



Advancing each generation.



Quadrennial Energy Review

Alcoa Energy Portfolio Overview

October 10, 2014

- Introduction to Alcoa & Alcoa Energy Portfolio
- QER Comments

Alcoa at a Glance

- Founded in 1888
- 200+ locations
- 30 countries
- \$23 billion 2013 sales
- Award-winning sustainability leadership
- 125 years of aluminum technical leadership, including the original aluminum process



Number of Employees (2013)

U.S.	26,000
Europe	17,000
Other Americas	10,000
Pacific	7,000

60,000



Global leader in lightweight metals engineering and manufacturing

- Celebrating **125 years** in 2013; **inventors** of the original **aluminum process**
- Delivers **value-add products** made of **titanium, nickel and aluminum**, and produces **best-in-class bauxite, alumina and primary** aluminum products
- **200+** locations in **30** countries



Downstream - EPS

- Fastening Systems
- Power & Propulsion
- Wheels & Transportation
- Building & Construction
- Forgings & Extrusions
- 2013 Revenue \$5.7B
- 2013 ATOI \$726M

2013
57% Revenue
80% ATOI
value-add



Midstream - GRP

- Global packaging
- Aero, transportation and industrial
- China and consumer electronics
- 2013 Revenue \$7.1B
- 2013 ATOI \$252M

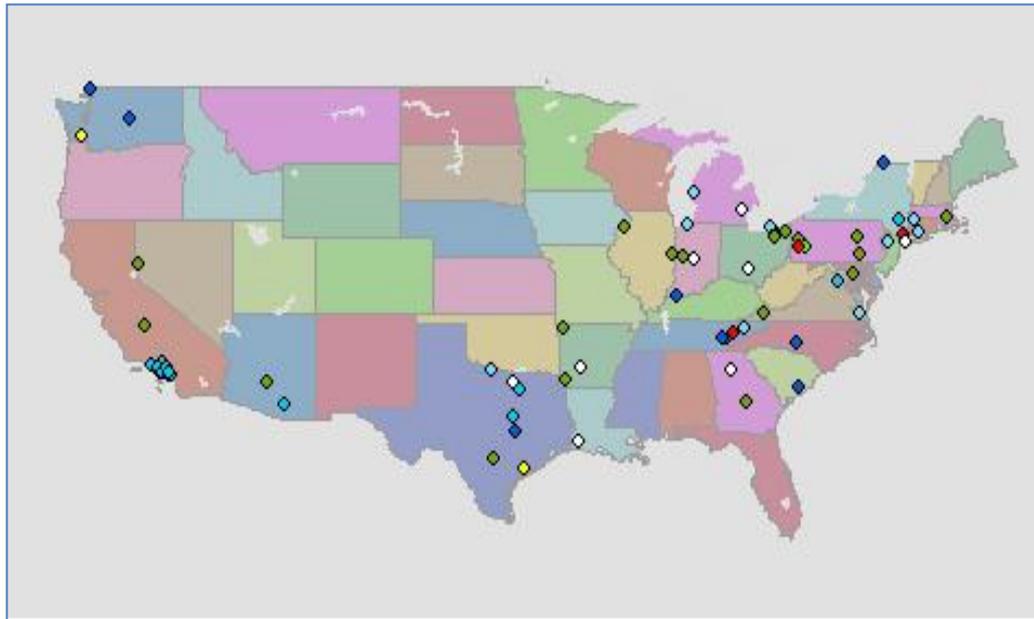


Upstream - GPP

- Bauxite mining
- Alumina refining
- Aluminum smelting
- Power
- 2013 Revenue \$9.9B
- 2013 ATOI \$239M

Alcoa is an energy-intensive manufacturer, especially in the U.S.

