



Better Plants

U.S. DEPARTMENT OF ENERGY

THE ROLE OF ENERGY EFFICIENCY IN A NEW MANUFACTURING ENERGY LANDSCAPE

Better Buildings Summit
May 27, 2015

U.S. DEPARTMENT OF
ENERGY

Speakers

- Neal Elliott, Associate Director for Research, American Council for an Energy Efficient Economy
- Tom Lorenz, MECS Survey Manager, U.S. Energy Information Administration
- Walt Brockway, Manager of Global Energy Efficiency, Alcoa, Inc.
- Sharon Nolen, Manager—Worldwide Energy Program, Eastman Chemical Company

Manufacturing energy use: recent data and trends



For

2015 Better Buildings Summit

May 27, 2015 / Washington, D.C.

By

Tom Lorenz

U.S. Energy Information Administration

Who is the EIA, and what is the Manufacturing Energy Consumption Survey (MECS)?

- The U.S. Energy Information Administration (EIA) is an independent agency within the U.S. Department of Energy that develops surveys, collects energy data, and analyzes and models energy issues.
- The EIA also disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.
- The EIA's only survey for collecting information on the stock of U.S. manufacturing establishments, their energy-related building characteristics, and their energy consumption and expenditures is the Manufacturing Energy Consumption Survey (MECS).

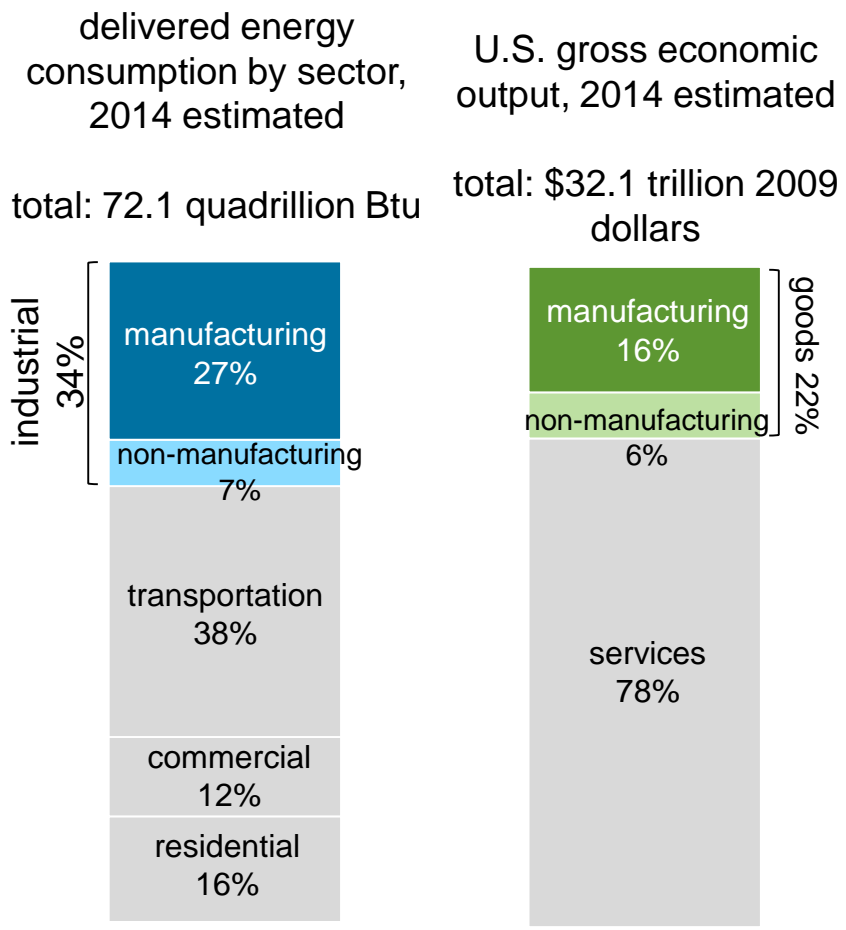
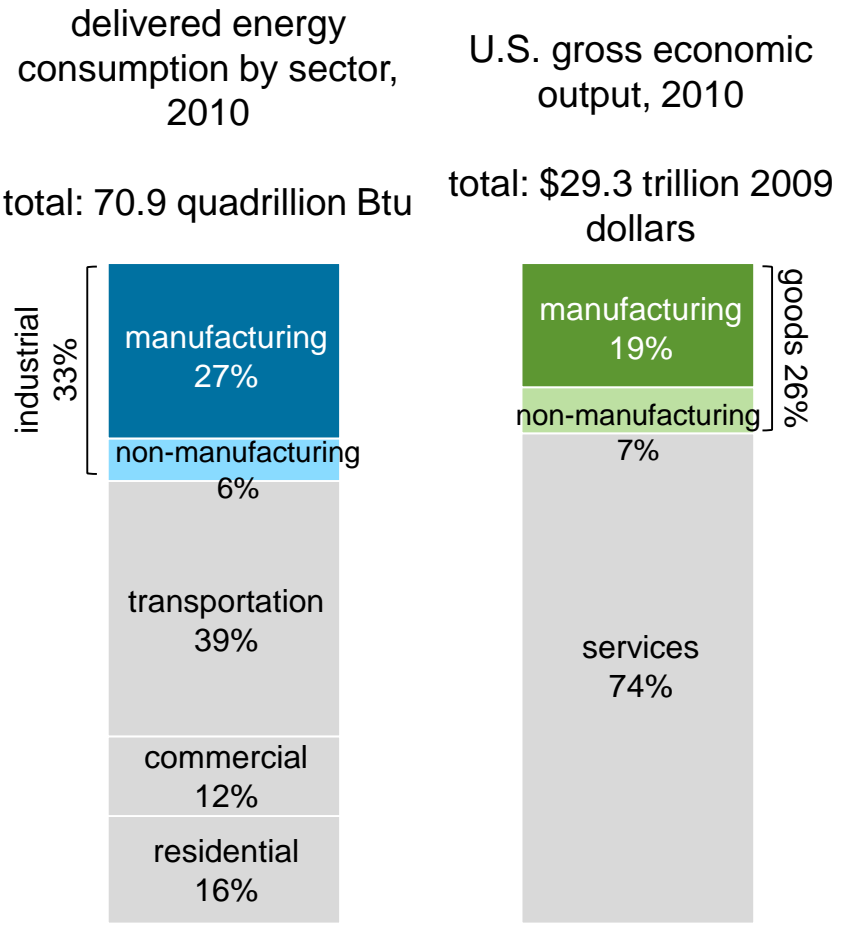
Manufacturing energy use – key takeaways

