

Morgan Stanley

## Troutman Saunders

Developing Renewable Energy: Bringing Wall Street &  
Renewable Technologies Together

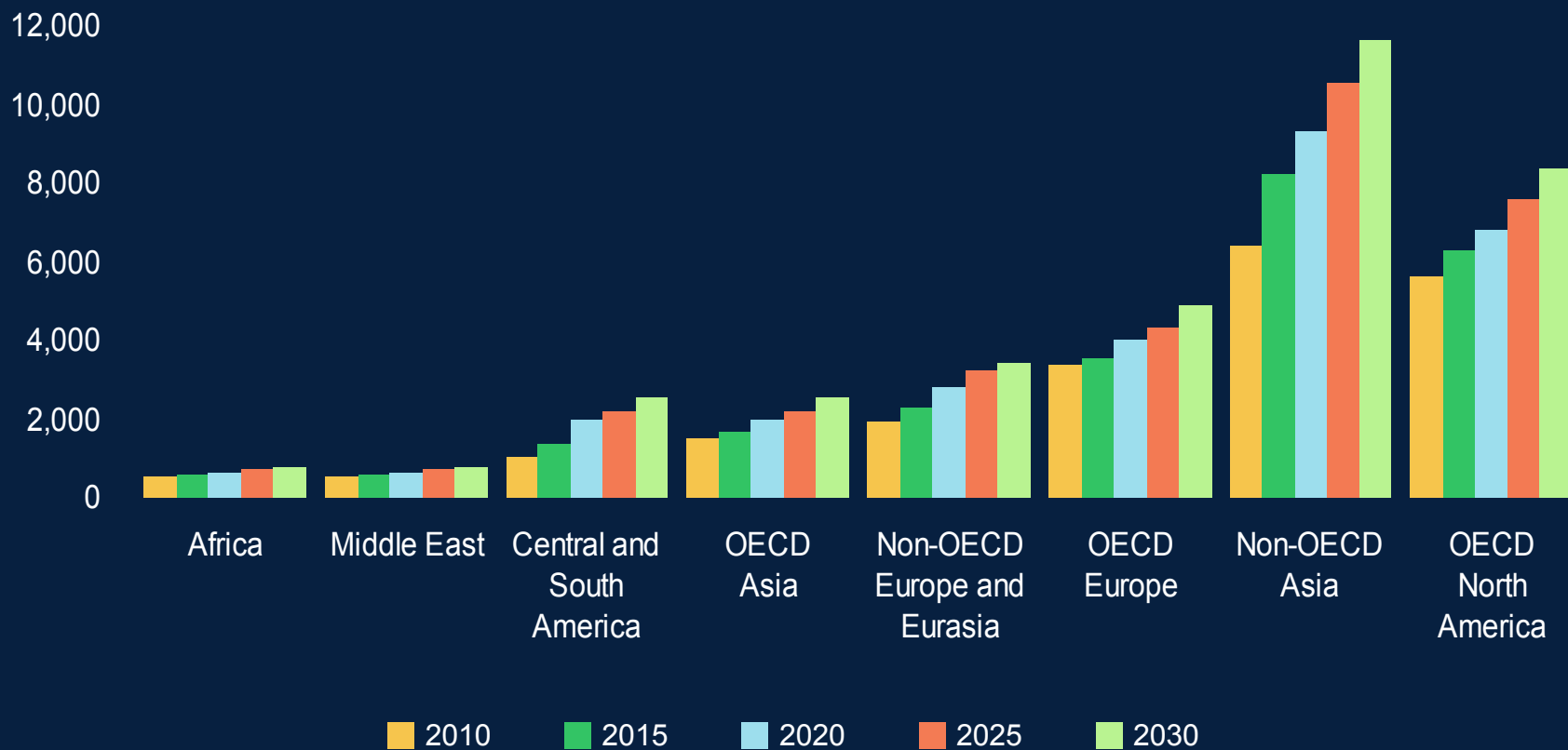
Jeffrey Holzschuh

Vice Chairman, Morgan Stanley

September 18, 2008

# Developing Countries Driving New Energy Demand

## World Net Electricity Consumption by Region



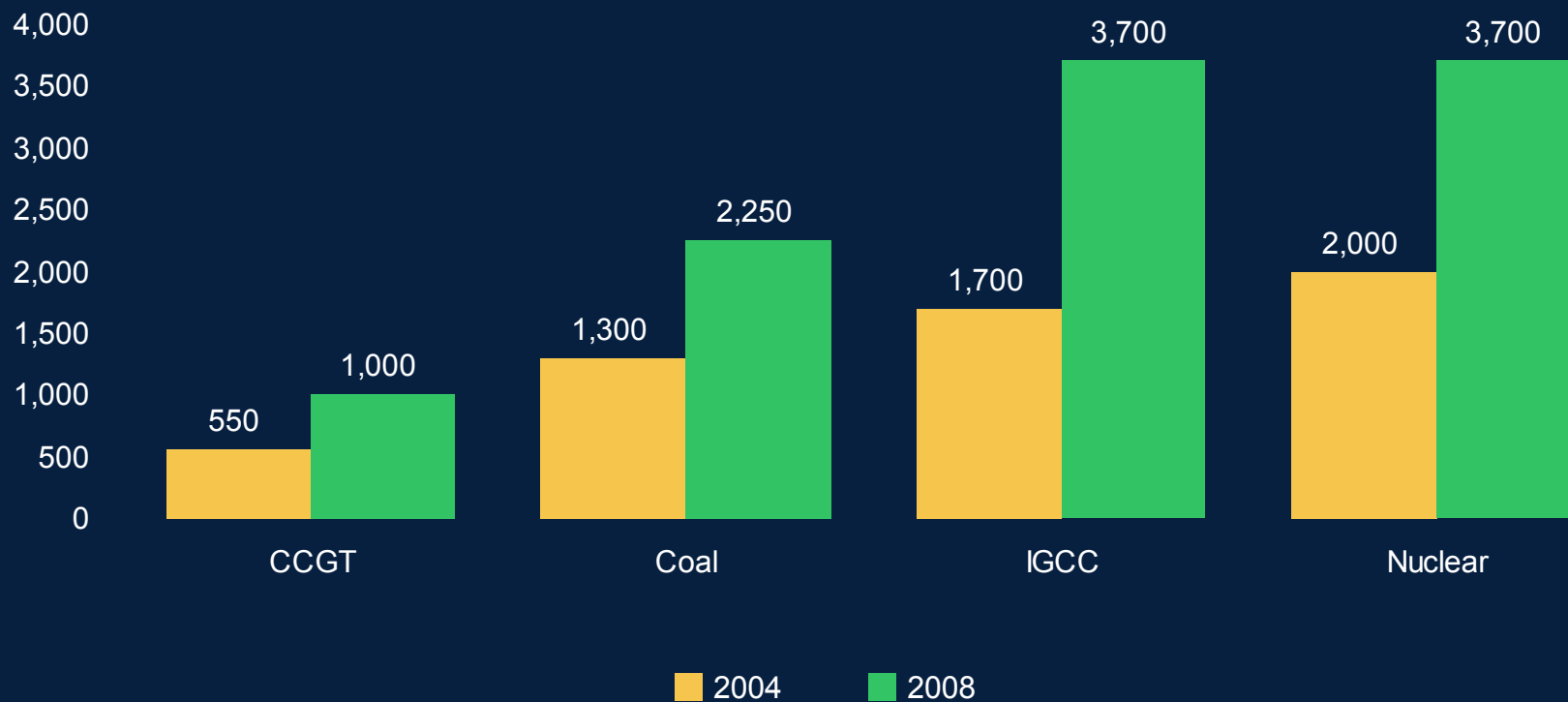
# U.S. Energy Challenges

- 50% of generation capacity was put in place pre-1970
- New power resources required to meet new demand and replace plants that are scheduled to go offline
- U.S. capacity is forecast to drop below desired 15% reserve margins
- E&P costs likely to increase by 5% – 10% annually from 2007 – 2011
- The price of the incumbents – fossil fuels – is rising, making clean energy alternatives more economical

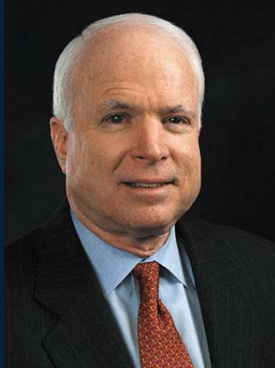
# Construction Cost of Conventional Power Plants Have Increased

## 2004 and 2008 Estimates of Plant Construction Costs

(\$/kW)



