



CHEM|INNOVATIONS  
2013 CONFERENCE  
& EXPO

**The Shale Gale Is Blowing:**  
*Plotting a Course That Avoids the Shoals and Rocks*

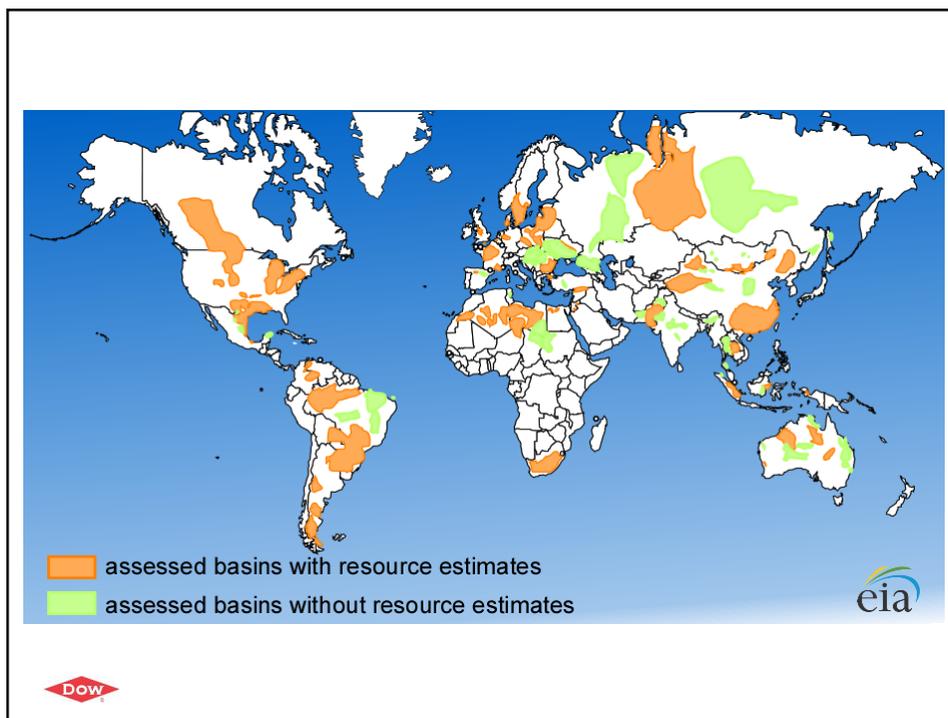
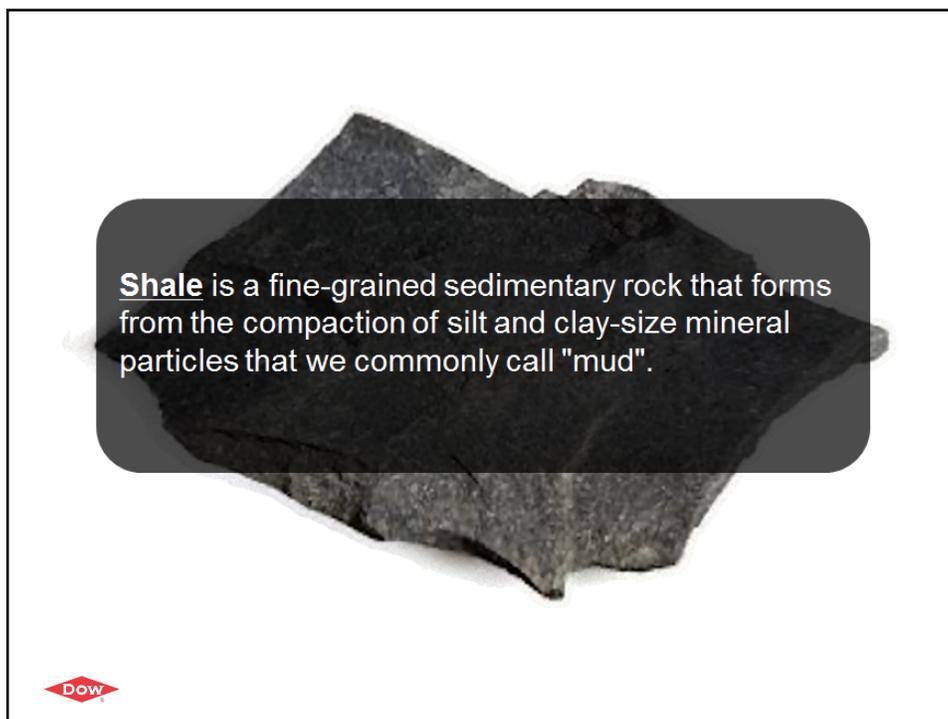
David Bem, Ph.D.  
Corporate Vice President of Research and Development

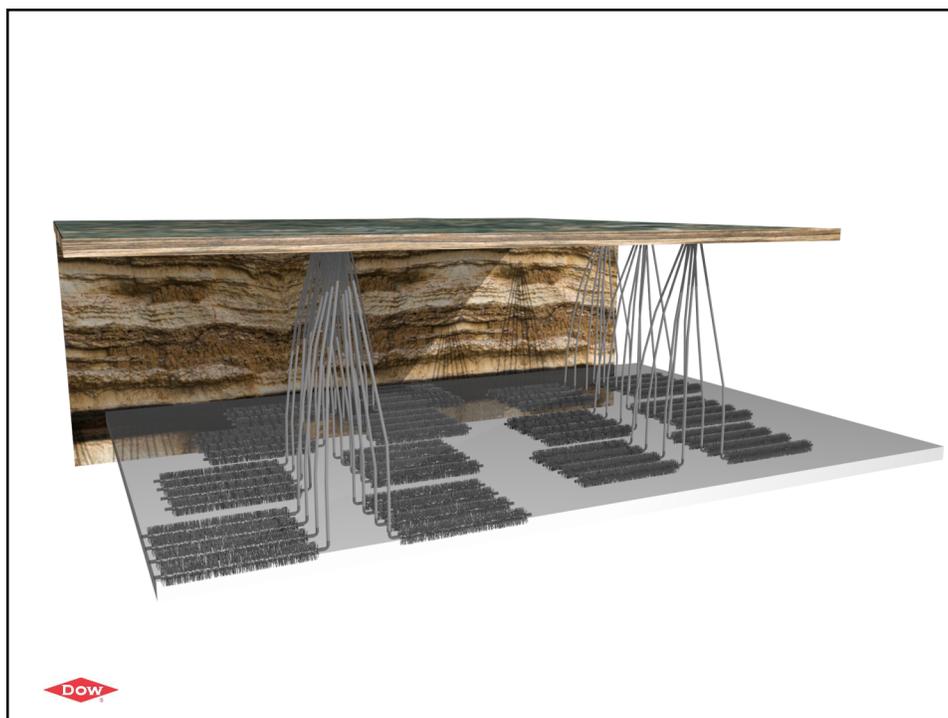
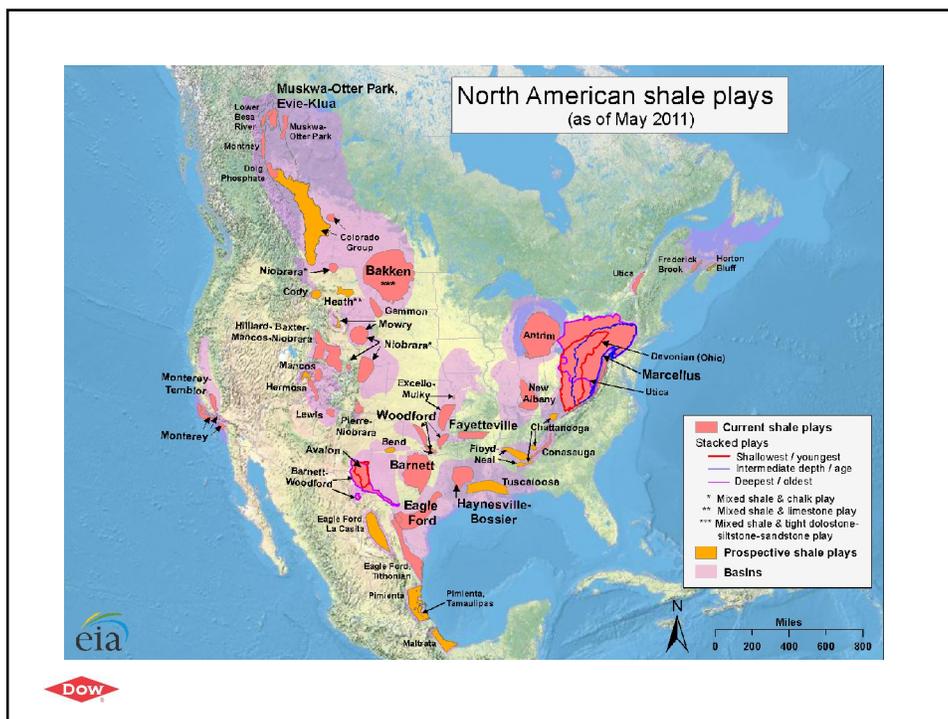
Mark Jones, Ph.D.  
Executive External Strategy and Communications Fellow  
The Dow Chemical Company

