



Natural Gas Trends
LNG 17 NYC, June 28, 2011

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

Balancing Our Energy Future

What do we want?

“Safe, clean, affordable, (abundant) energy”

“Reduced risk of disruptions, price volatility”

“Secure, commercially successful operations”

How do we get there?

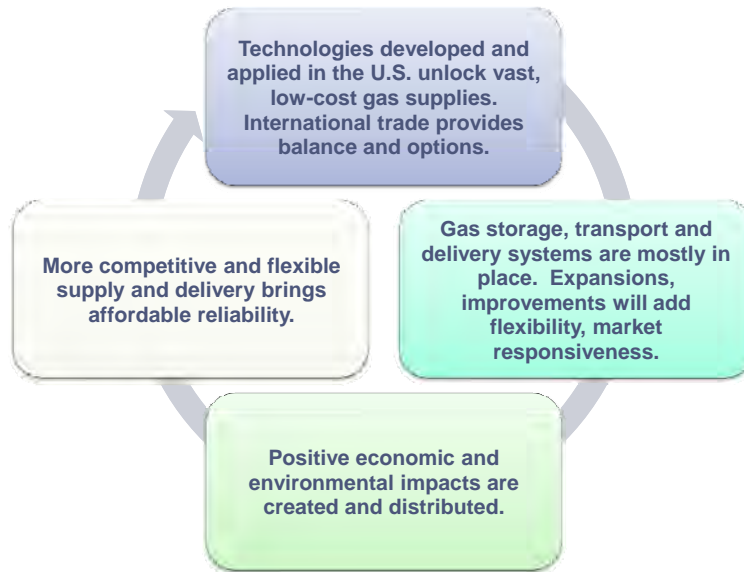
Natural gas is a desirable alternative, but resource and infrastructure must be developed

Portfolio including both supply diversity and price sensitive, demand-side response

Domestic drilling, international trade subject to market and policy/regulatory constraints

“Best practice” design at a price the market will bear.

Natural Gas Can Bring Multiple Benefits



How Does Unconventional Gas Fit In?

The Story...

- “It’s a factory business...”
- “Have I got a shale deal to sell you...”
- “We can make money at \$4...”

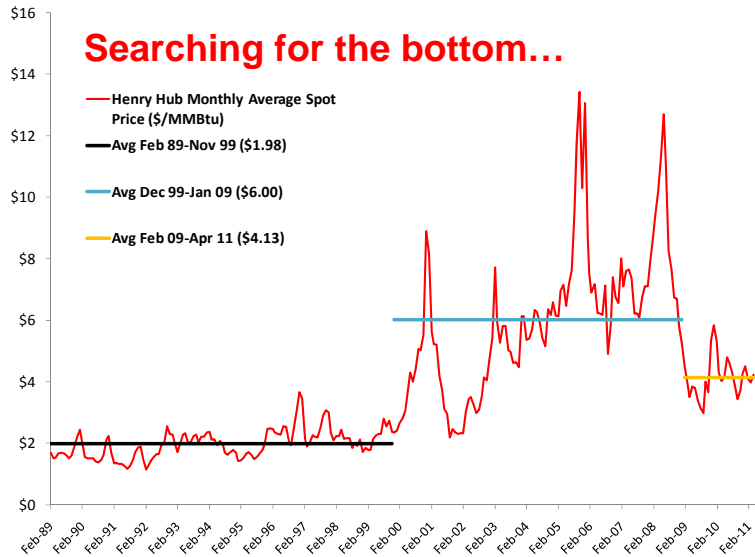
...and the “Back Story”

- Unknown unknowns in technology
- Shifting upstream business models
- Impact of oil directed drilling
 - *Is natural gas price volatility “dead”?*
- Private lands event driven by historical price marker

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

“Glubbausage”!

Searching for the bottom...