# U.S. Energy Policy – More Questions than Answers



**Congress**



**Renewable Subsidies /  
Incentives**

**Nuclear Debate**

**Greenhouse Gas Debate**

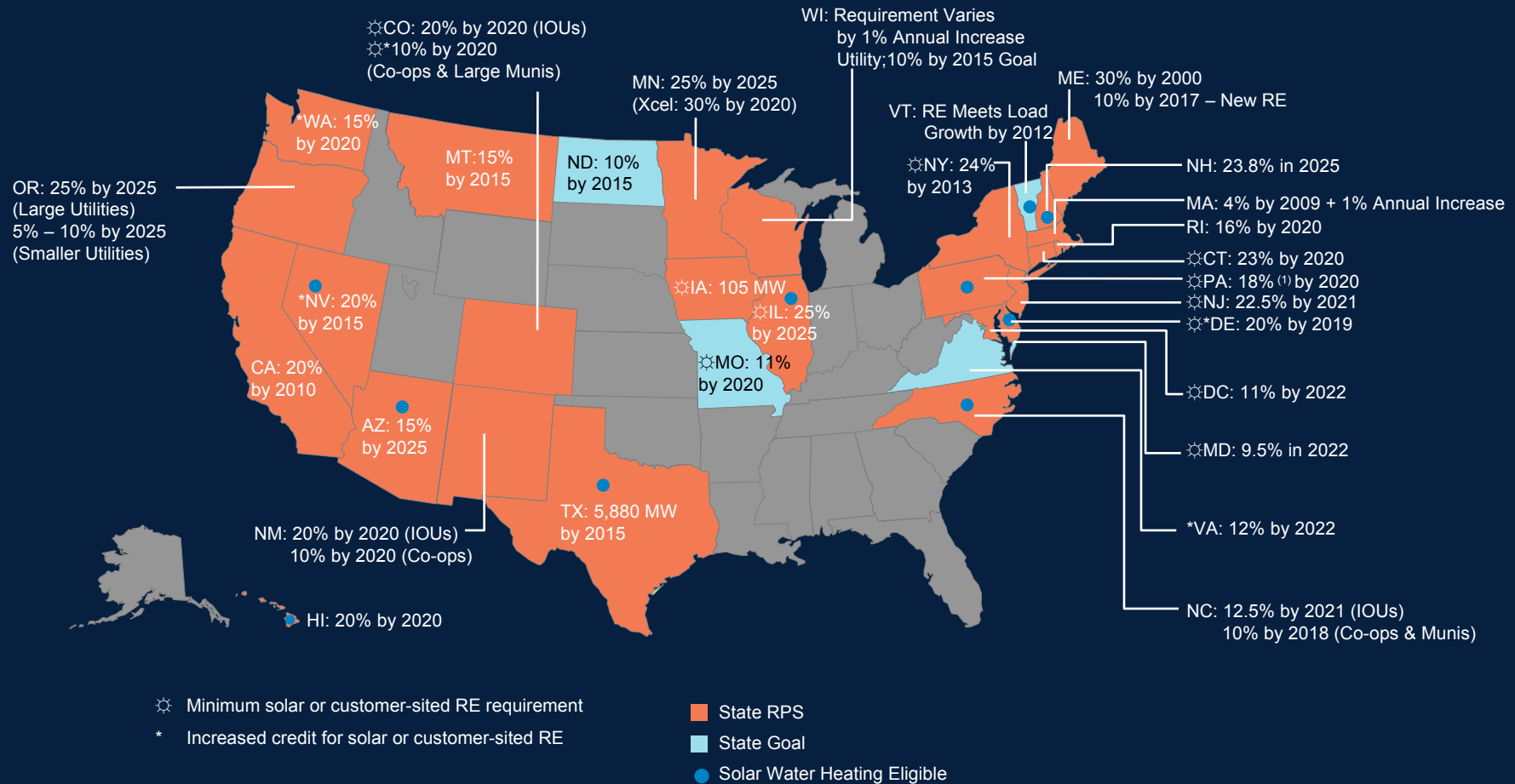
**Energy Security**

**Aging Infrastructure**



# Attractive State Legislative Environment