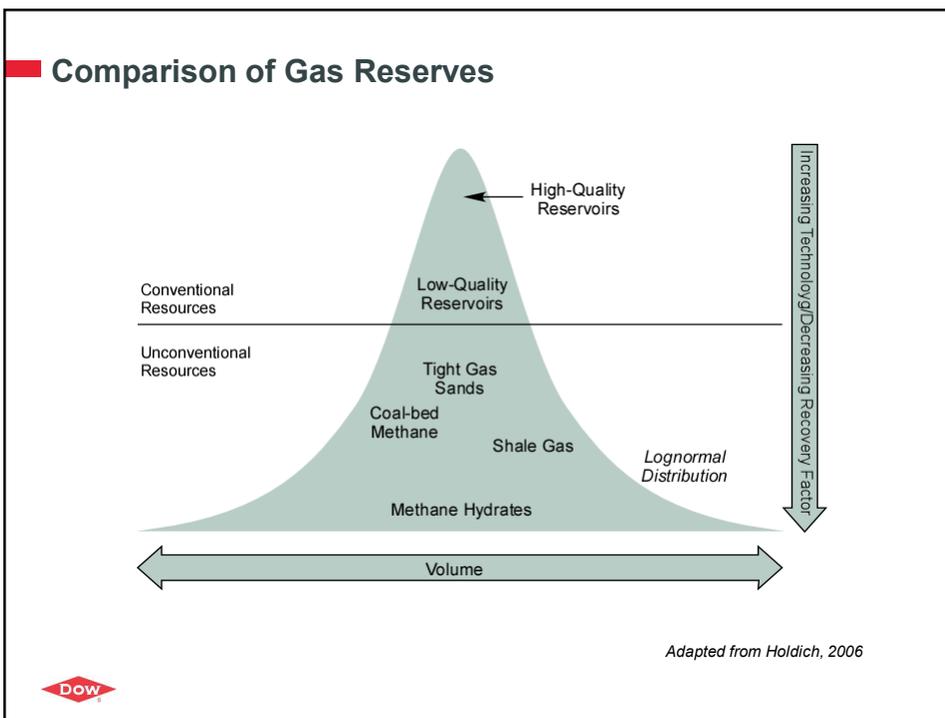
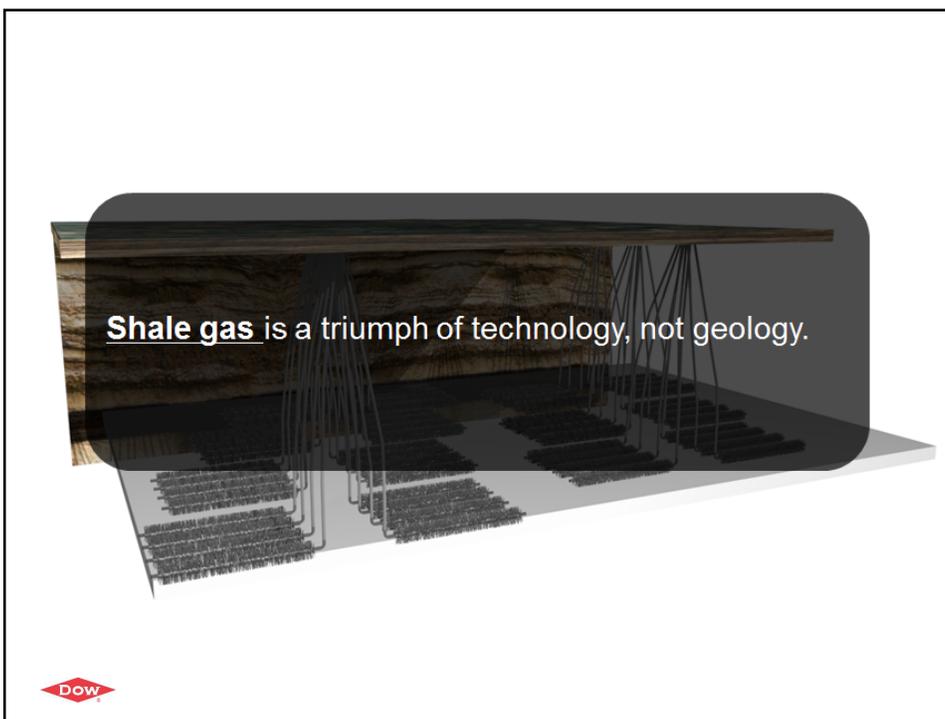
[Dow.com/innovation](http://Dow.com/innovation)

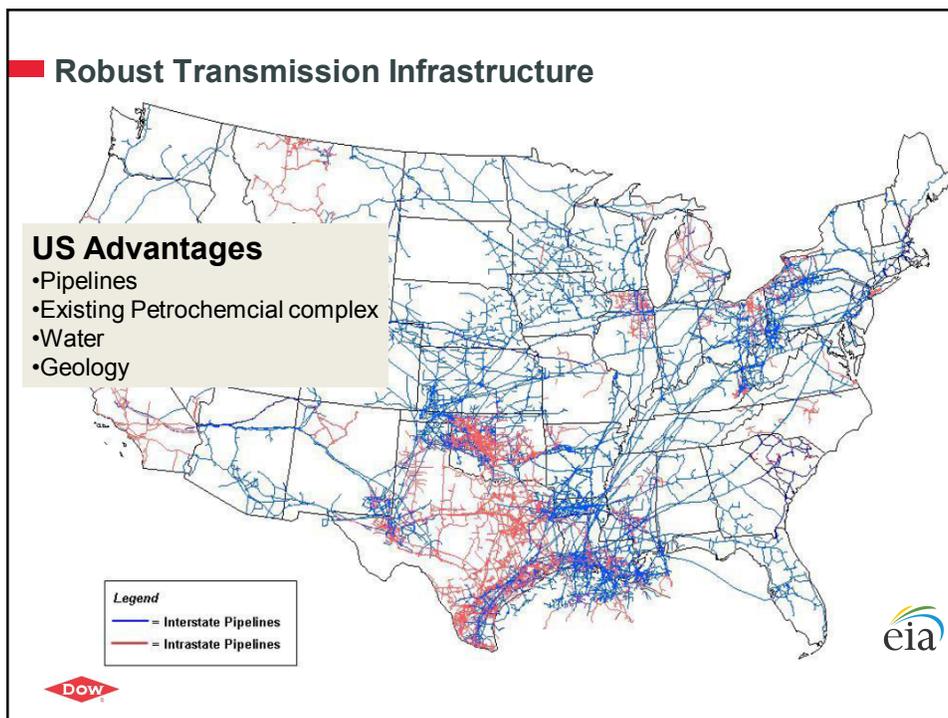
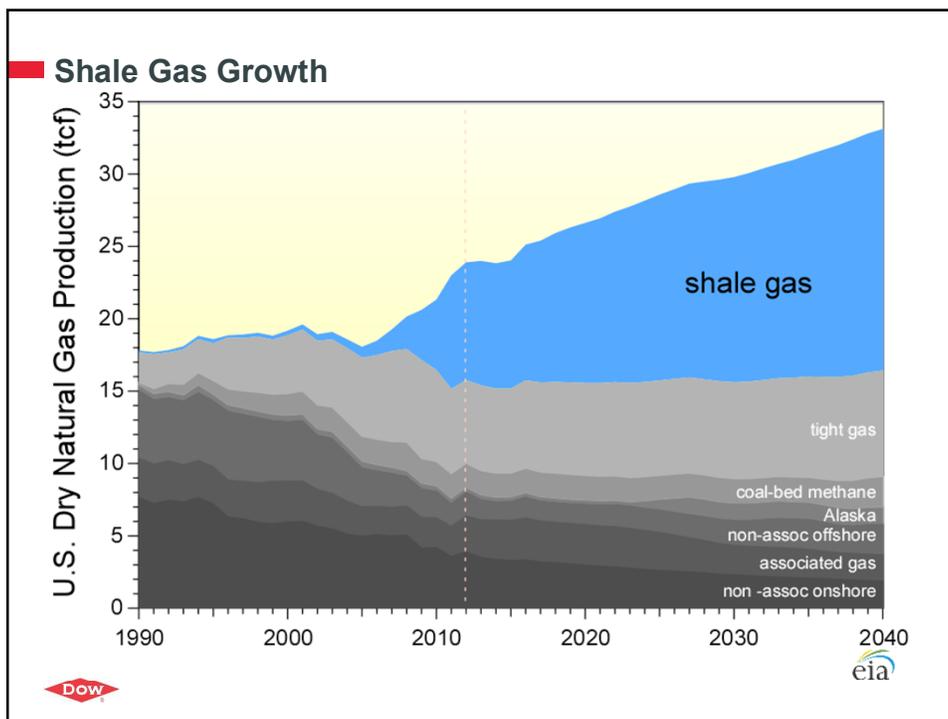
September 25, 2013

