

Morgan Stanley

**EPR21**

**ELECTRIC POWER  
RESEARCH INSTITUTE**

Putting Capital to Work to Achieve CO<sub>2</sub> Reduction

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August 7, 2007

# Market Overview

- Market believes CO<sub>2</sub> reductions are coming, but implementation and timing unclear
  - Lack of clarity makes long-term planning and investing challenging
- EIA predicts US demand for electricity will rise 45% by 2030
  - 350GW will be required to meet demand and replace existing generation
  - At \$1,500/kW, represents \$525 Bn of capital
- A portfolio of options needed to meet demand and CO<sub>2</sub> limitations
  - Traditional resources, IGCC, nuclear, renewables and demand response/efficiency
- Cost pressures increasing
- No clear winner in CO<sub>2</sub> friendly technologies

# For Investors, Each Option has Significant Positives and Challenges

	Positives	Challenges
<b>Nuclear</b>	<ul style="list-style-type: none"> <li>• Zero emissions</li> <li>• Reduced pricing volatility</li> <li>• Excellent operating record</li> <li>• NRC guidelines more clear</li> <li>• Standard designs should lead to lower costs</li> </ul>	<ul style="list-style-type: none"> <li>• Capital intensity &amp; rising costs</li> <li>• “Untested” regulatory requirements</li> <li>• No solution to waste issues</li> <li>• Concerns over terrorism/event risk</li> <li>• Long “memories” of last cycle</li> </ul>
<b>IGCC</b>	<ul style="list-style-type: none"> <li>• Use of abundant fuel source</li> <li>• Fuel flexibility</li> <li>• More economical capture of CO<sub>2</sub> than traditional coal technology</li> </ul>	<ul style="list-style-type: none"> <li>• Capital intensity &amp; rising costs</li> <li>• Concerns over reliability</li> <li>• Lack of full requirements EPC contracts</li> <li>• Uneconomical at low carbon costs</li> <li>• CO<sub>2</sub> storage technology</li> </ul>

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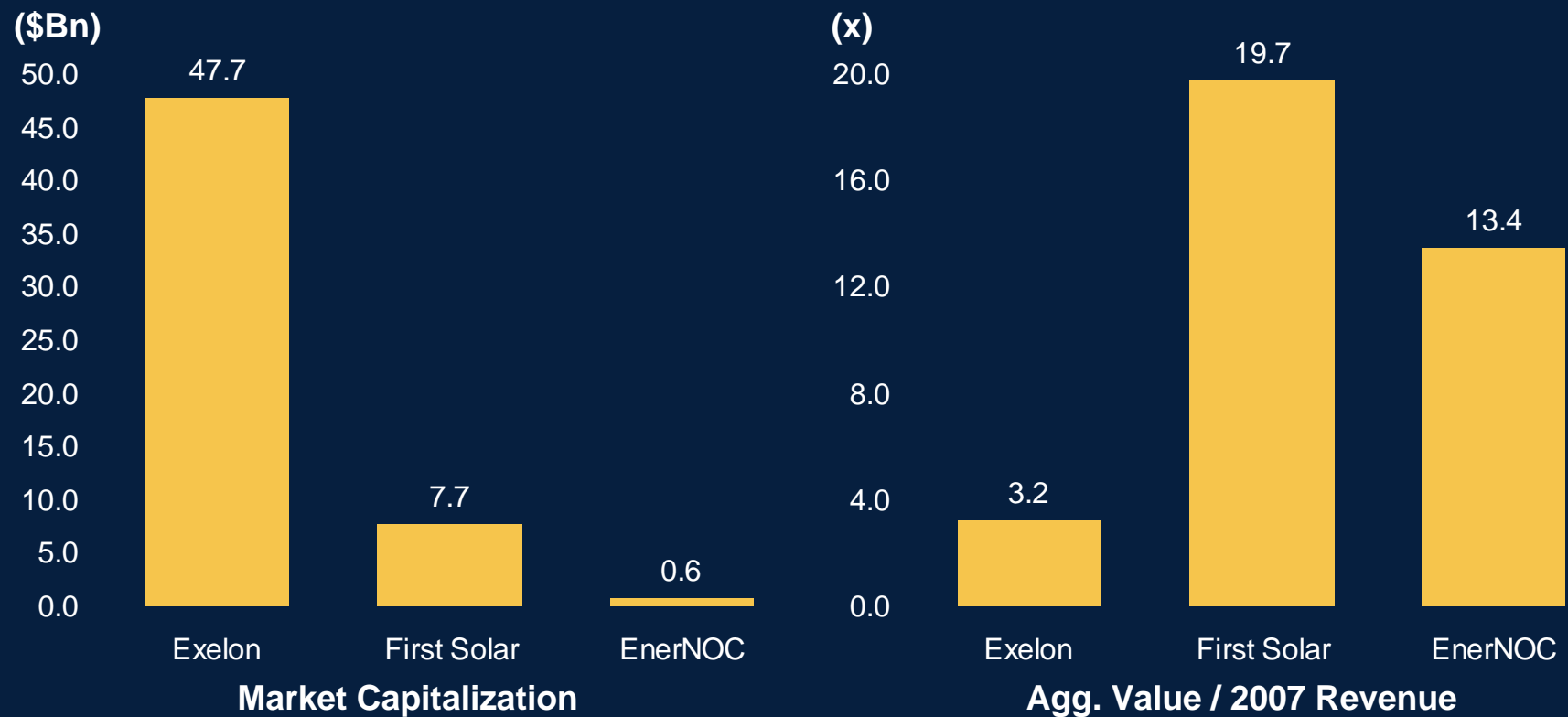
	Positives	Challenges
<b>Wind</b>	<ul style="list-style-type: none"><li>• Zero emissions</li><li>• Relatively inexpensive</li><li>• Ability to scale</li><li>• Construction time</li></ul>	<ul style="list-style-type: none"><li>• Intermittent power supply</li><li>• Need for new transmission</li><li>• Need PTC extension</li></ul>
<b>Demand Response</b>	<ul style="list-style-type: none"><li>• Zero emissions</li><li>• Siting anywhere</li><li>• Short build time</li><li>• Zero transmission losses</li></ul>	<ul style="list-style-type: none"><li>• Cannot fill demand for baseload generation</li><li>• Overcome skepticism on reliability</li></ul>
<b>Other</b>	<ul style="list-style-type: none"><li>• Zero emissions for certain technologies (solar, tidal)</li></ul>	<ul style="list-style-type: none"><li>• Significant cost improvement needed</li><li>• Small project size but changing</li><li>• Many technologies still in pre-commercial stage</li></ul>

# What Do Investors Need from Companies, Regulators and Politicians?

- Clear and consistent guidelines for pre-approval and recovery
- Recognition of CWIP to demonstrate regulatory support during the construction process and limit the near term dilution to companies
- Recognition of the value of fuel technology and diversity
- Loan guarantees and tax incentives to help finance construction
- EPC contract clarity to make certain that projects are delivered on time and at expected costs
- Joint ventures or further consolidation to diversify risk over numerous parties or across a larger capital base

# PowerTech: Irrational Exuberance?

## Comparative Analysis



# What Factors are Supporting the PowerTech Valuations?

**Continued High  
Commodity Prices**

**Demand for Growth**

**Technology  
Advancements**

**Government &  
Regulatory Support**

**Public Awareness /  
Concern**

**Aging Infrastructure /  
Demand for  
Reliability**

**Energy Security /  
Independence**

**Diversity of Global  
Demand**

**Resource  
Requirements**

**Expectation of  
Carbon Legislation**

**Large Corporate  
Initiatives**

**Compelling  
Economics**