- Manufacturing energy consumption represents 27 percent of total U.S. delivered energy use
- Four energy-intensive industries account for 80 percent of total manufacturing energy use
- Energy accounts for 2.5 percent of overall manufacturing costs; however, for some parts of manufacturing, the energy cost share exceeds 30 percent
- Manufacturing energy consumption has a higher relative share of consumption than it has of output; the manufacturing sector is more energy-intensive than the economy as a whole

Manufacturing energy use – key takeaways (continued)

- It is important to distinguish between fuel and non-fuel uses in overall manufacturing energy use; including byproduct energy sources, fuel use by itself is roughly 76 percent of total manufacturing energy use
- Fuel intensity in manufacturing continues to decline, but the rate of decline has slowed, in part reflecting shifts in the composition of manufacturing activity
- The price of natural gas used by manufacturers has declined, while other energy prices have risen; EIA estimates natural gas to account for a greater share of manufacturing fuel

In 2010, manufacturing accounted for 27% of U.S. onsite energy use and 19% of U.S. gross output (GO); from 2010 to 2014, estimated growth of manufacturing GO and energy use were 14% and 3% respectively



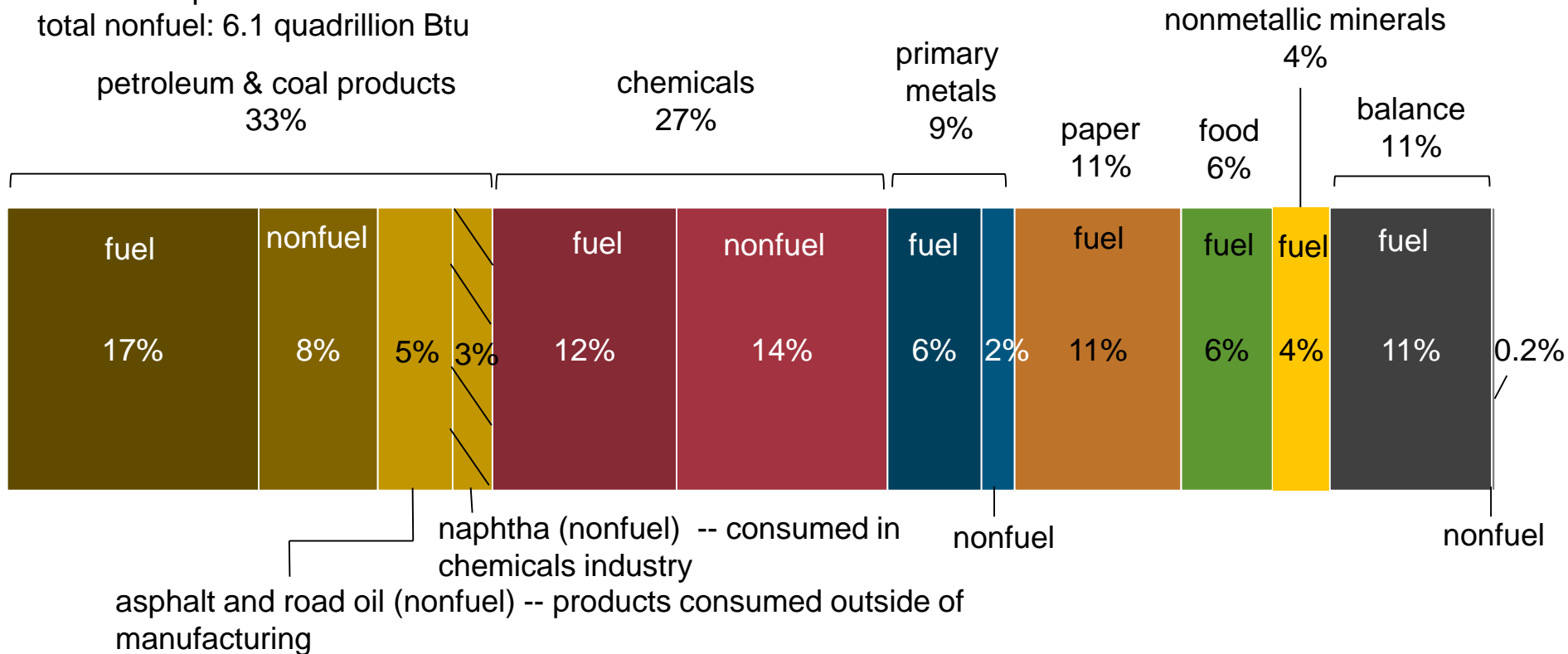
Note: delivered energy does not include the energy used to create electricity at utilities and any losses along the way

A few industries dominate manufacturing energy use; nonfuel uses are dominant in the chemicals industry

manufacturing energy consumption by industry, 2010

total: 18.8 quadrillion Btu

total nonfuel: 6.1 quadrillion Btu



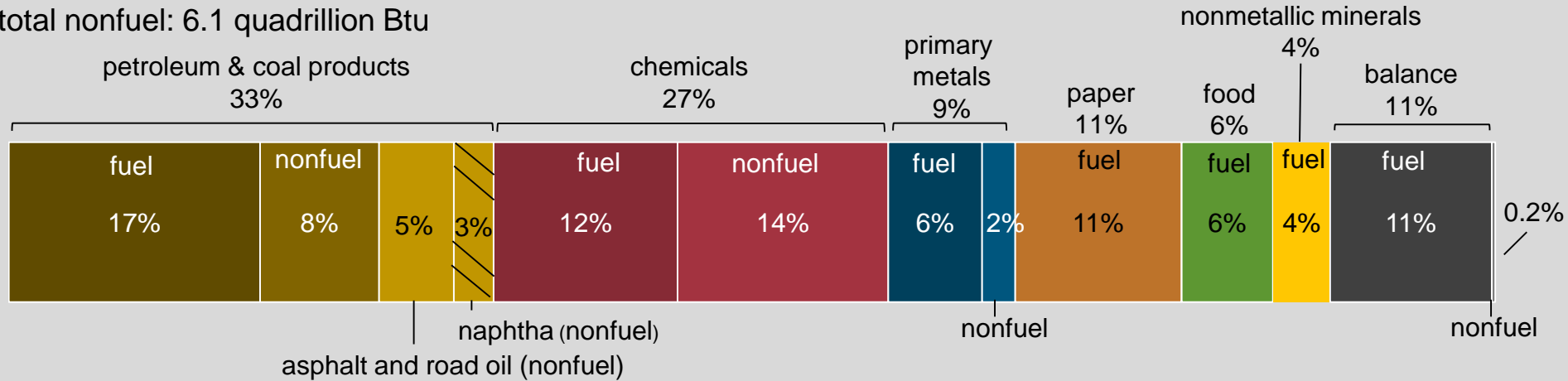
Note: to adjust for double counting, 1.5 quadrillion Btu are netted out of fuel consumption (MECS table 1.2)