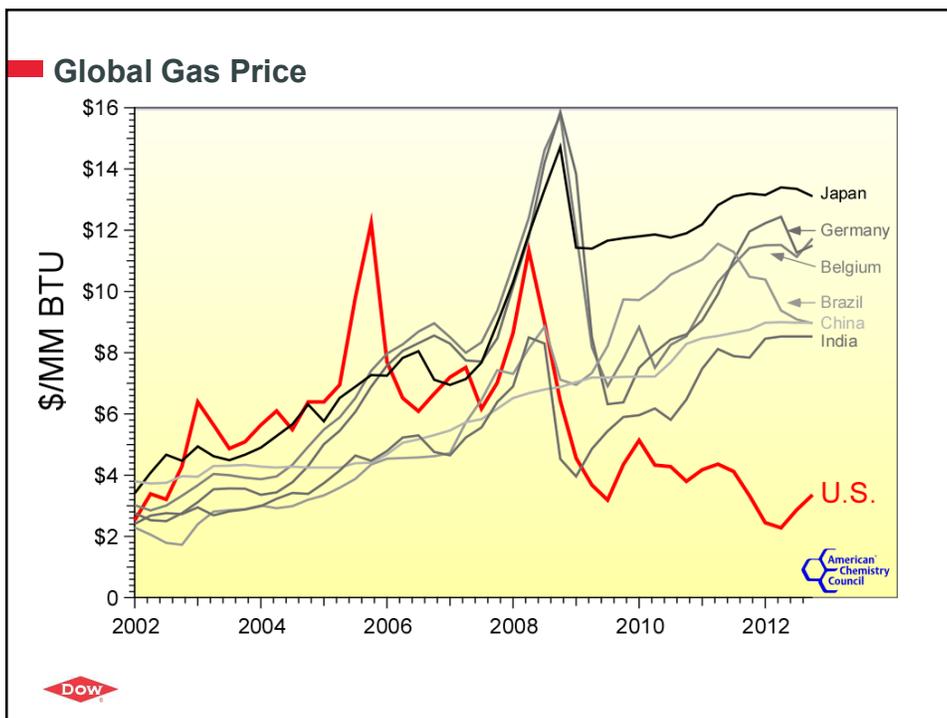
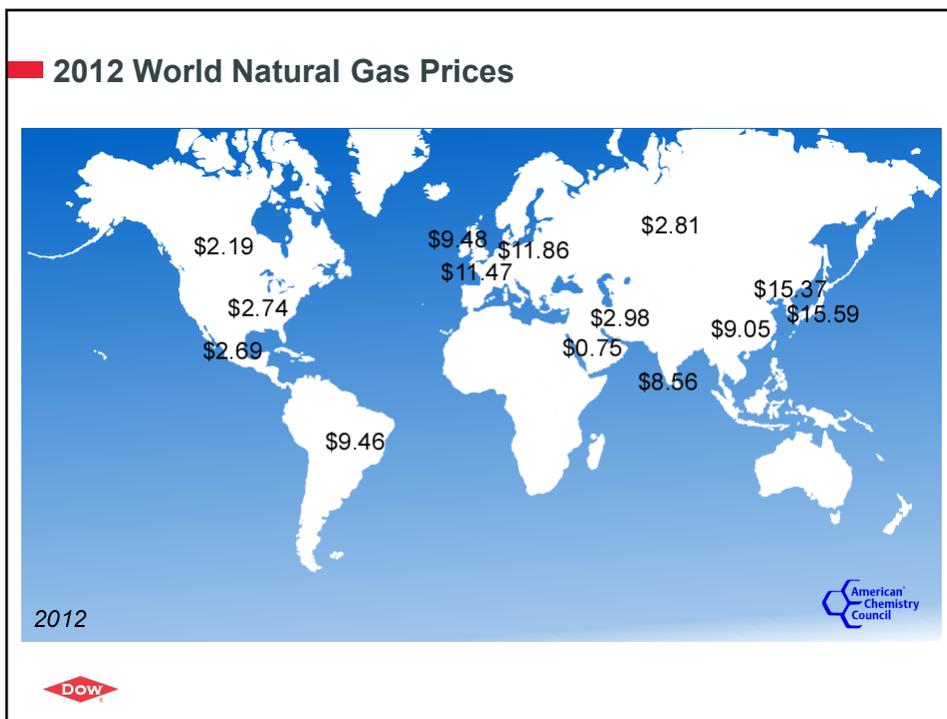