for Renewables

## U.S. State Based Renewable Energy Targets

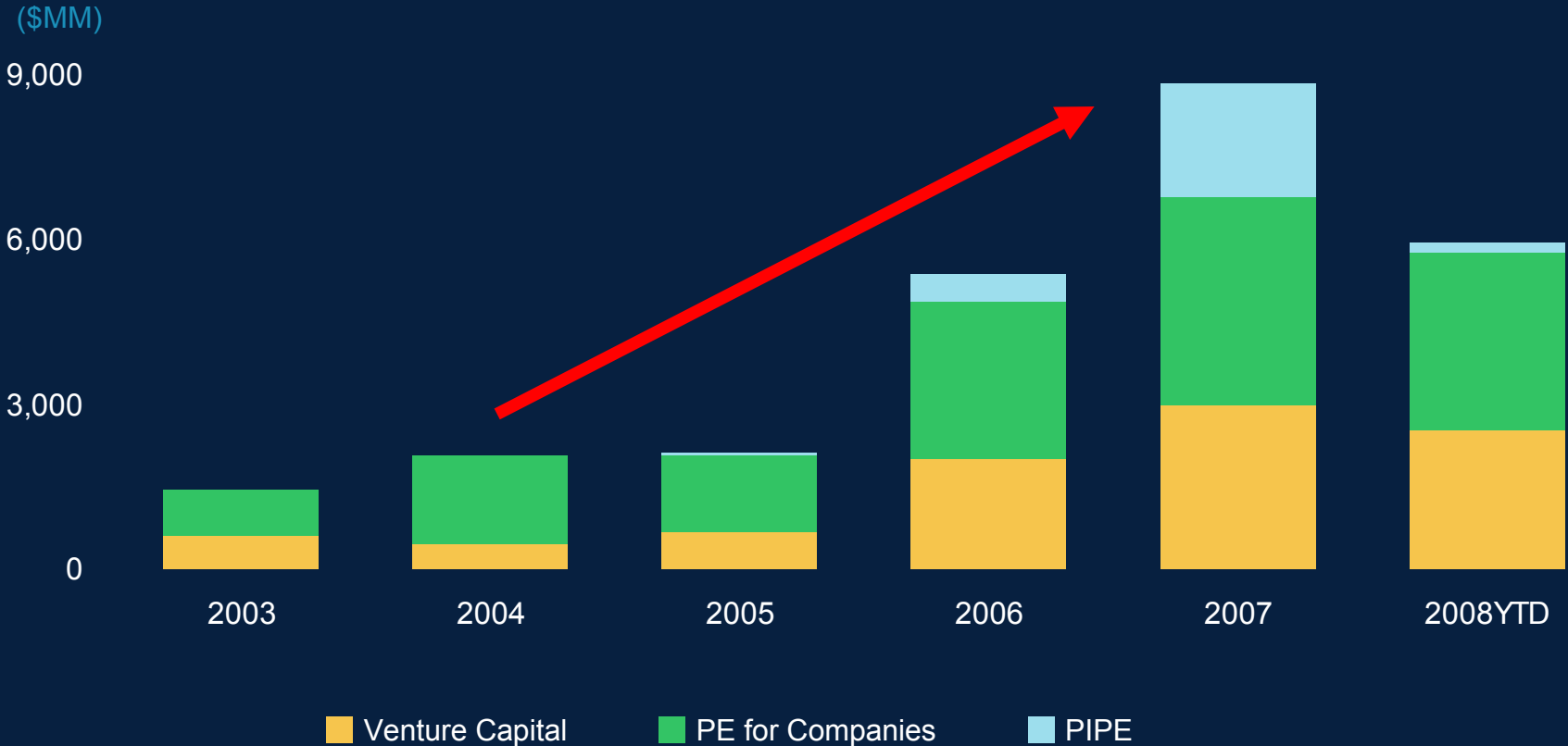


# Driving Factors of Alternative Energy



# Investment and Innovation

## Total VC / PE Investment in Clean Energy Companies

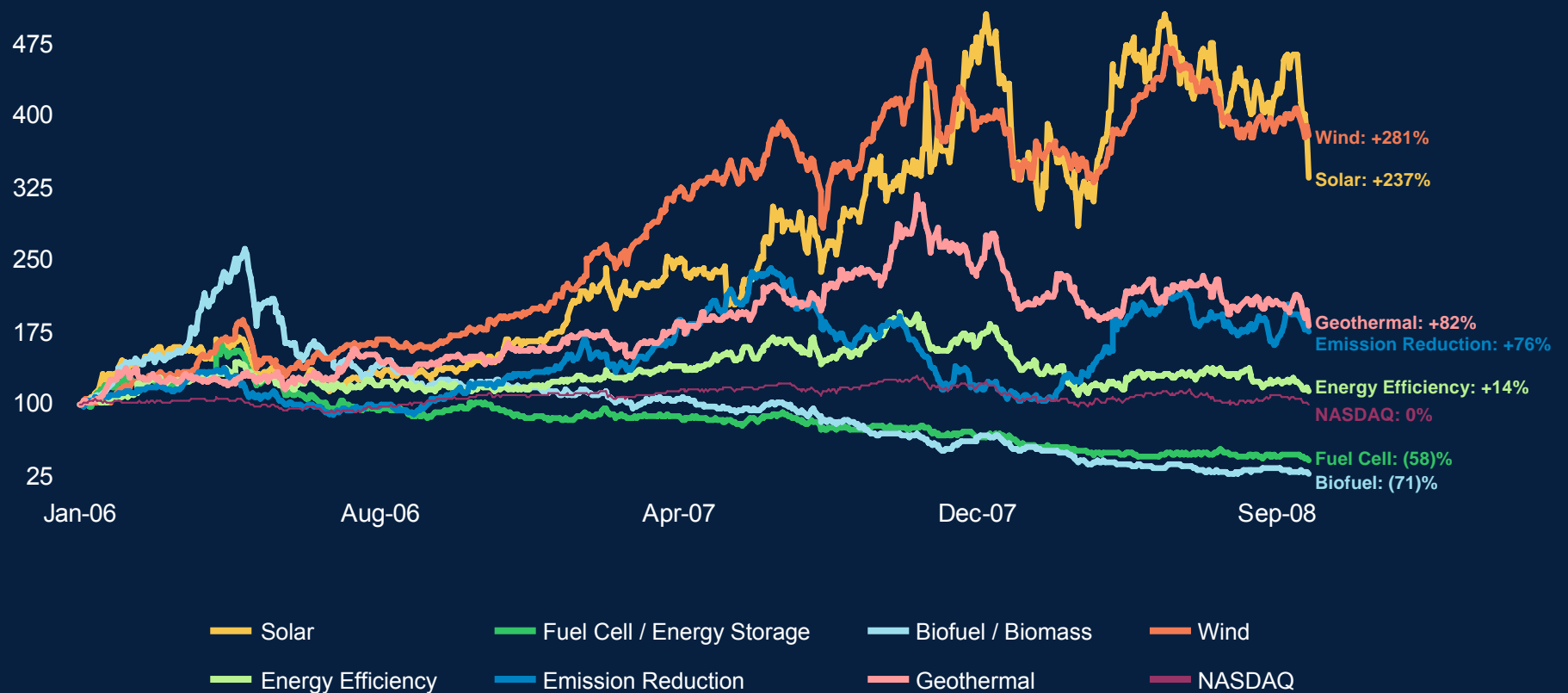