Energy use in paper and chemicals has relatively low carbon intensity, due to the fuel mix and carbon stored in non-fuel uses

manufacturing energy consumption by industry, 2010

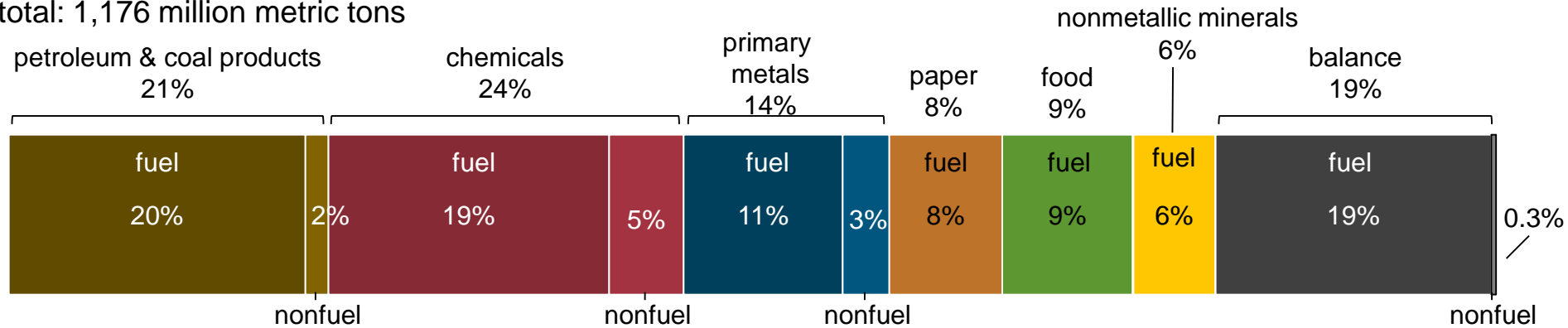
total: 18.8 quadrillion Btu

total nonfuel: 6.1 quadrillion Btu



manufacturing energy-related CO₂ emissions including emissions from generation of electricity used, 2010