### What Unhealthy Looks Like

Healthy



Unhealthy



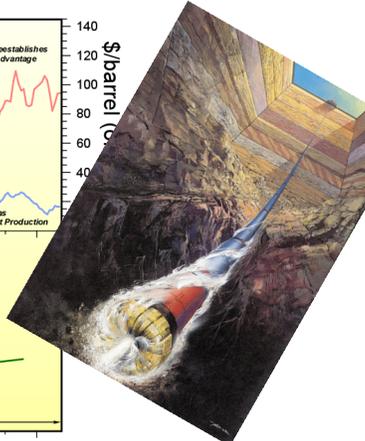




### Chemical Industry Health

**Energy Prices and Trade Balance (1996-2012)**

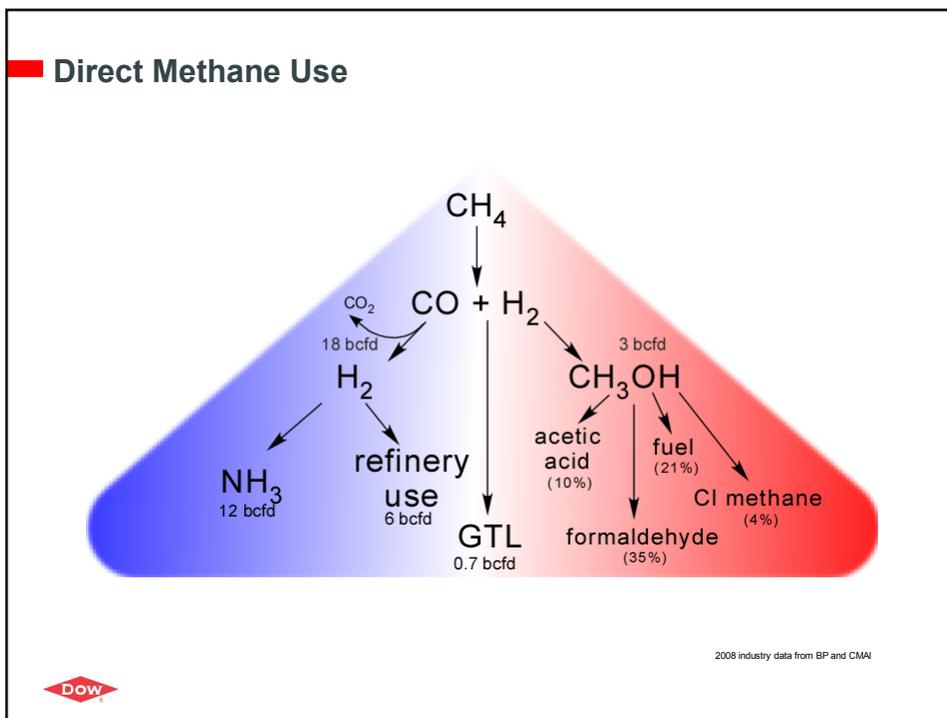
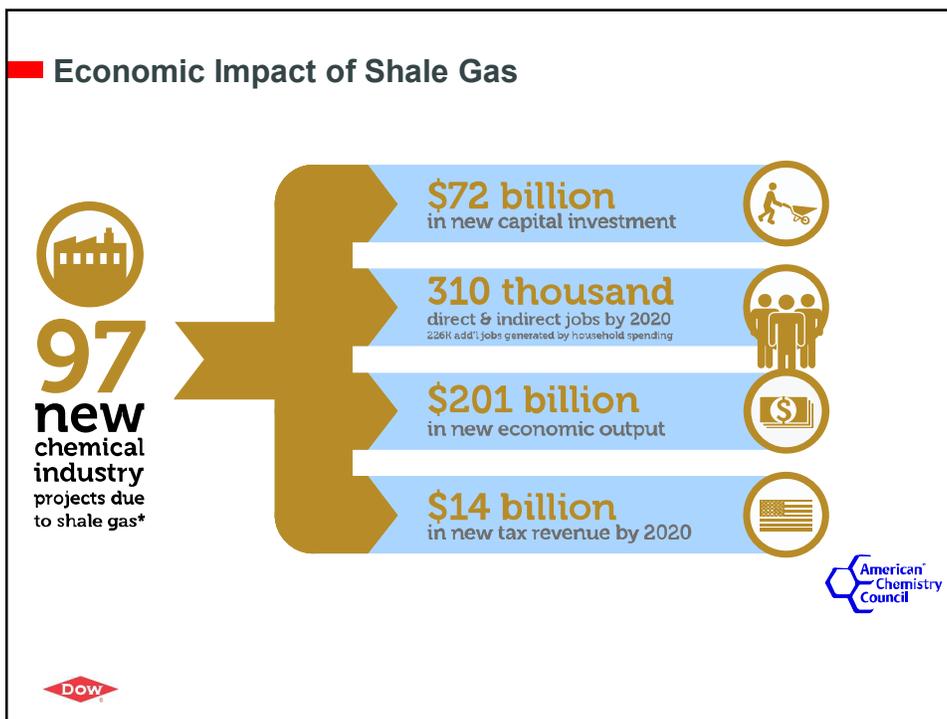
Year	Natural Gas Price (\$/MM BTU)	Oil Price (\$/MM BTU)	Trade Balance (billions of 2005 US\$)
1996	~2	~3	~10 (Healthy)
1998	~2	~3	~10 (Healthy)
2000	~2	~3	~0 (Healthy)
2002	~5	~5	~-10 (Unhealthy)
2004	~5	~5	~-20 (Unhealthy)
2006	~5	~5	~-25 (Unhealthy)
2008	~5	~10	~-25 (Unhealthy)
2010	~5	~10	~-20 (Unhealthy)
2012	~5	~10	~-15 (Unhealthy)

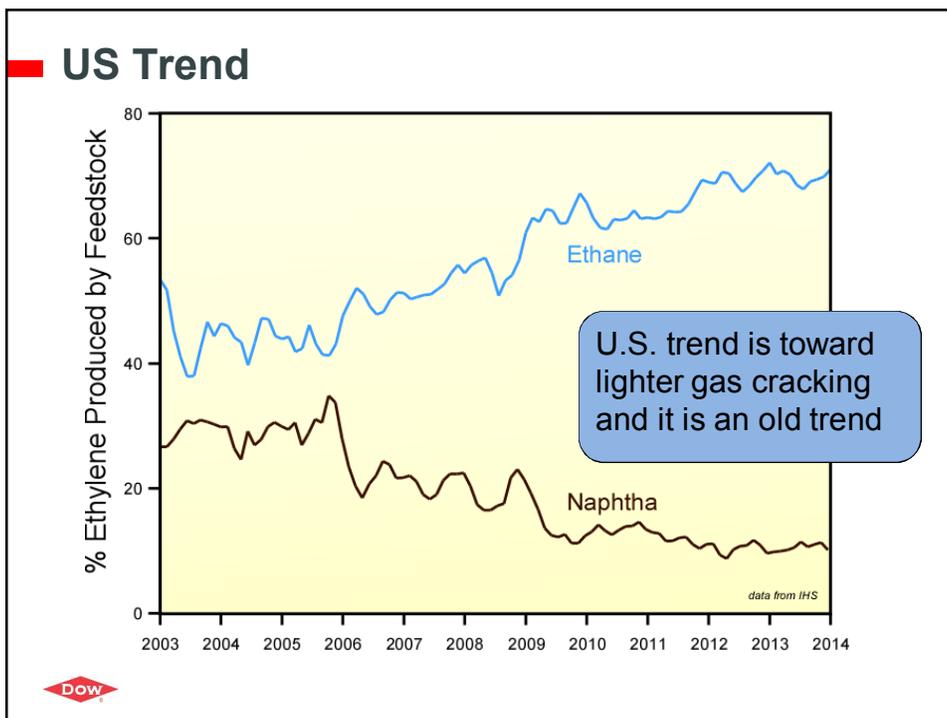
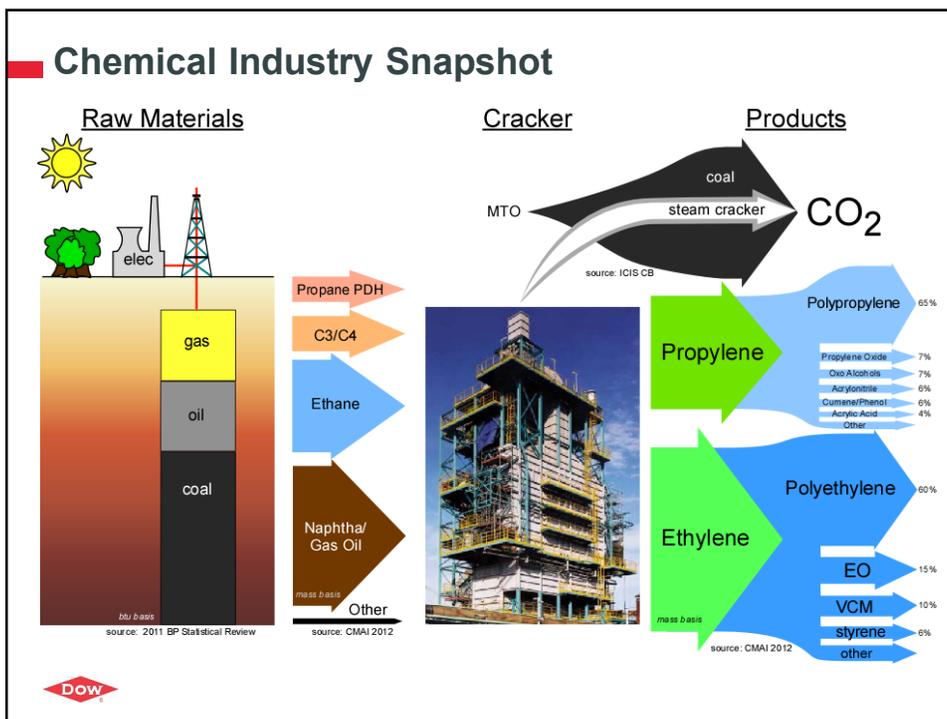