# Market Performance of Clean Energy Stocks

2006 – 2008 YTD

## Relative Price Performance

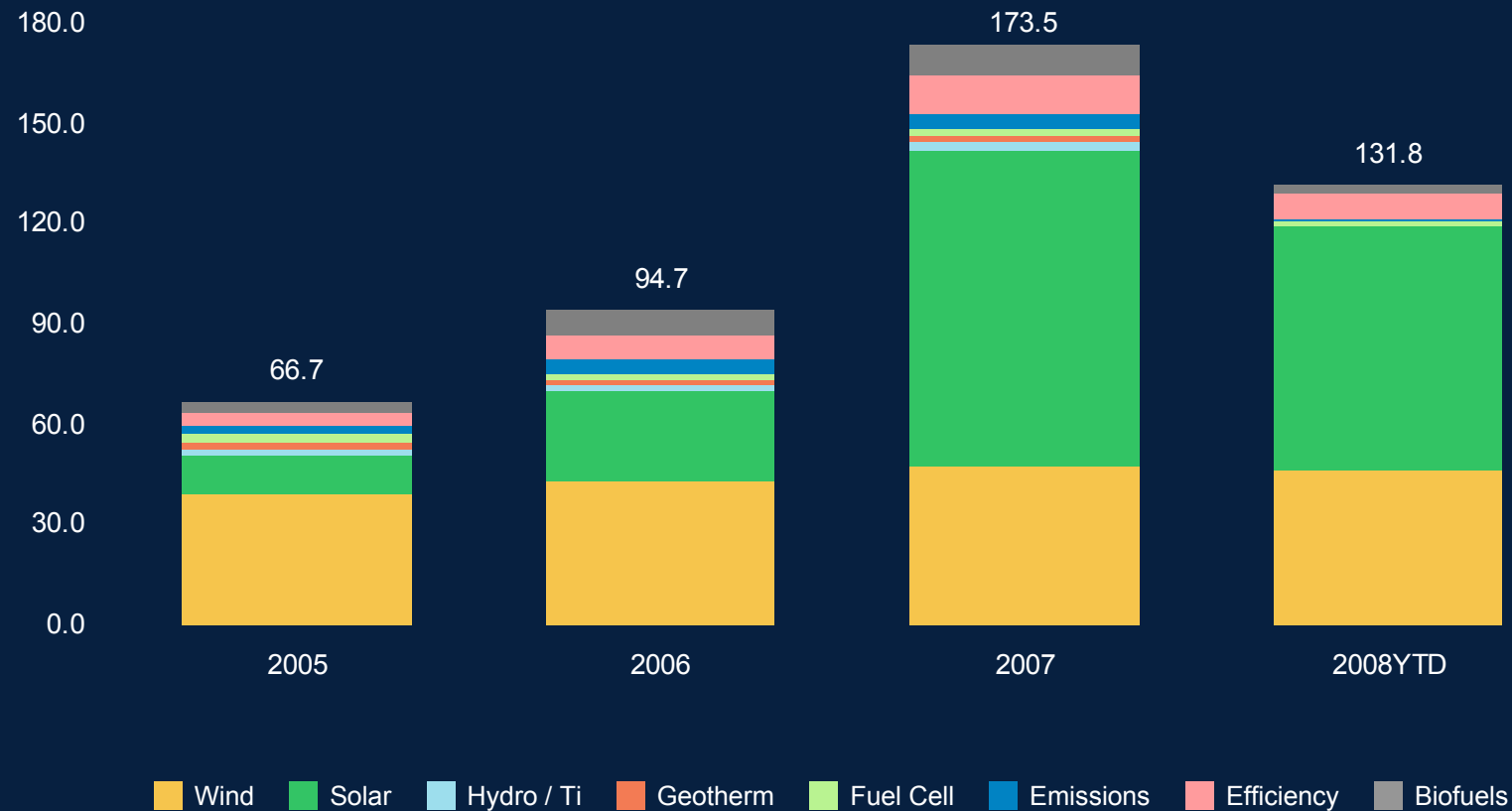
Indexed to 100 on 1/1/06



# Clean Tech Universe Continues to Grow

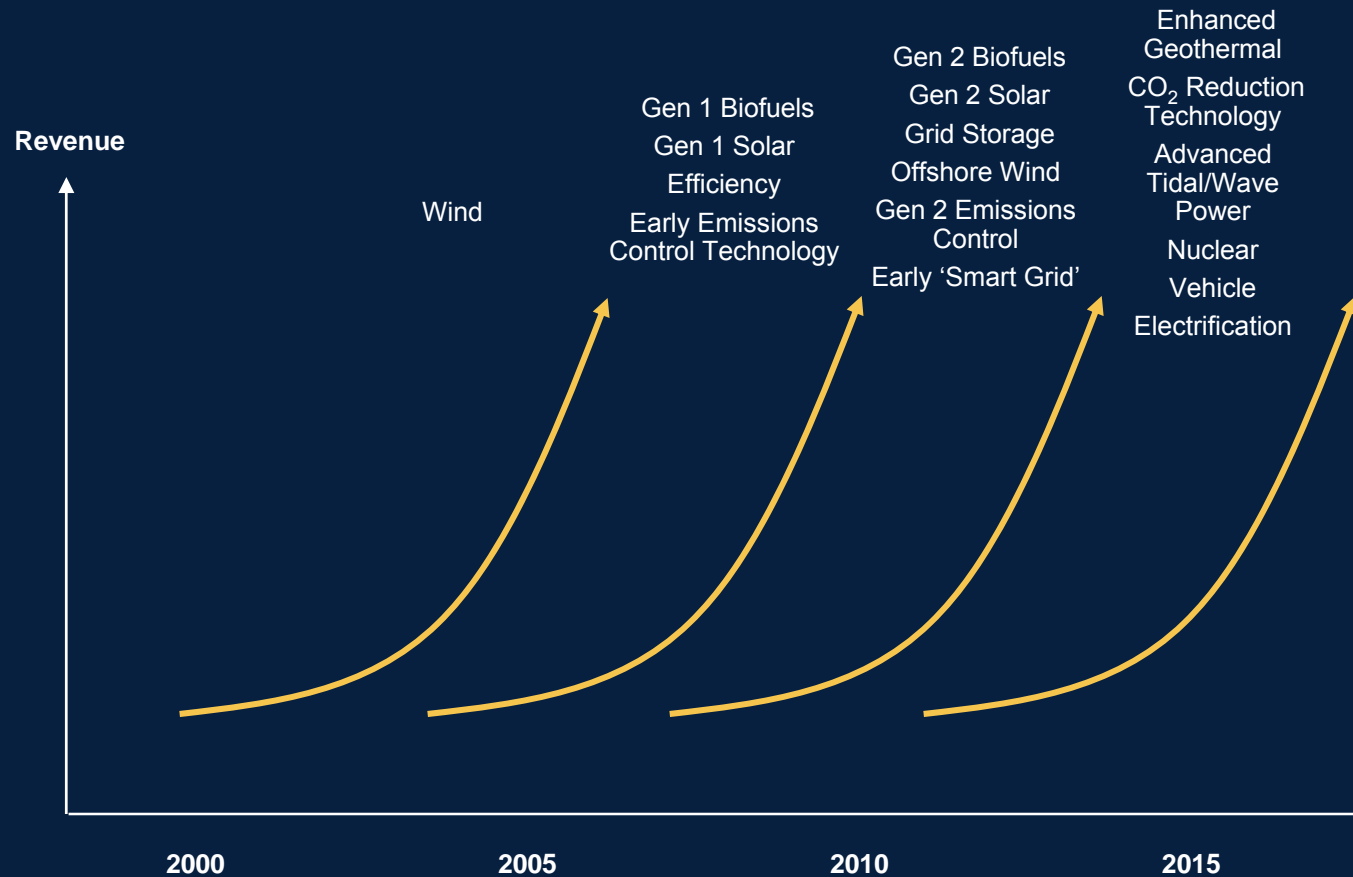
## Pure Play Clean Tech Market Capitalization