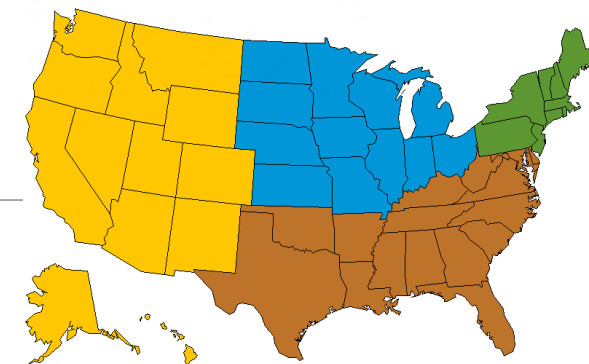
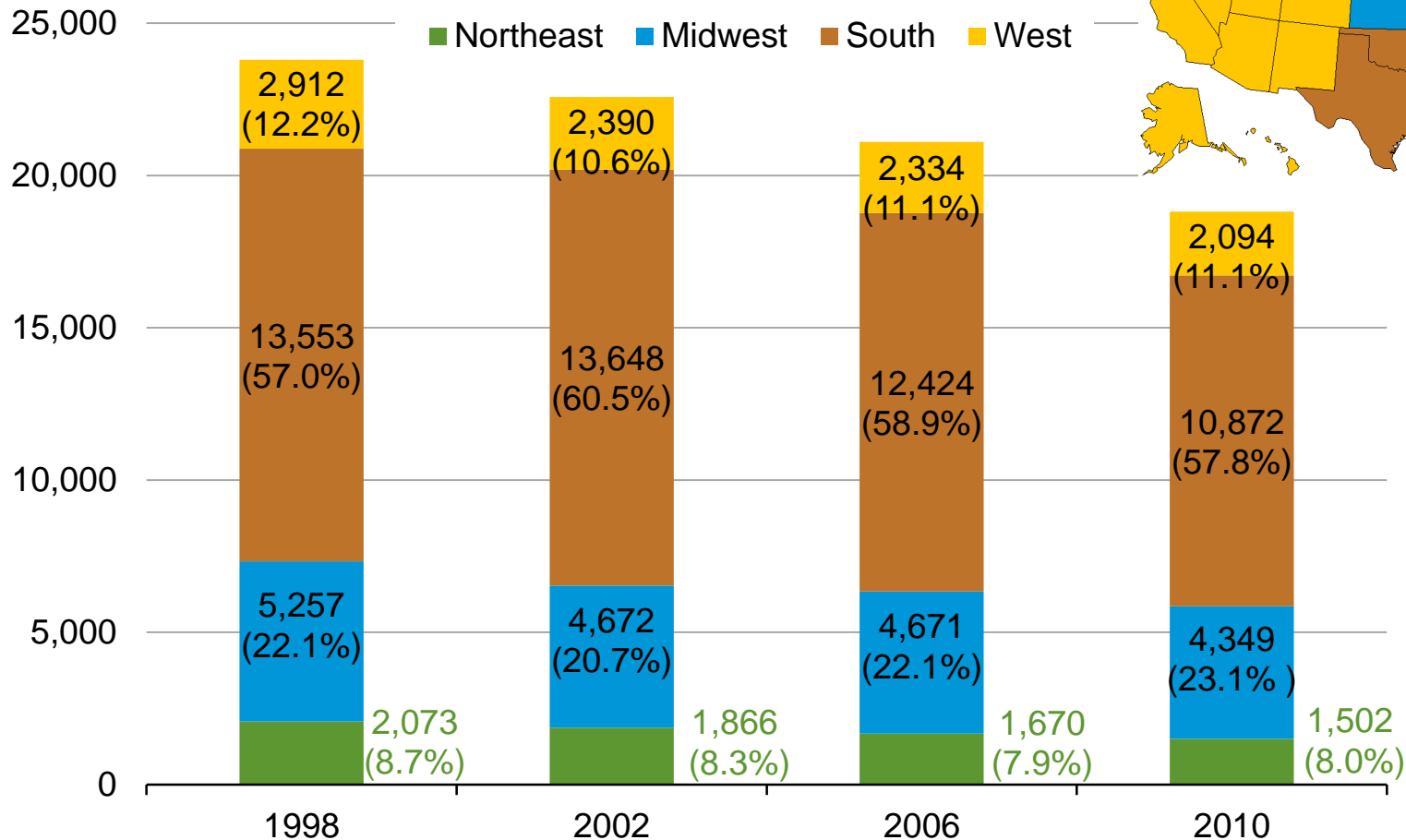
total: 1,176 million metric tons