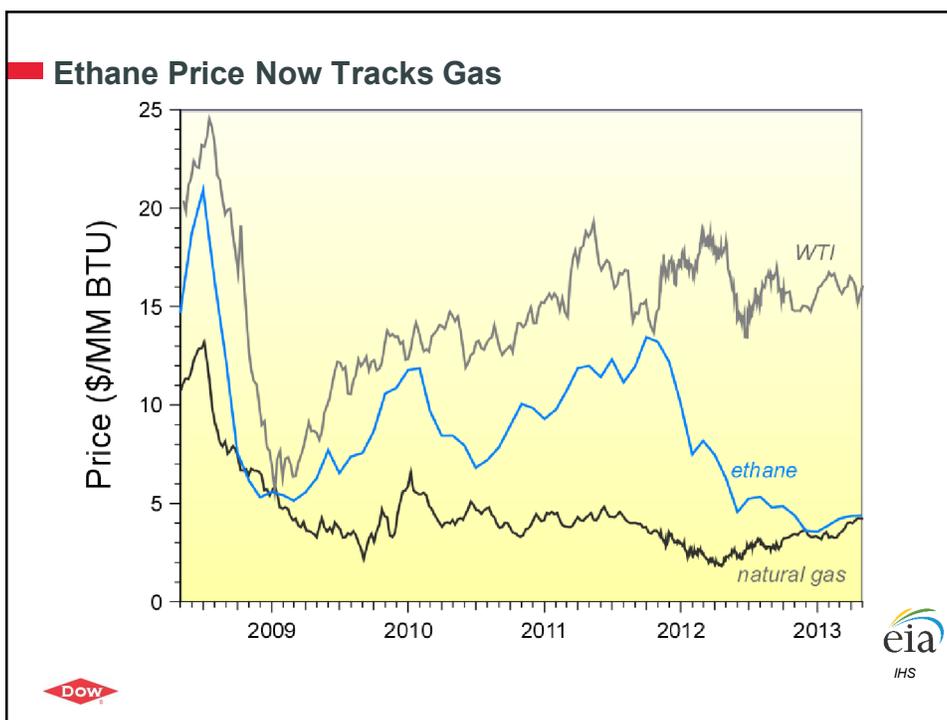
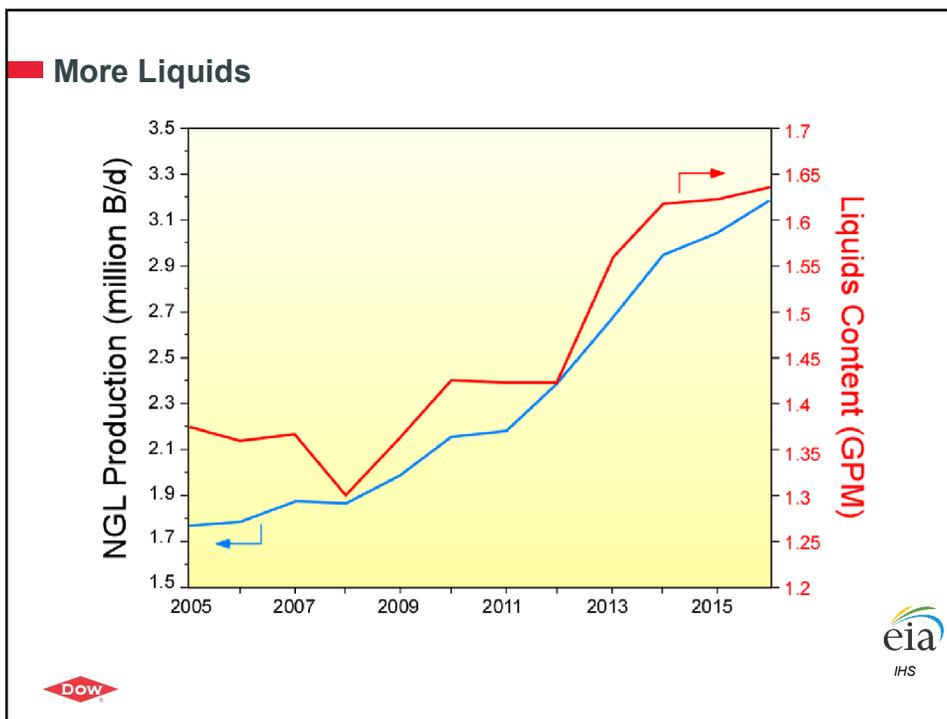
IHS Global Insight, "The Economic and Employment Contributions of Shale Gas in the US", prepared for America's Natural Gas Alliance, December 2011.

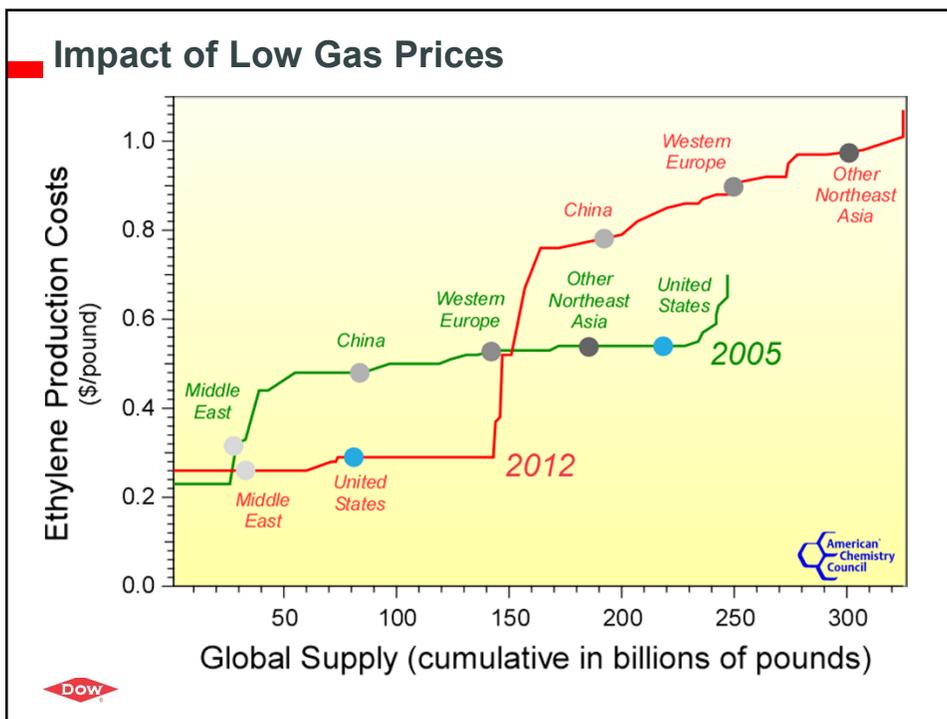




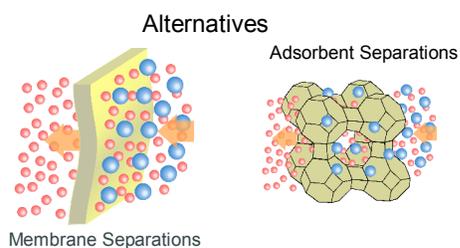
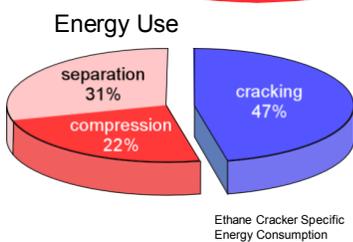