(\$Bn)



# Still in Early Innings

## Four Waves of Clean Energy Innovation



# Comparative Generation Costs

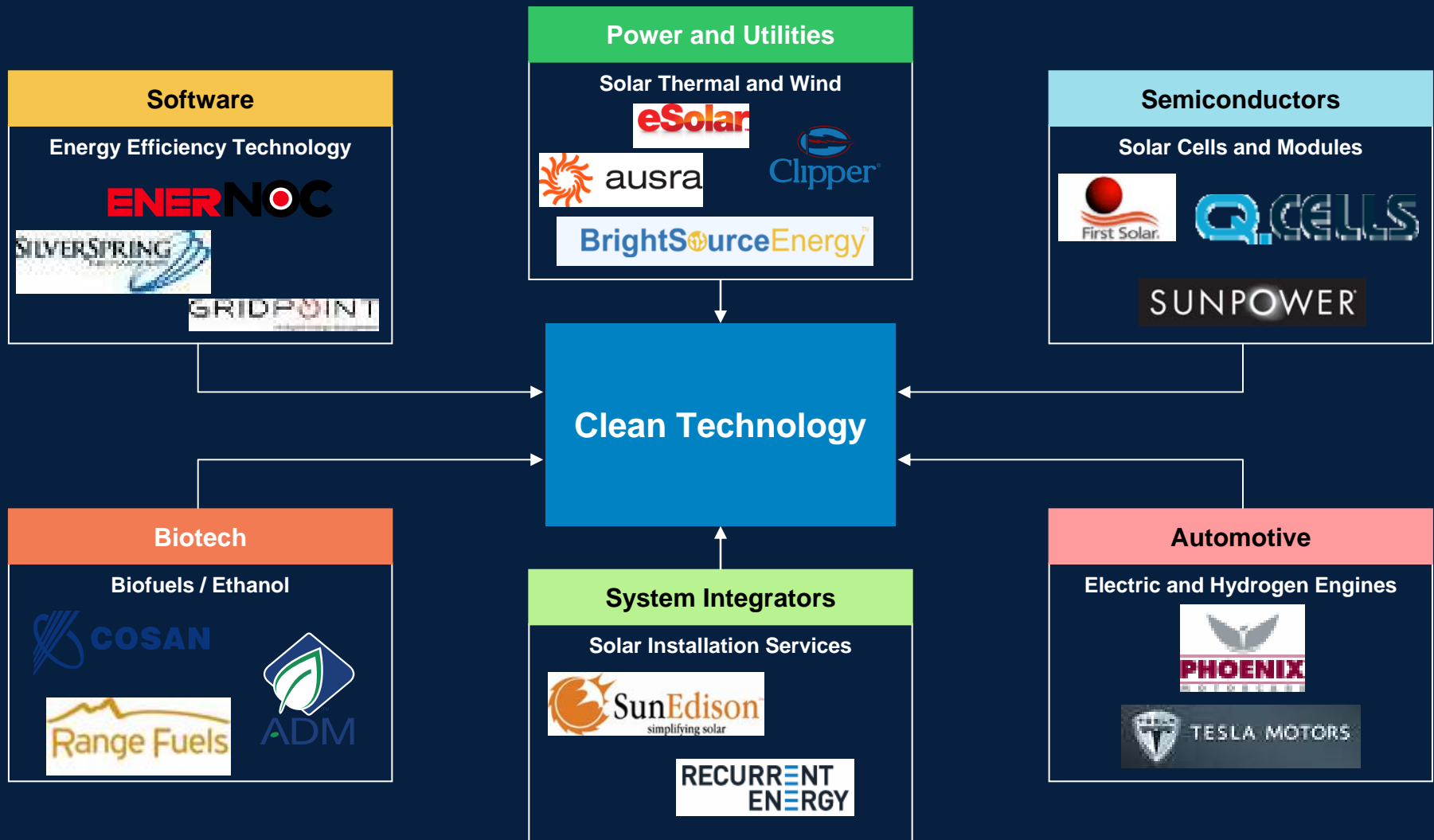
## Total Installed Cost

### Renewable Energy Costs

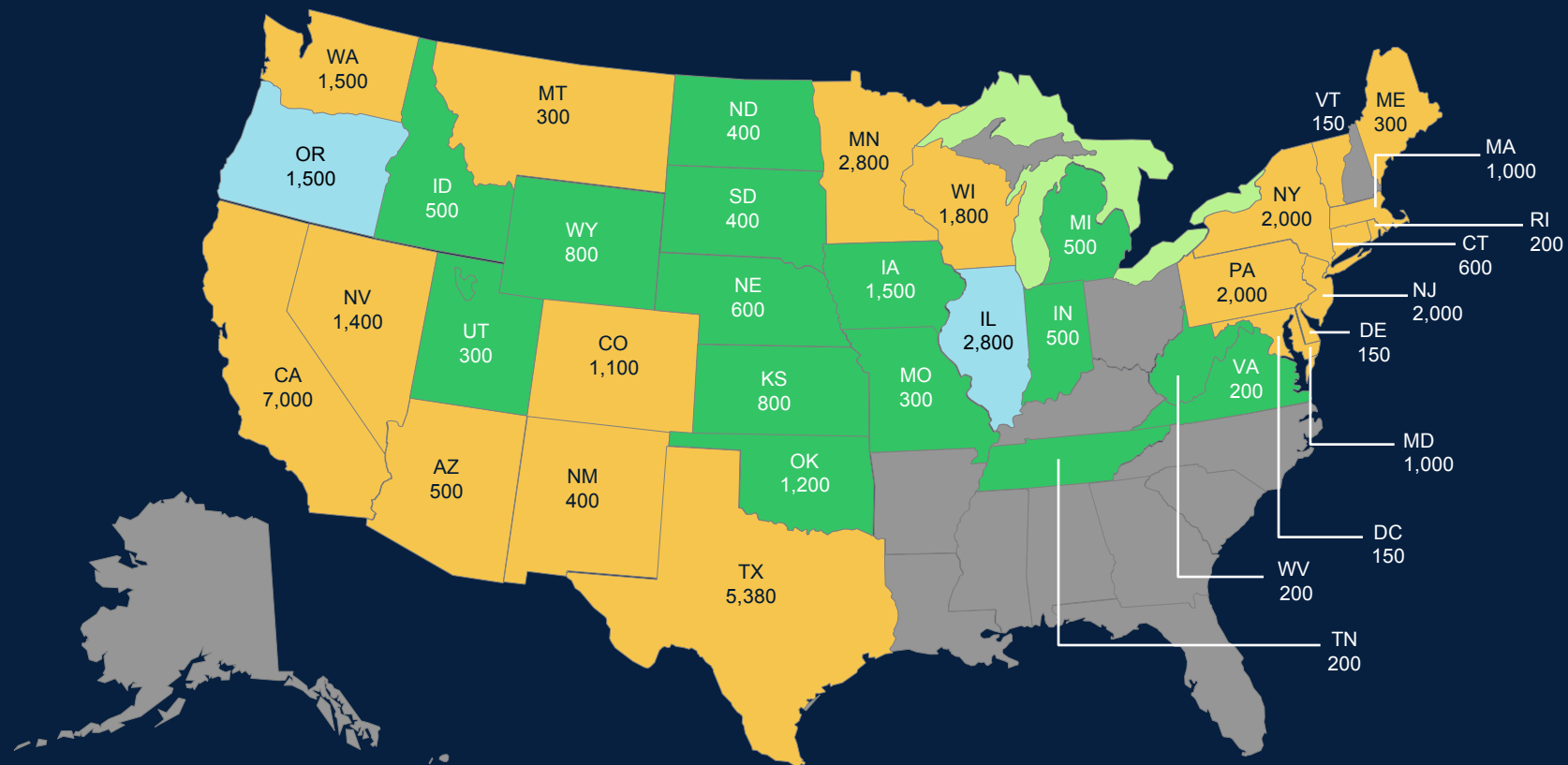
(c/kWh)



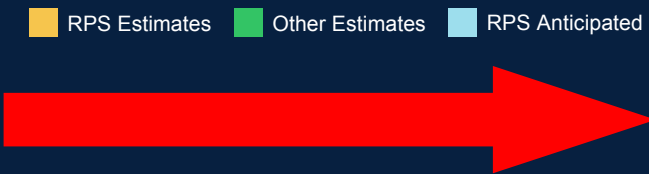
# Clean Technology Spans a Wide Variety of Business Models



