Overview

• Aluminum process flow (2\textsuperscript{nd} in series)
• Non-manufacturing
• NGL price drivers & bulk chemicals
• Environmental updates
• CHP updates
Process flow: Aluminum results

• New aluminum model allows for technology choice in all facets of raw aluminum and finished products;

• No new potlines/primary smelters built in U.S.; but use of primary capacity varies as potlines at smelters are allowed to come back (subject to projected electricity prices) on line as aluminum industry recovers;

• Energy consumption higher in both electricity and natural gas
  – Industrial output
  – Update in retirement assumptions
Aluminum: natural gas consumption

Energy Consumption in Trillion BTUs

- NEMS run 9/4/12
- AEO2012 reference case

NEMS run 9/4/12
AEO2012 reference case

2010 2015 2020 2025 2030 2035 2040

Energy/Consumption in Trillion BTUs

0 50 100 150 200 250 300

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Aluminum: electricity consumption

Energy Consumption in Trillion BTUs

- NEMS run 9/4/12
- AEO2012 reference case
Aluminum: total energy consumption

![Graph showing energy consumption from 2010 to 2040]

- NEMS run 9/4/12
- AEO2012 reference case
Non-manufacturing

• Non-manufacturing energy consumption drivers “endogenized” with buildings and transportation module energy efficiency drivers

• Mining (coal + oil & gas sectors) includes productivity drivers

• Energy consumption increases with shipments; energy supplies
Non-Manufacturing heat and power energy consumption
(units in quadrillion btus)

- NEMS 9/4/2013
- 2012 Reference Case
Natural Gas Liquids (NGL) pricing & Bulk Chemicals

• NGL prices relative to naphtha

• Feedstock requirements of additional petrochemical capacity

• Don’t forget shipments!
Natural Gas Liquids (NGL) pricing & Bulk Chemicals

• Multi-team effort to forecast NGL prices
  – Regression-based but allowing for more than “typical” explanatory variables
  – Bayesian approach/Dynamic Linear Models
  – Sectoral propane prices
  – Useful for chemical feedstock choice and as input for chemical gross output
  – Feedstock choice to be based on demand for basic petrochemicals and relative feedstock pricing
NGL/LPG pricing to industrial customers

![Graph showing the price of NGL/LPG over time]

- **Price in $2011 / million BTU**
- **X-axis:** Years from 2010 to 2040
- **Y-axis:** Price in $2011 / million BTU
- **Legend:**
  - **NEMS run 9/4/12**
  - **AEO2012 reference case**

**Note:**
- The graph is for working group presentation purposes only.
- Results are subject to change.

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Bulk Chemicals: feedstock consumption
(units in quadrillion btus)

- NEMS 9/4/2013
- 2012 Reference Case

[Graph showing consumption trends for natural gas, NGL, and petrochemicals from 2010 to 2040]
Environmental

• California Global Warming Solutions Act of 2006: AB32 cap & trade
  – Multi-module adaptation: EMM, LFMM, IDM, Integration
  – Interpretation challenge: cannot pick up California macro changes
  – Cannot measure leakage in NEMS, although the California Air Resources Board (CARB) has measures to prevent or reduce

• U.S. EPA: Boiler MACT
  – Estimated compliance cost represented as change in industrial final demand
  – Food, Iron & Steel, Chemicals, BOM most affected
  – Update fuel cost/selection factors to represent and incent compliance primarily through ‘fuel switching’
Combined Heat and Power (CHP)

• Economic Assessment: Utilization
  – Lowered assumptions for utilization; since AEO2012, IDM simulates the utilization of installed CHP systems based on historical utilization rates and is driven by end-use electricity demand – i.e., updated appraisal incorporates historical rather than assumed capacity factors for new CHP facilities
  – Utilization of new CHP additions now expanded to allow for both industry and regional differences
  – Update industrial CHP based on EIA’s historical data; preliminary 2011 data from EIA Office of Energy Statistics (OES)
  – Will update regional CHP scorecards when ACEEE data becomes available

• Industrial CHP Coverage
  – Starting with AEO2012, regulated generators are modeled under EMM
    • Modeling impact is movement of a few hydropower facilities from industrial sector to power sector
Thank you for your attention!

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