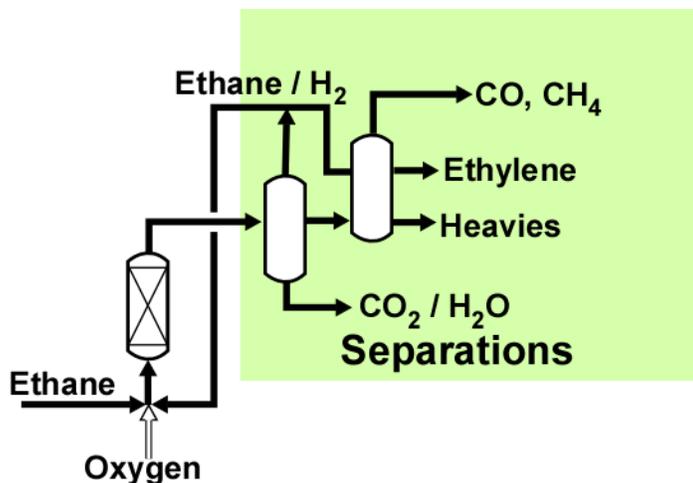


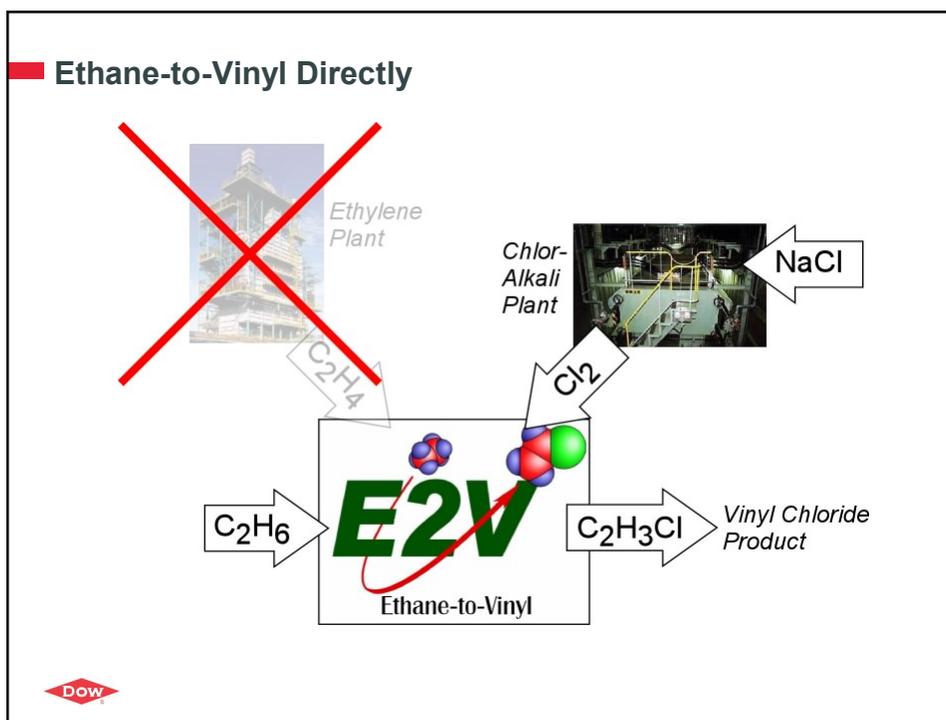
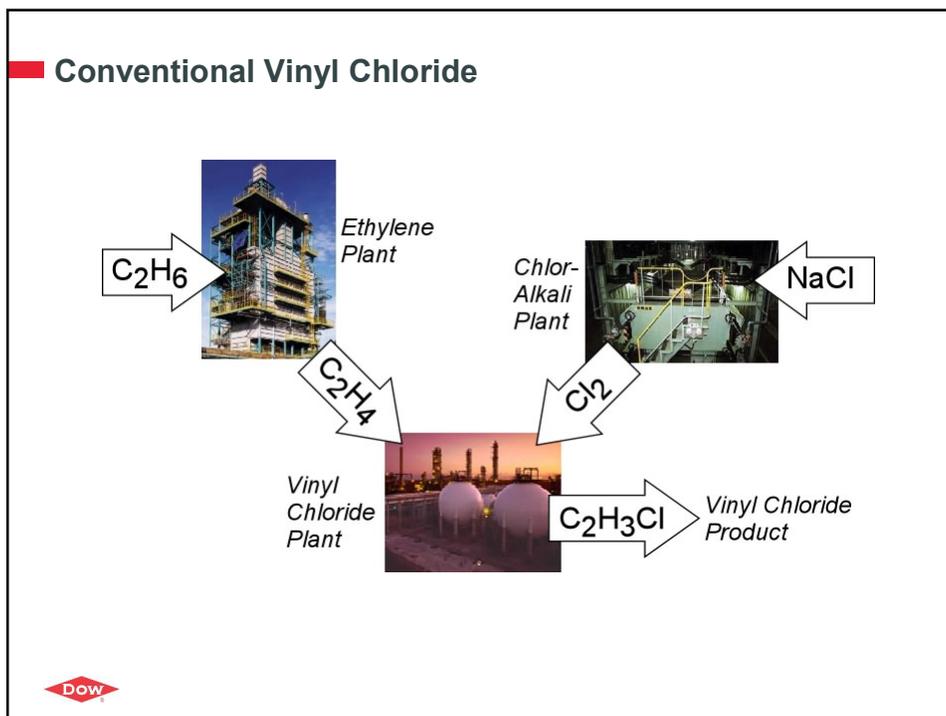