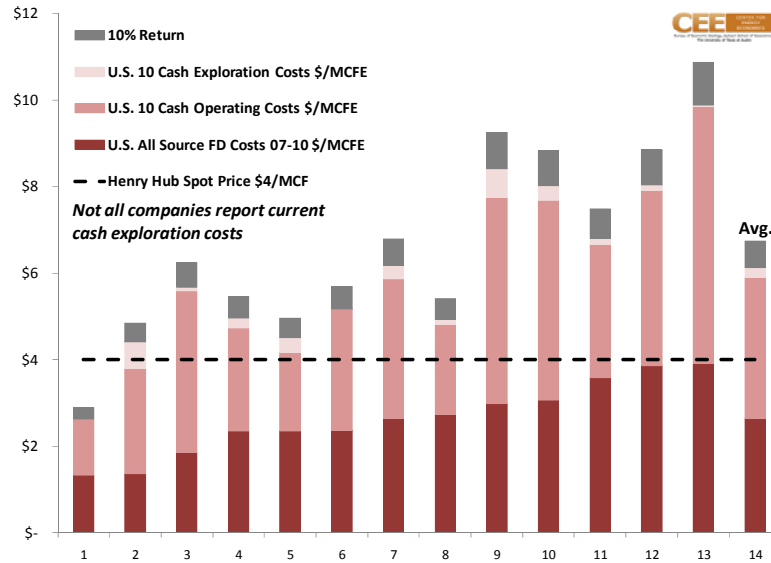


CEE based on U.S. EIA, CME

©CEE-UT, 5

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

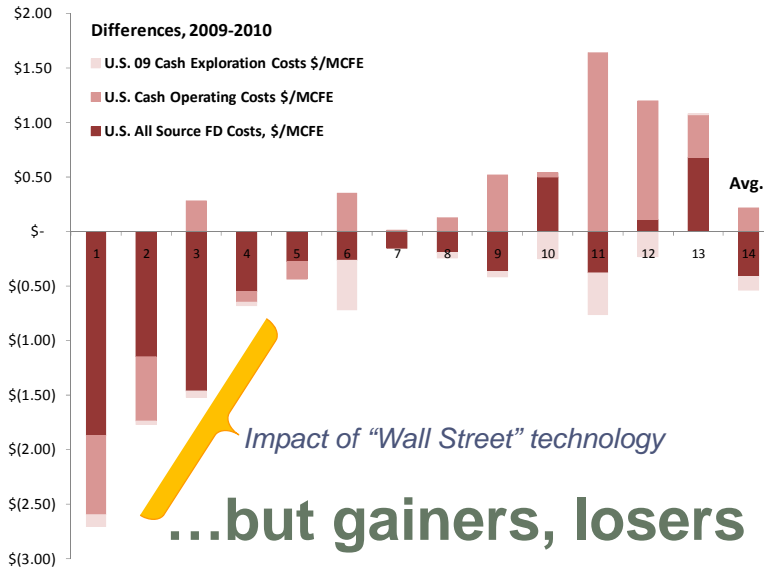
\$4? A Tough Business, Anyway



©CEE-UT, 6

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

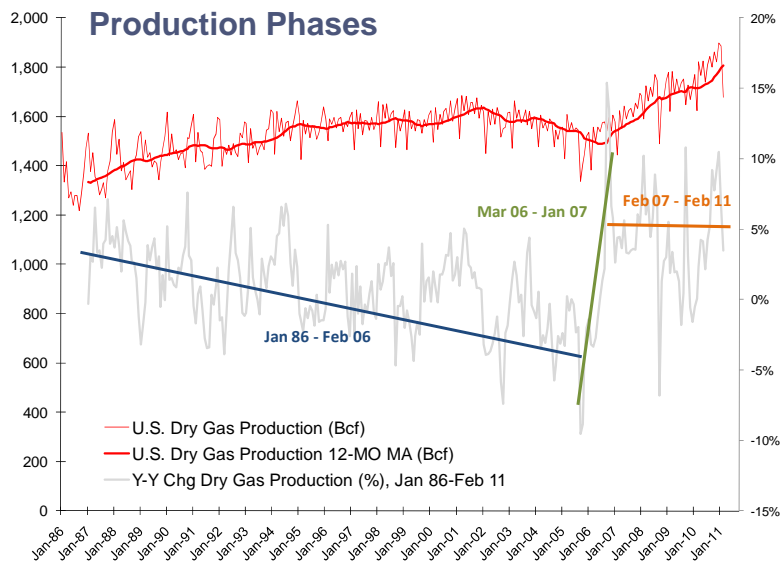
Cost reductions are real...