# U.S. Wind Capacity – Projected 2015 (1) – (MW)



**2008 Total  
MW Installed:  
20,212**



**2015 Total  
Projected  
MW Installed:  
~ 50,000**

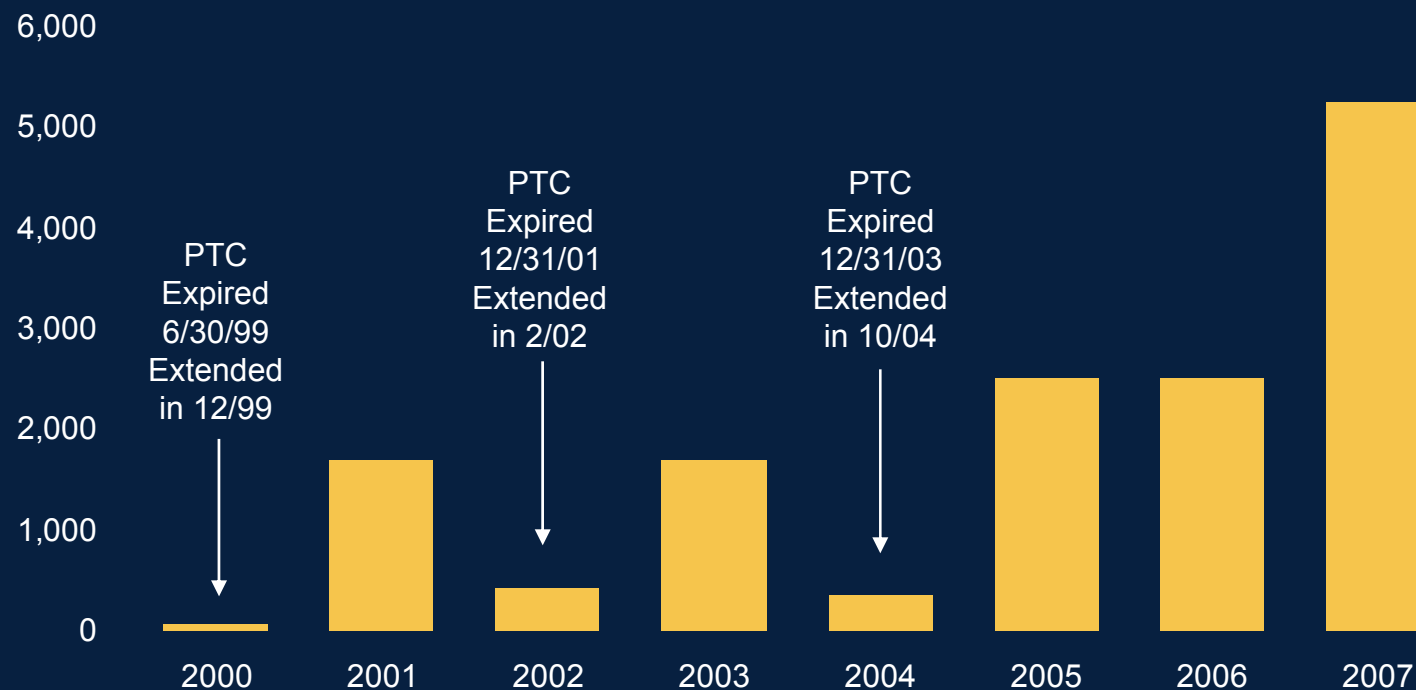
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Source:  
The American Wind Energy Association  
(1) Based on state renewable portfolio standards (RPS) targets.