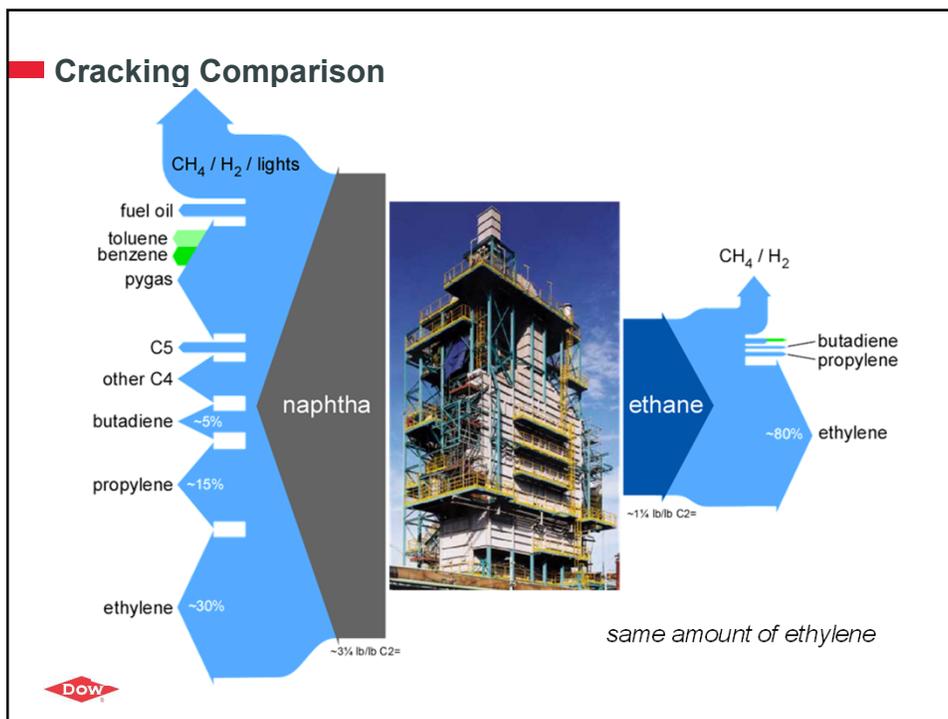
**Make The Cracker Better**

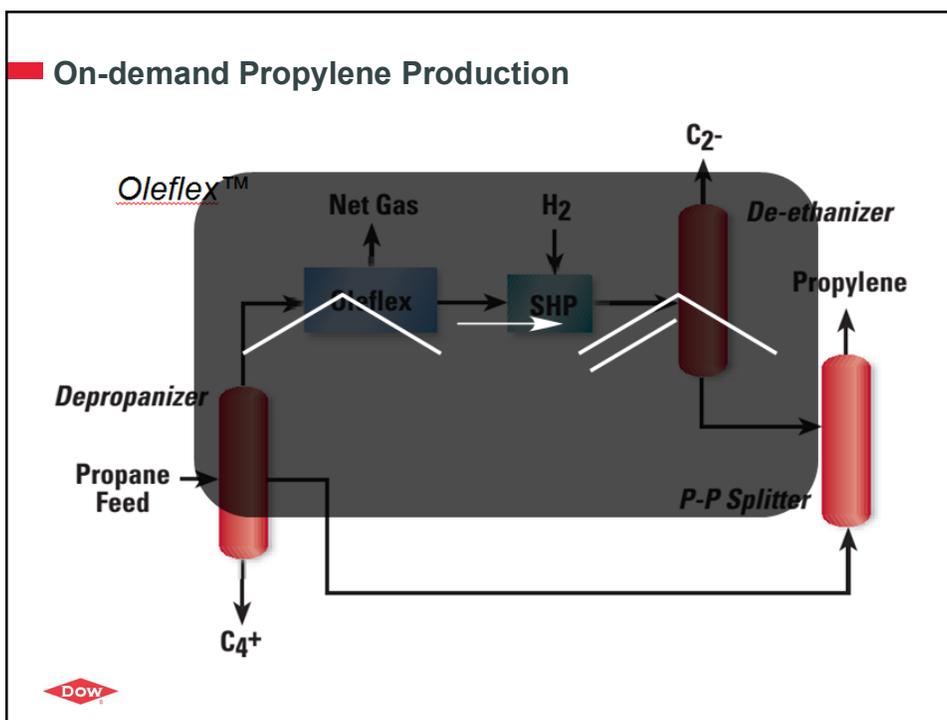
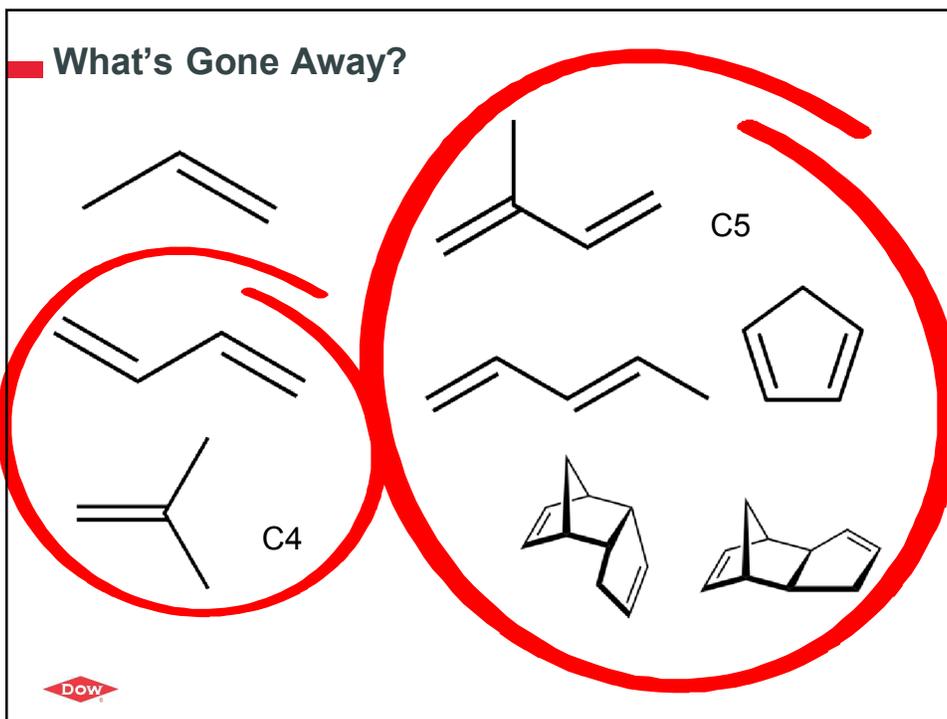


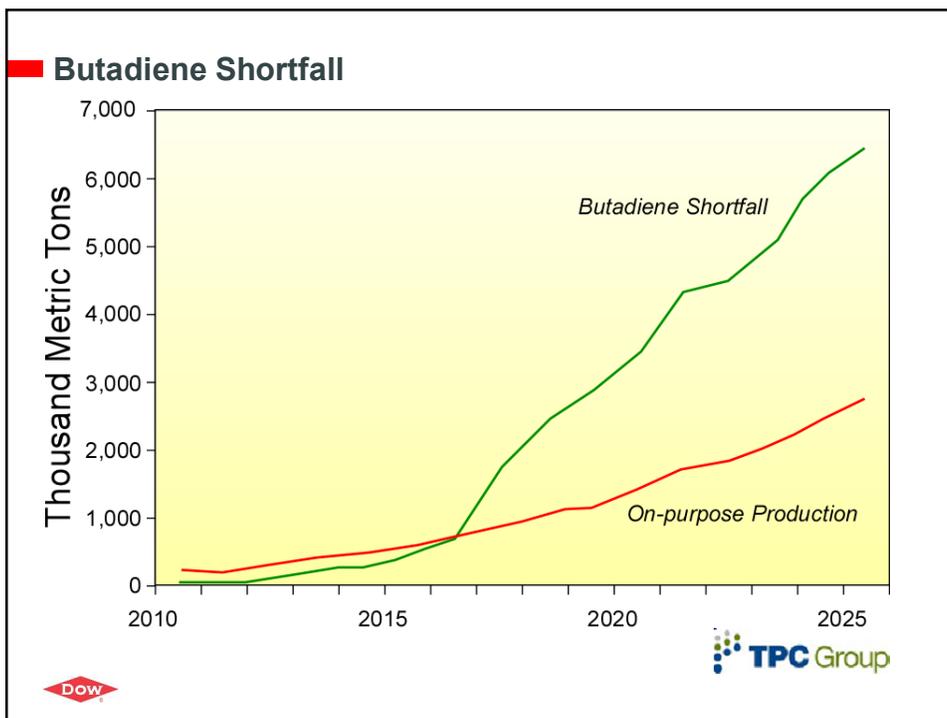
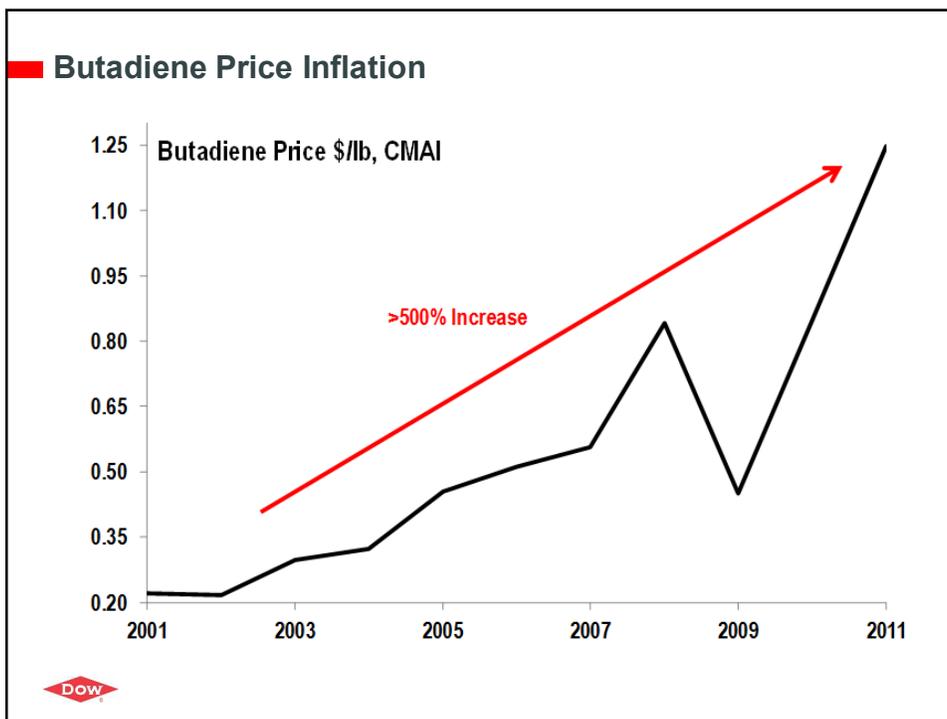
**Make the Cracker Better**