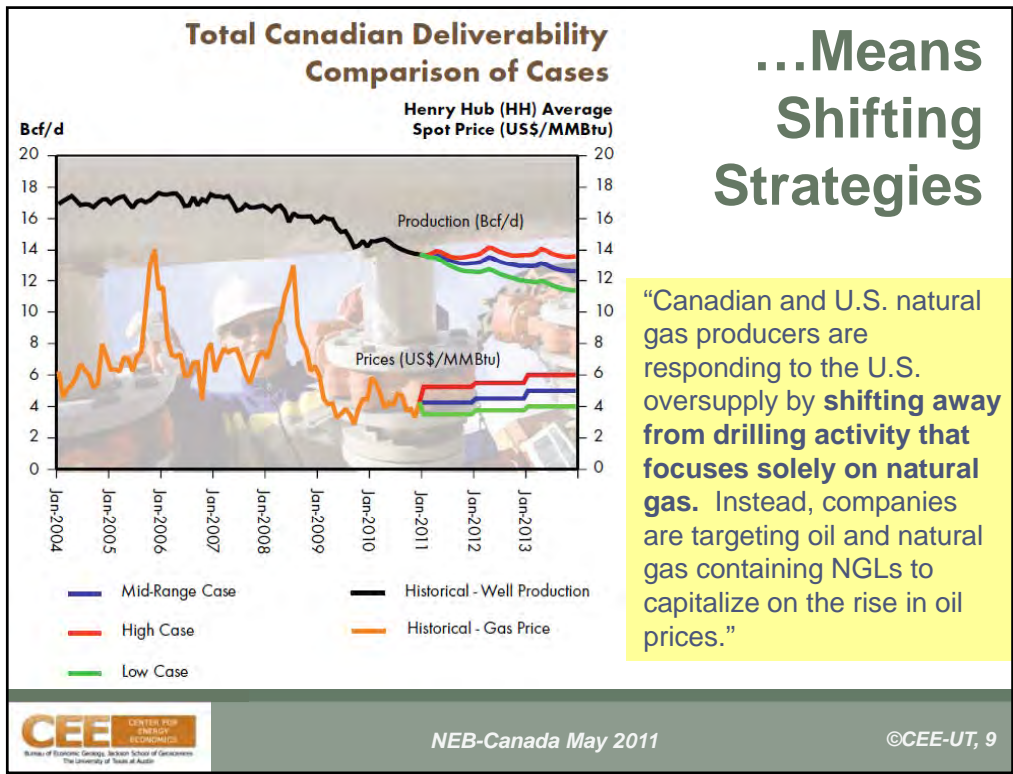
©CEE-UT, 7

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

Living with Negative Margins...