Alcoa's U.S. portfolio



Location Categories
◆ Alumina
◆ Primary Metals
◆ Flat-Rolled Products
◆ Packaging and Consumer

◆ Engineered Solutions
◆ Extruded and End Products
◆ Technical Center
◆ Corporate

Alcoa energy highlights

- High energy use across downstream, midstream and upstream portfolio
- Two power plants in the U.S. – Indiana (coal) and North Carolina (hydro)
- Demand response system in e.g., Indiana, Washington
 - Working with DOE to update the 2009 Report on DR Best Practices - a 5-year analysis of DR in regional markets including the impacts of FERC Order 745.
 - Developing a DOE Implementation Model for DR.
- Alcoa Oil & Gas business unit active in hydraulic fracturing and deepwater development

State and national leader on associations including PGC, IECA, ELCON and diverse state associations

Alcoa is also active as a partner to DOE

2014 DOE activity

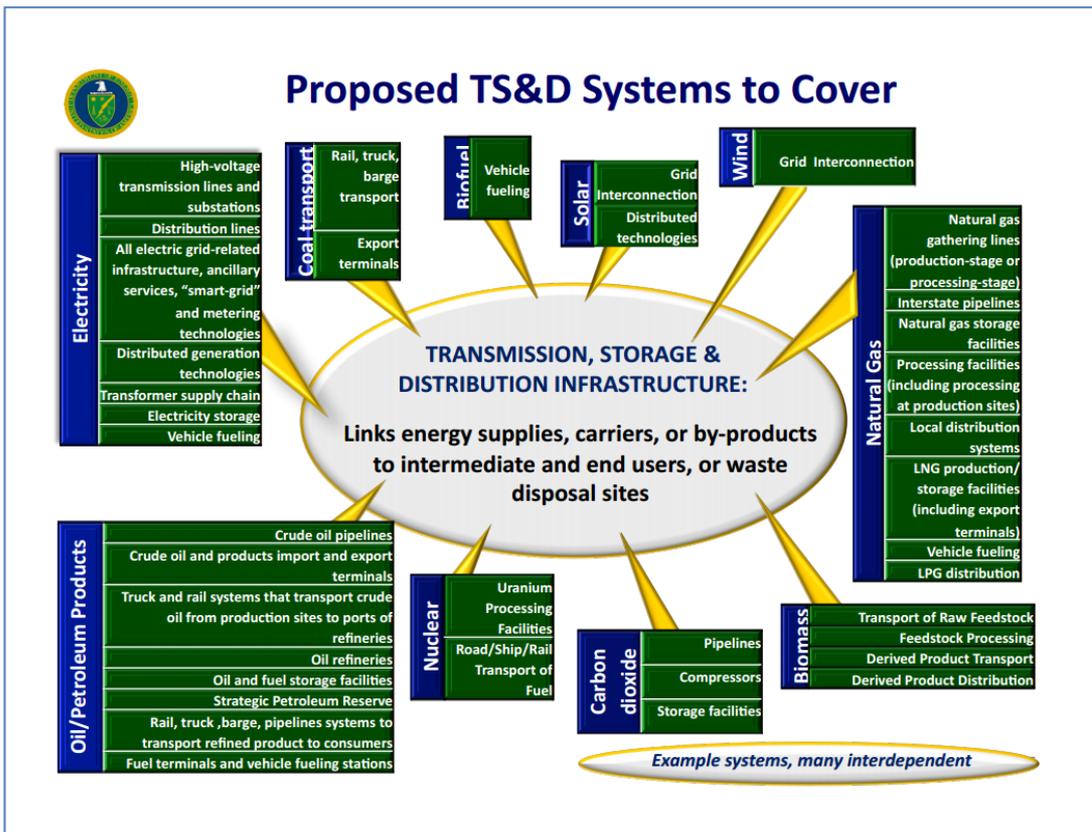
- Better Buildings, Better Plants member
- Steering Committee member of President's AMP 2.0 initiative
- Active member of America Makes (formerly NAMII); likely will begin first project this year; also supporting LM3I and DMDI
- Applying for an Advanced Technology Vehicle Manufacturing (ATVM) loan; the loan is currently in evaluation and negotiation
 - The loan would finance a \$300M novel lightweight automotive aluminum sheet expansion for our Tennessee Operations
- Recent Grants:
 - VTO: \$2.6M with \$2M cost share to develop new 7xxx alloy in partnership with Honda and others
 - BTO: \$1.5M project for novel thermal break technologies for energy efficient windows
 - ARPA-E: Active grant (awarded 2013) for new aluminum alloys that will, in part, have automotive applications

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QER is an excellent opportunity to address U.S. energy needs