# The Production Tax Credit (PTC) Effect

## Effect of PTC on Wind Power Capacity Additions

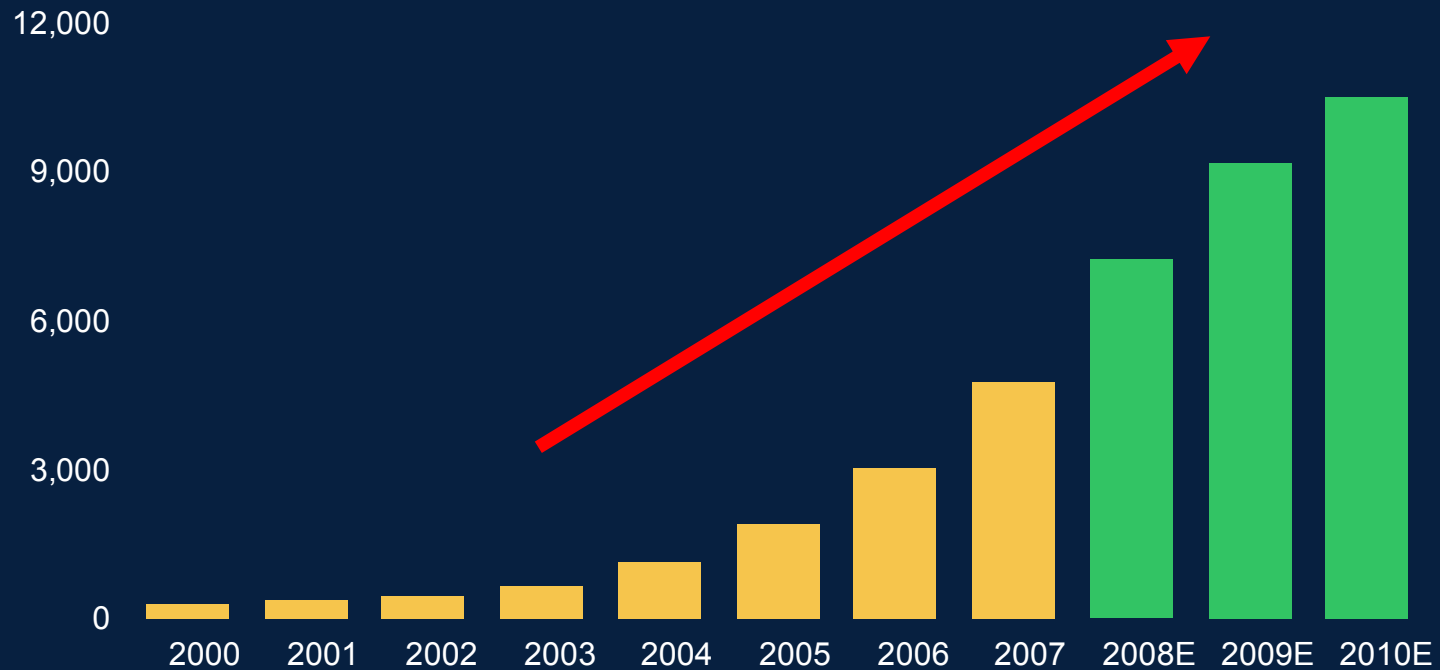
Capacity (MW)



# U.S. Solar Market Snapshot

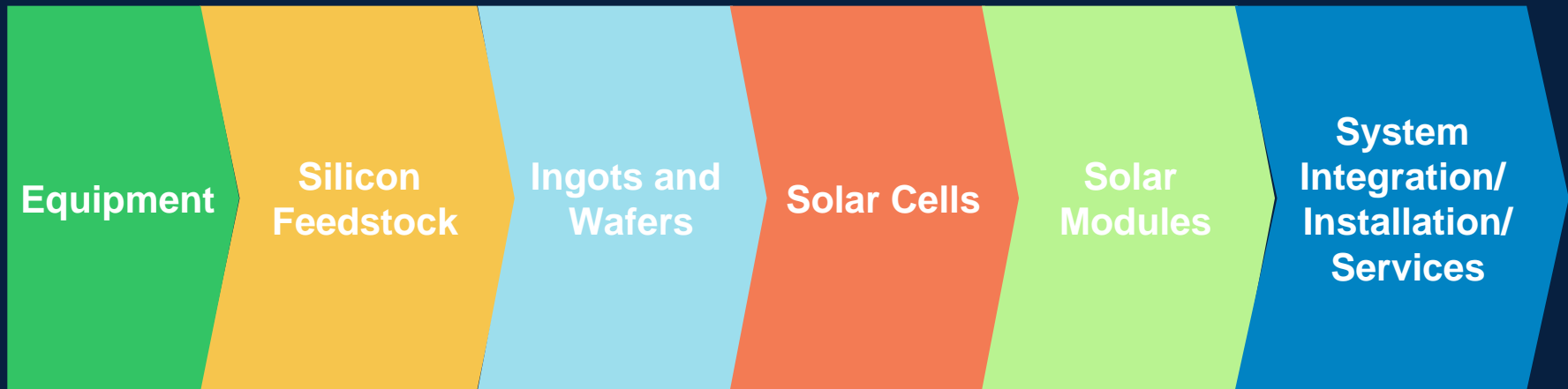
## Annual PV Installations and 2008 – 2010 Forecast (U.S.)

(MW)