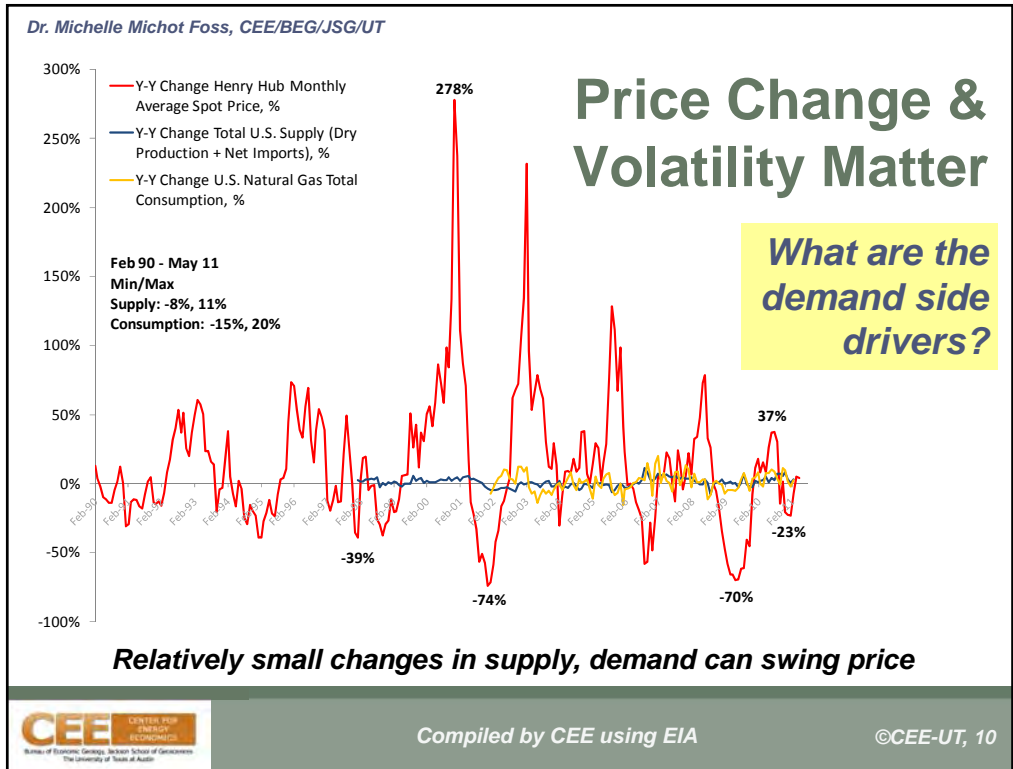


©CEE-UT, 8

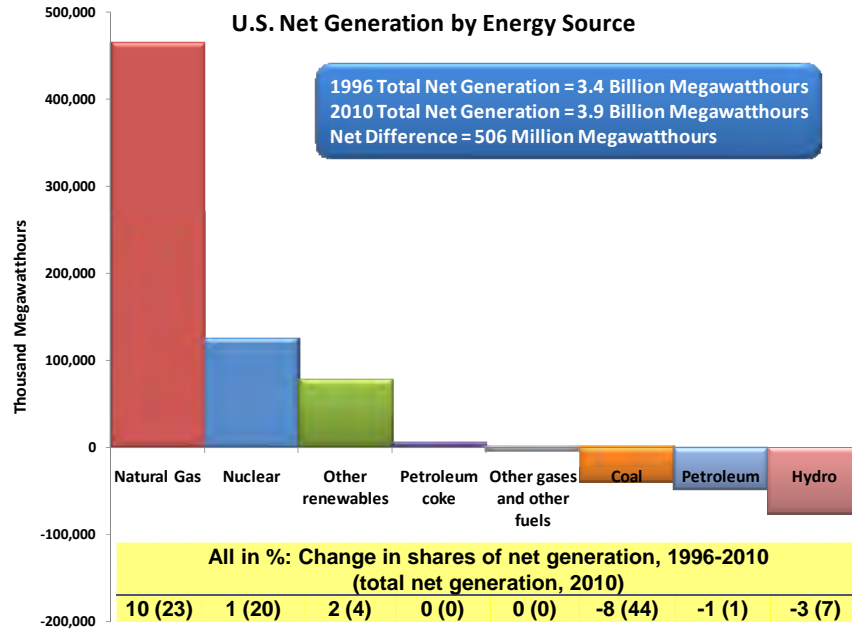


...Means Shifting Strategies

“Canadian and U.S. natural gas producers are responding to the U.S. oversupply by **shifting away from drilling activity that focuses solely on natural gas**. Instead, companies are targeting oil and natural gas containing NGLs to capitalize on the rise in oil prices.”



Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

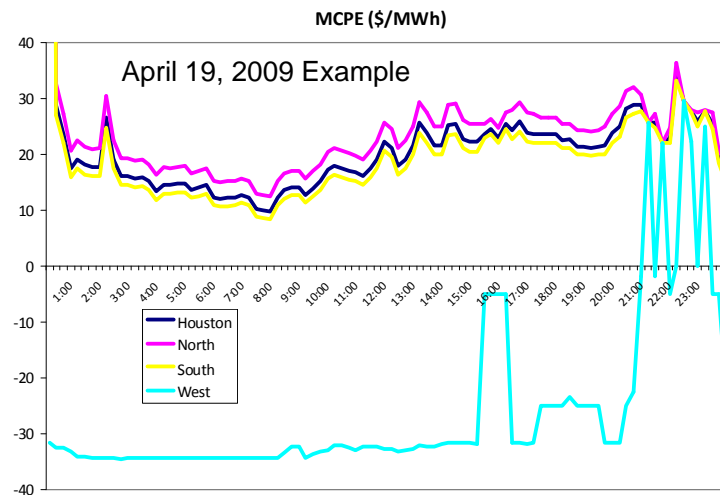


Compiled by CEE; U.S. EIA

©CEE-UT, 11

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT

Does Renewable Energy Create Volatility?