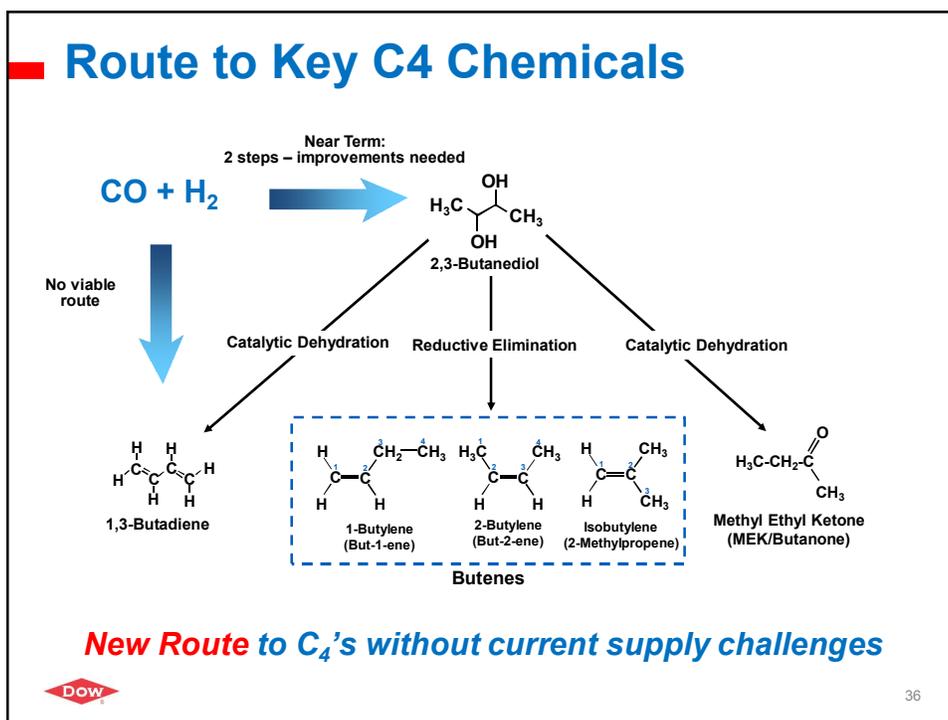
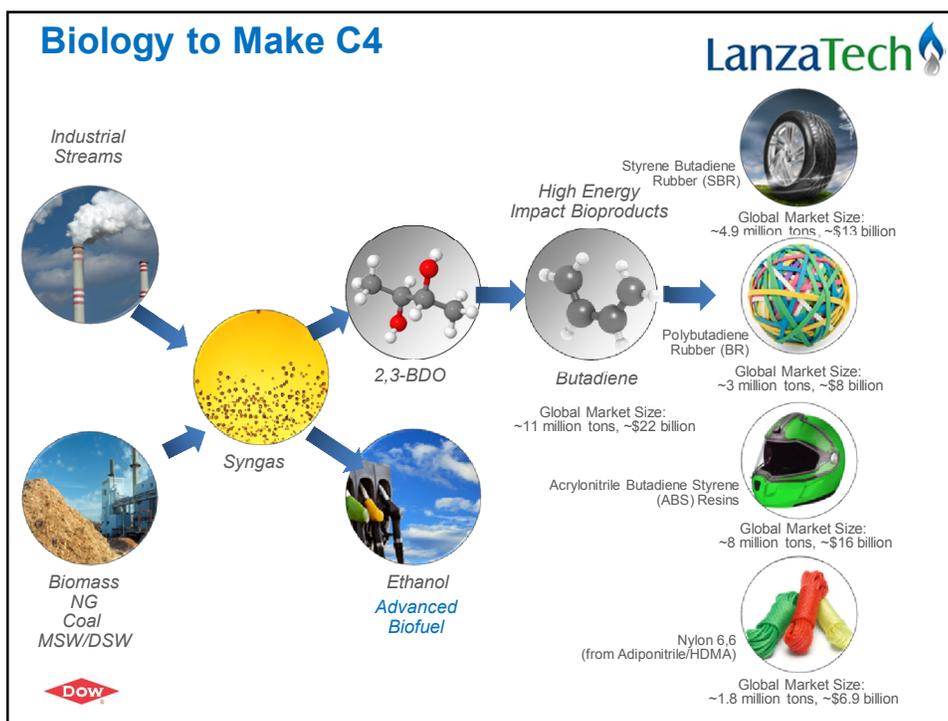


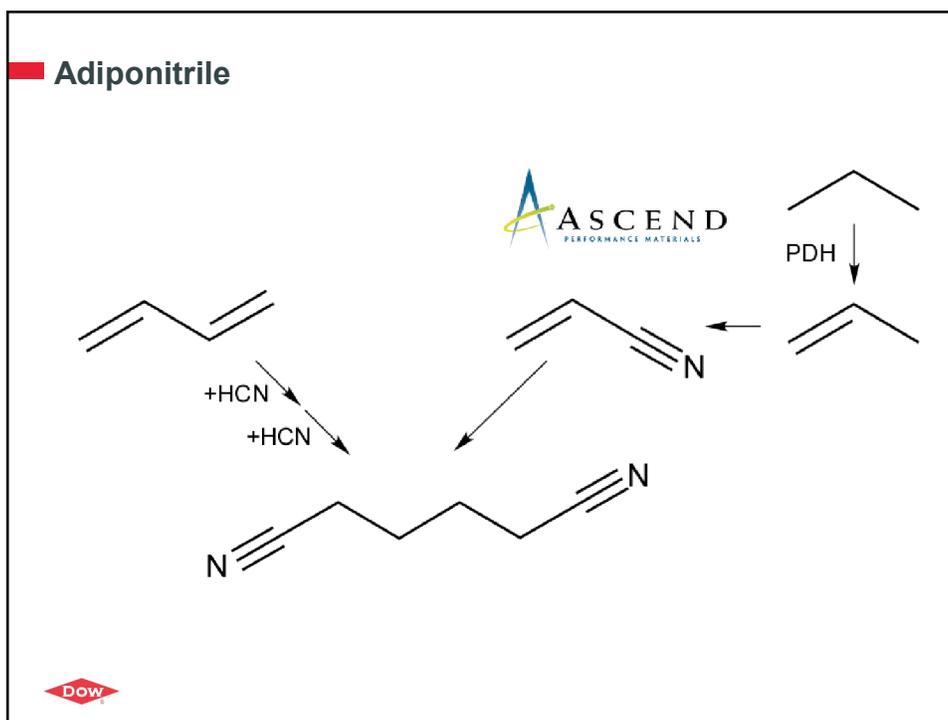
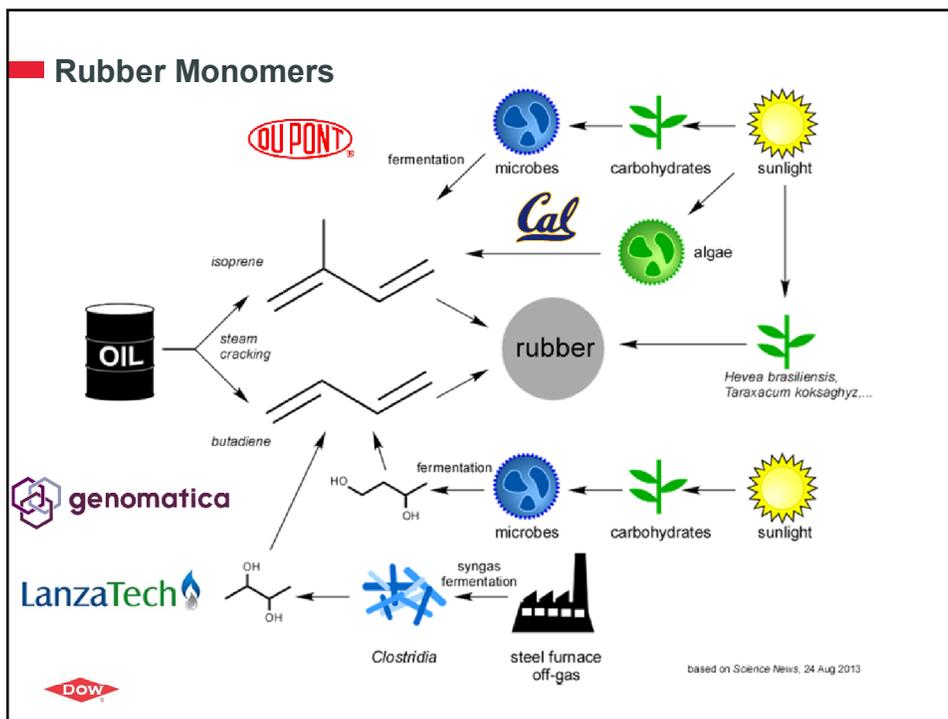














### ■ Concluding Remarks

- shale gas underlies a U.S. chemical industry renaissance
- ethylene production drives the industry and is moving to ethane-only crackers
- on-demand production of materials previously made in the crackers is changing the industry landscape
- opportunities for technology improvements based on better utilization of natural gas liquids exist
- methane to olefins is a tough, both technically and economically
- shale gas:  $\uparrow$ ethylene,  $\downarrow$  C<sub>3</sub>-C<sub>8</sub>



