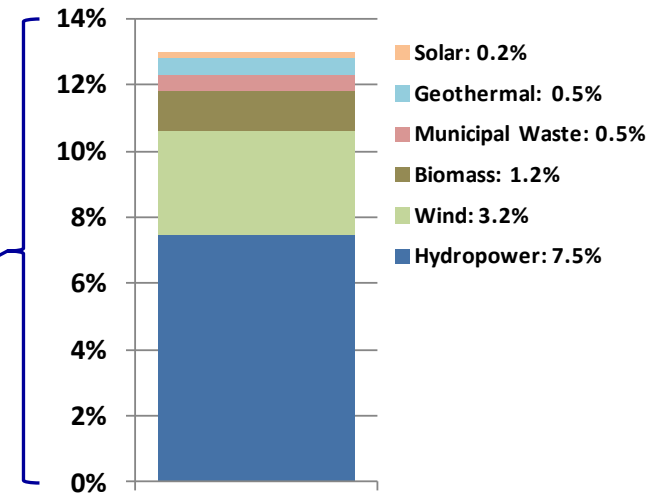


# U.S. Electric Sector Trends

## U.S. Electric Sector Net Generation



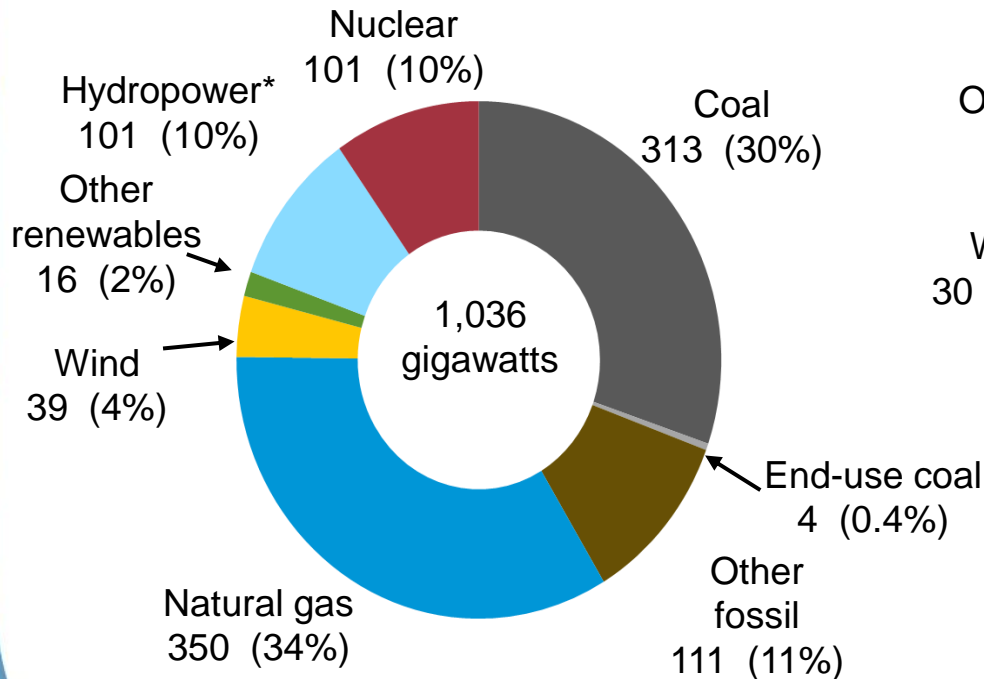
## U.S. Renewable Generation



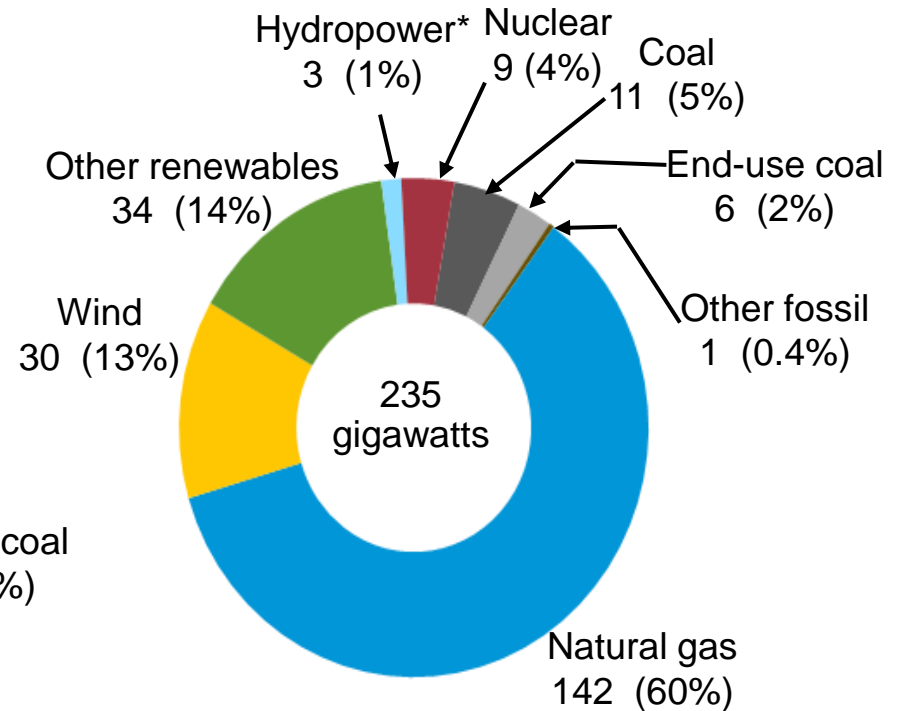
Source: EIA, Annual Energy Outlook 2012

# Natural gas, wind and other renewables account for the vast majority of capacity additions from 2010 to 2035

**2010 capacity**



**Capacity additions 2010 to 2035**

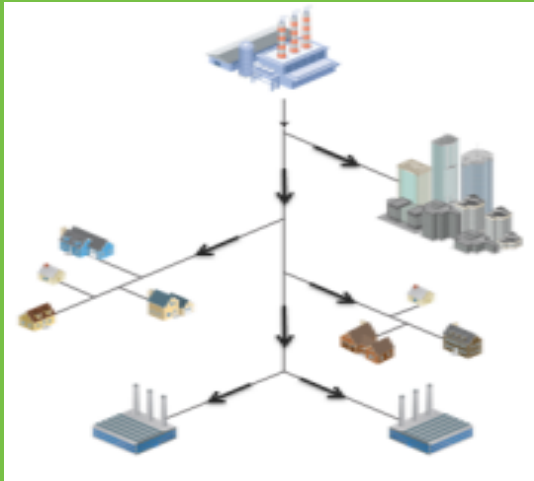


\* Includes pumped storage

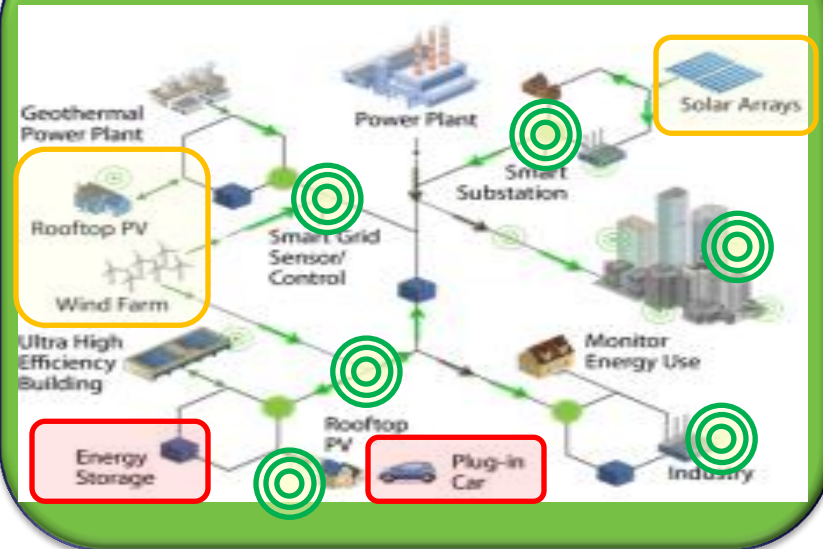
Source: EIA, Annual Energy Outlook 2012

# Why Energy Systems Integration?

## Current Energy Systems



## Future Energy Systems



## New Challenges – Need to tackle difficult problems

- Increasing penetration of variable RE in grid
- New communications and control models
- Electrification of transportation
- New energy technologies and services integrating energy storage
- Increasing system flexibility
- Understanding interactions between electricity/thermal/fuels

# Innovation, Integration, & Adoption

## Reducing Investment Risk

- Enable basic and applied clean energy technology innovation
- Accelerate technology market introduction and adoption
- Integrate technology at scale
- Encourage collaboration in unique research and testing “partnering” facilities
- Provide analysis and expertise to inform decisions



# Draft Conclusions from Task Force Report

## Investment

- New business models are essential for successful power generation and smart grid operation
- Must focus on human capital

## Technology

- Modernizing the power delivery system with smart grid systems
- Ruggedized smart grid for future infrastructure reliability and cyber security for power generation and delivery



*Using less. Doing more.*

# Draft Conclusions from Task Force Report (cont.)

## Human Behavior

- Consumer education is key

## Leadership and R&D

- National energy policy
- Investments in R&D
- Remove regulatory barriers







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