ERCOT

Negative price intervals (15 min)

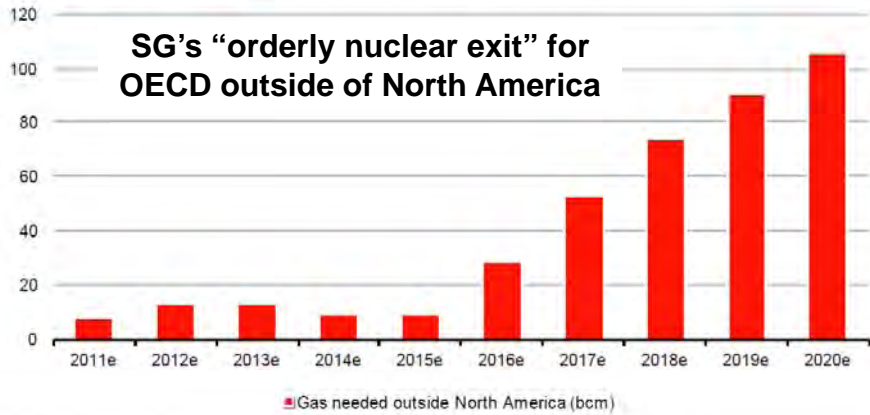
2006	76
2007	338
2008	4,894
2009	3,069
2010	4,445 (Nov)



Compiled by CEE using ERCOT data

©CEE-UT, 12

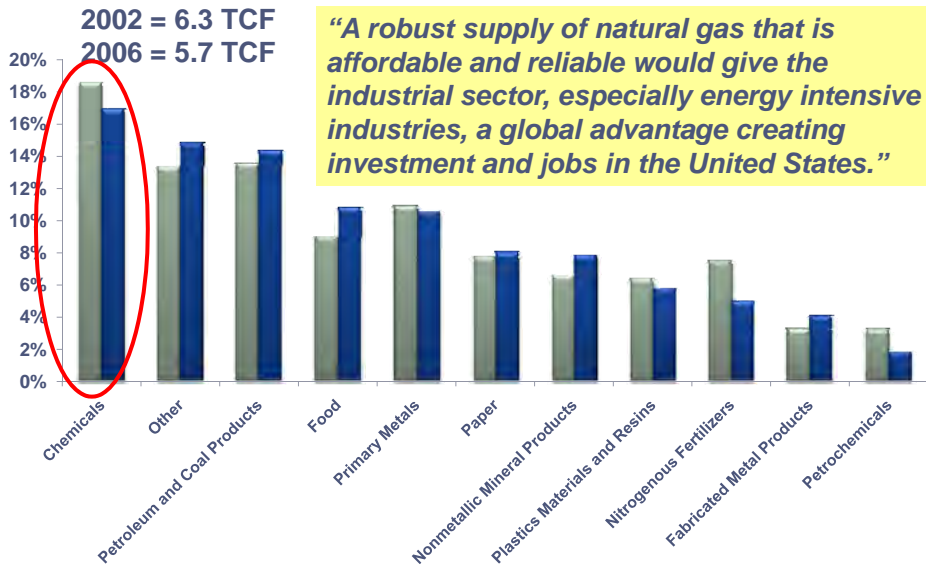
Estimated extra gas needed outside North America after the Japanese disaster



Source: SG Cross Asset Research

Approx. 3.7 TCF by 2020; roughly 7% of current total OECD demand

Industrial Renaissance?



Environment Discontent

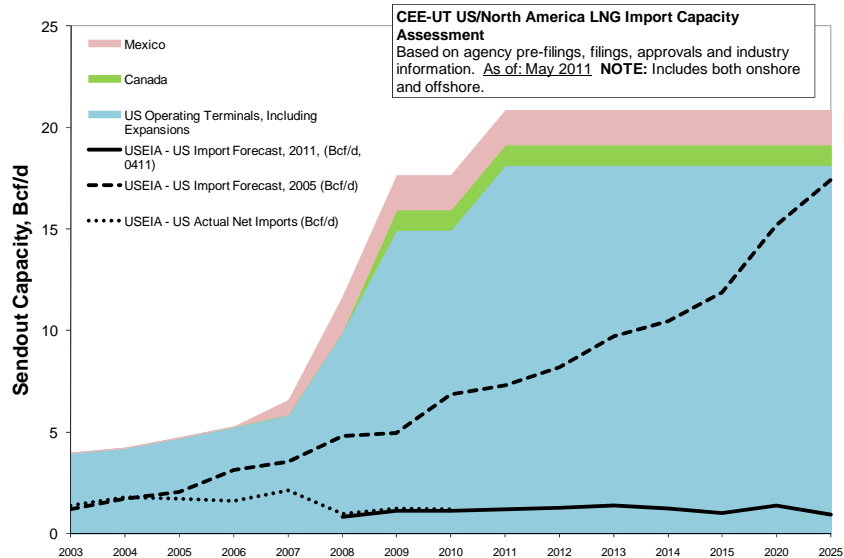
“Cleanest burning fossil fuel” but...