# Solar Market Consolidation is Coming

## Solar Value Chain



# Solar Thermal: The Potential for Utility Scale Power

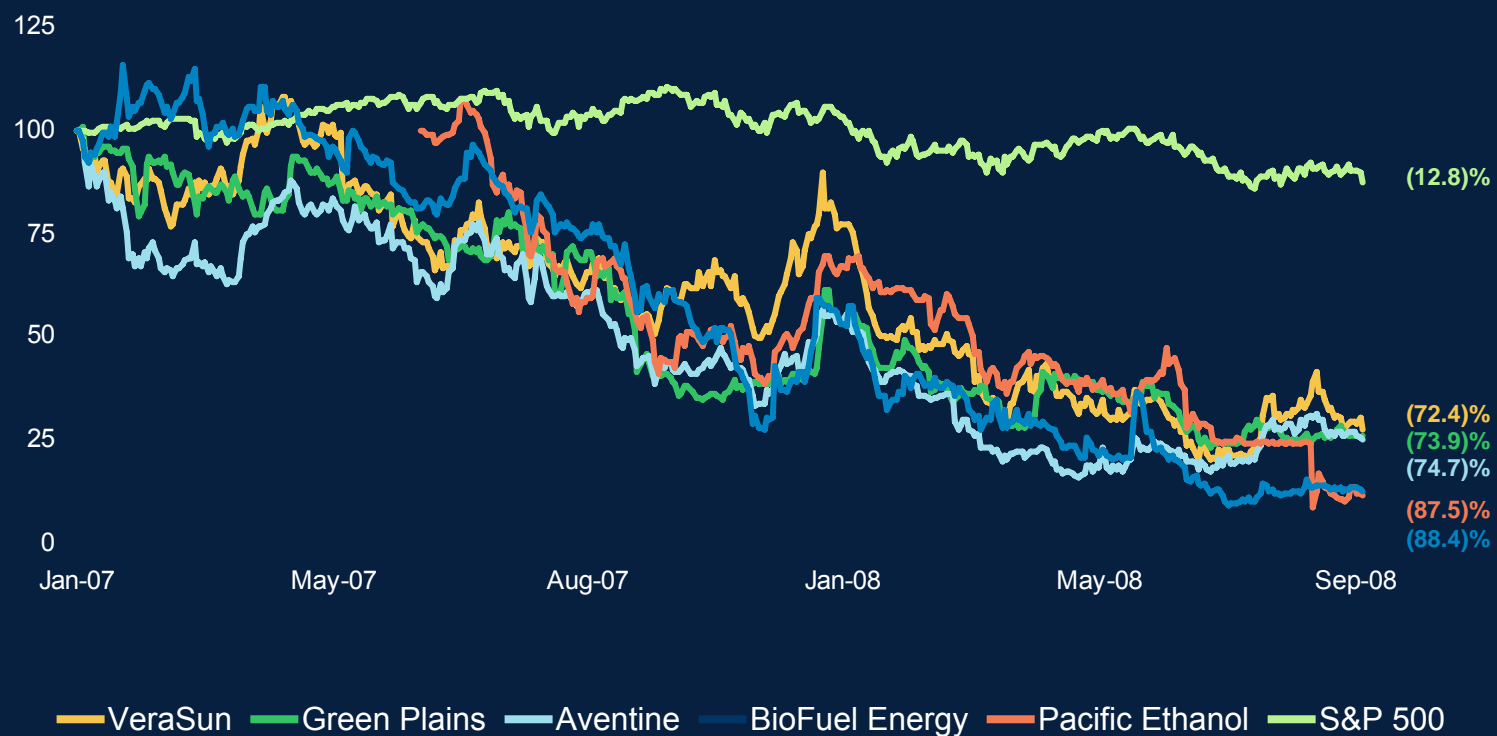


# Relative Stock Price Analysis – Ethanol Leaders

## Indexed Prices

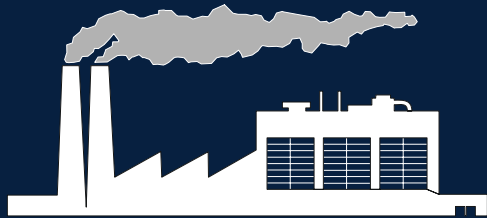
### Indexed Price Performance

Since 2007 <sup>(1)</sup>



# Energy Efficiency – Creating a ‘SmartGrid’

## Generation



## Smart Grid

- Load Management
- Grid Automation and Monitoring
- Storage
- Communication and Control
- Remote Power

## Smart End Use



- Commercial / Residential
- Smart Lighting
- Smart Appliances
- Automation

# SmartGrid Is Evolving

## Internet Evolution

### Hardware



### Infrastructure



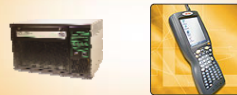
### Applications



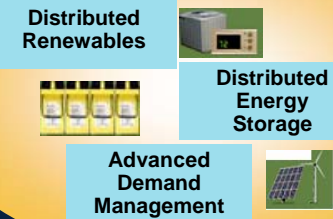
### Hardware



### Infrastructure



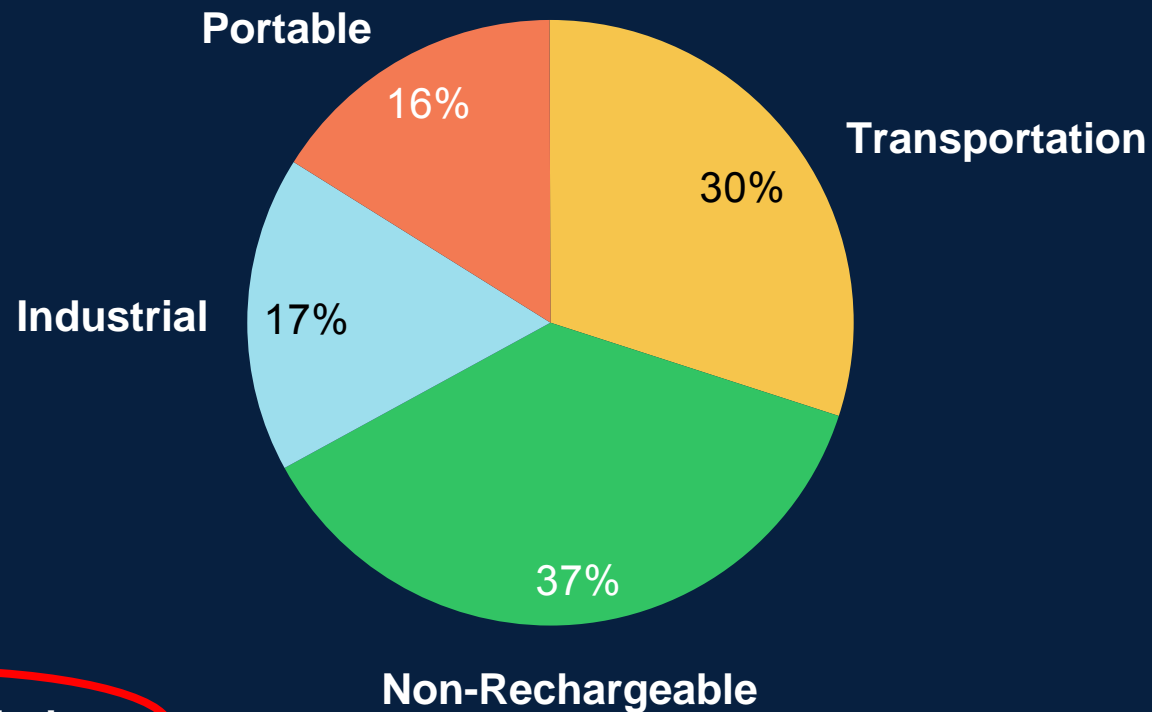
### Applications



## SmartGrid Evolution

# Higher Energy / Power Storage Solutions Are in Increasing Demand

## Global Battery Market – 2007



**\$30 Billion Market**

# Emerging Technology Pipeline

## There Are Many Innovations Still in the Pipeline...

- **CO<sub>2</sub> Capture**
  - Significant opportunity for new technologies that can capture and sequester carbon
- **Fuel Cells**
  - Stationary fuel cells could play a significant role in distributed generation
- **Grid Infrastructure**
  - The opportunity to build new grid infrastructure and “upgrade” the grid
- **Marine**
  - Tidal and wave power is still relatively early in development
- **Nuclear**
  - Less ‘toxic’ subject in political circles, making it possible for nuclear plant development
- **Geothermal**
  - Innovations have reduced levelized cost of energy makes geothermal an attractive, clean generation alternative

# Conclusion

- World energy demand increasing dramatically
- Emergence of “Clean Energy” sector
- U.S. investment in alternative energy increasing
- Established industries will be affected (Transportation, Utilities, Oil & Gas)
- Significant public and private market activity going forward
- Alternative Energy will be an important piece, BUT... traditional power will still dominate
- CO2 legislation is coming...