Alcoa's interest in 2014 QER agenda



1. Stronger planning for longer-term energy needs
2. Improved coordination between agencies overseeing energy policy (e.g., DOE, FERC, EPA, etc.) to coordinate infrastructure shift
3. Management of dislocations that are occurring in the nature of production vs. use (e.g., wind, natural gas)

Source: DOE, Alcoa Energy

1 & 2. Top-down coordination would streamline energy use

Infrastructure constraints & infrastructure resilience

- The multimodal energy market should have a more robust and comprehensive mechanism for planning and coordination – across DOE, FERC, EPA, states and others
- Infrastructure resilience and mitigation of vulnerabilities
 - Will increasingly become a concern; should be coordinated by the same agencies

Infrastructure constraints

- Gas-fired generators vs. natural gas transportation – need to match sale of firm power with requirement for firm source of fuel.
- Infrastructure to connect new gas and oil production (due to changes / new source location)
- Policies to rationalize gas transmission capacity no longer needed (due to change in gas sources)

Infrastructure resilience

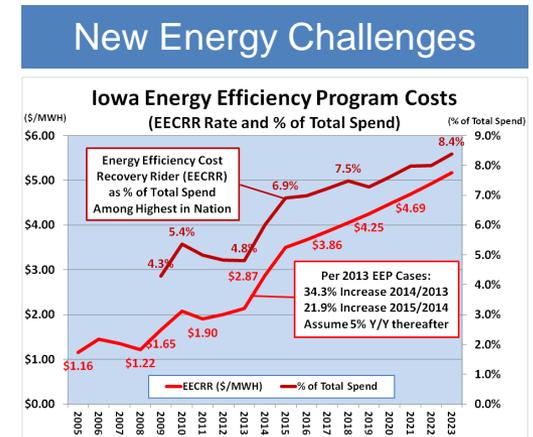
- Replace and upgrade aging gas and power infrastructure
- Peak day design modeling – is this still being done?
- Design Winter modeling for storage – is this being done?
- Effect of import/export balance

3. Upgrades should be managed in a globally cost-competitive way

Proposed grid structure management

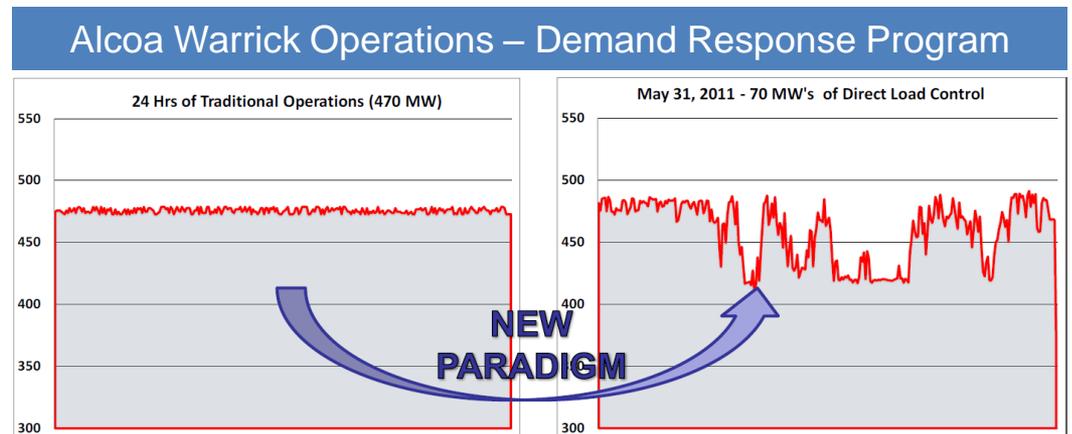
Necessary grid infrastructure upgrades provide challenges....

- Load: Grid was not built to manage multiple inputs and outputs (e.g., from renewable, microgrids)
- Cost: Renewable and energy efficiency mandates become a hidden cost to consumers making energy for industrials more costly and less predictable and frustrates investment.
- Demand: Ensuring new sources (e.g., natural gas) can supply even during a Polar Vortex is critical
- Capacity: Infrastructure needs by 2030 in the U.S. Eastern Interconnection alone are projected at \$83.3B - \$121.9B



But also opportunity:

- Alcoa works with local communities to manage loads – and is expanding its programs
- QER could propose broader industry involvement in demand response as part of infrastructure solution



Source: Alcoa Power Generation, ICF International

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