- Hydraulic fracturing
 - Water use, disposal (flowback and produced water, methane)
 - Seismicity
- Air emissions
 - Drilling operations
 - Fugitive GHG; combustion GHG (power, industrial boilers)
- Infrastructure siting
- ***Is natural gas too cheap?***

Solutions???

- *State frac disclosure laws*
- *FracFocus*
- *STRONGER*

How does LNG fit in?



How does LNG fit in?

25

CEE-UT US/North America LNG Import Capacity

- Crucial swing capacity to balance supply, demand
 - How do players manage “optionality”?
- Perceptions of the U.S. as a “closed system”, self supplied
 - LNG at what cost when we need it?
- Capacity expansions did not alter fundamental HH transportation basis
 - Head room for shale gas?

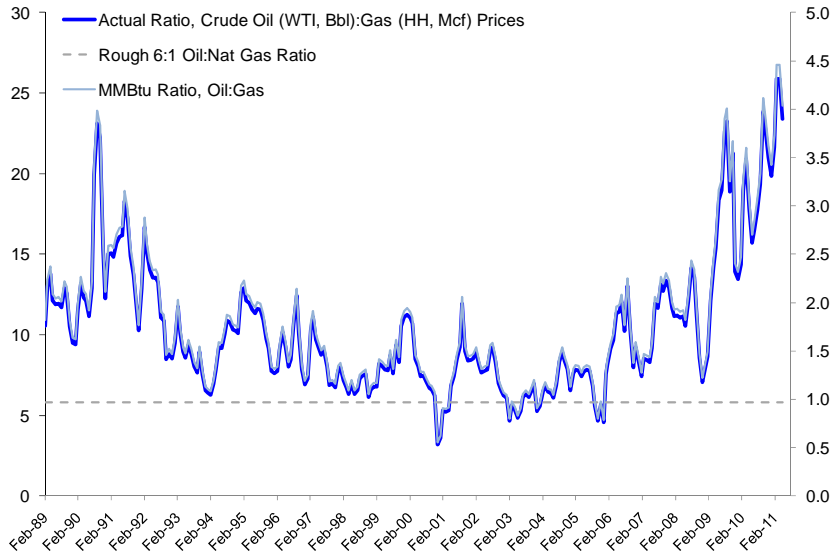
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2020 2025



Compiled by CEE based on industry data

©CEE-UT, 17

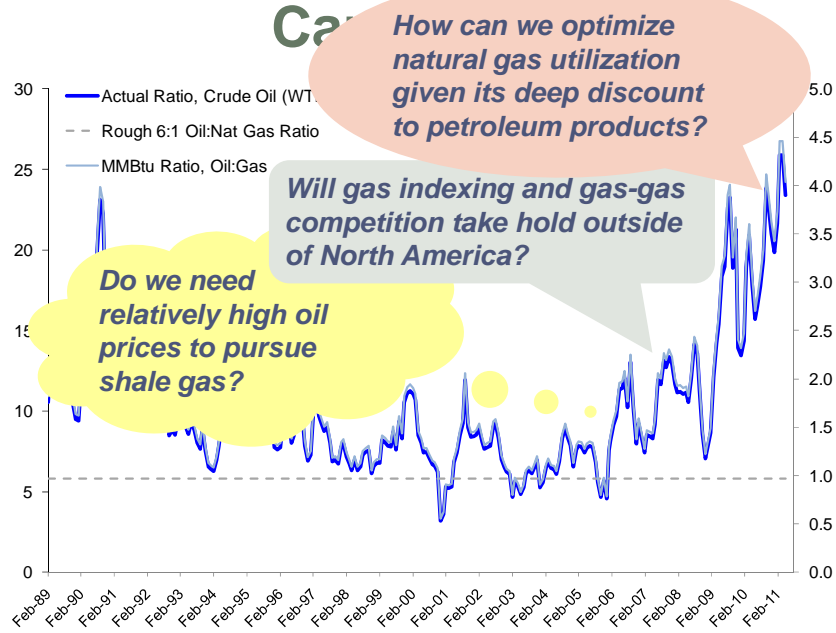
Carpe Diem



Compiled by CEE based on CME, EIA

©CEE-UT, 18

Dr. Michelle Michot Foss, CEE/BEG/JSG/UT



Compiled by CEE based on CME, EIA

©CEE-UT, 19