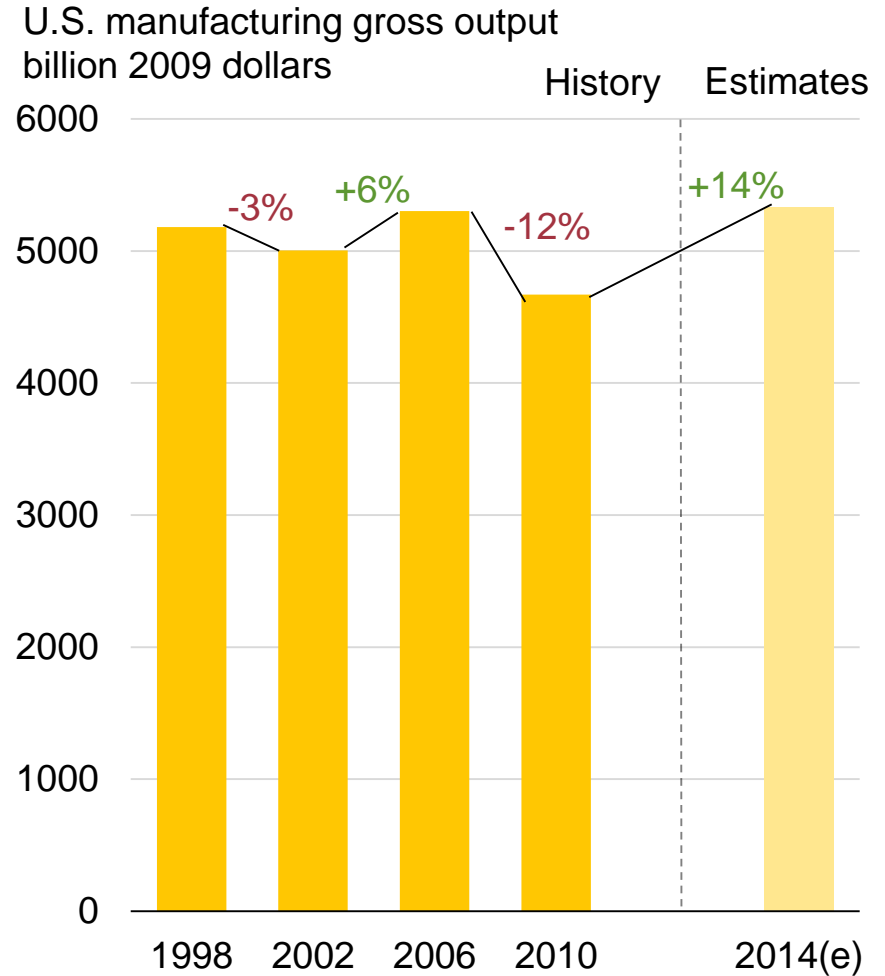
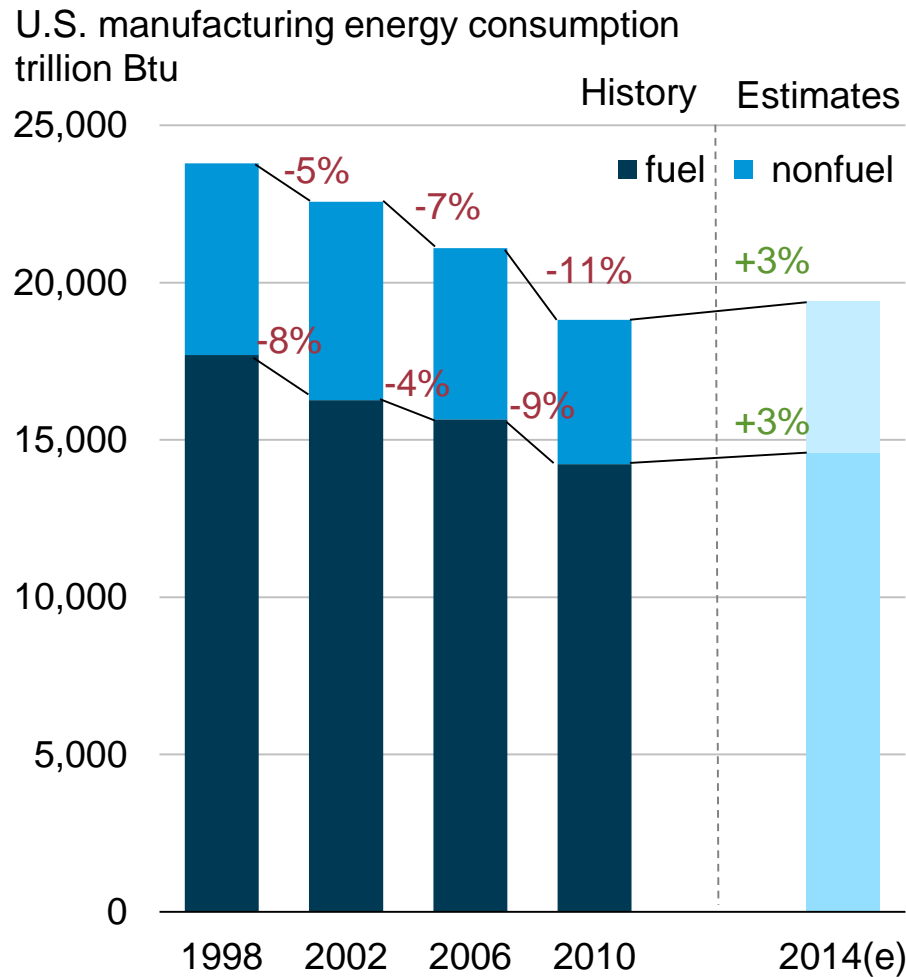
Note: to adjust for double counting, 1.5 quadrillion Btu are netted out of fuel consumption (MECS table 1.2)

Shares of manufacturing energy use by Census Region have held steady; the South dominates due to its concentration of energy-intensive refining, chemicals, and paper

U.S. manufacturing energy consumption
trillion Btu



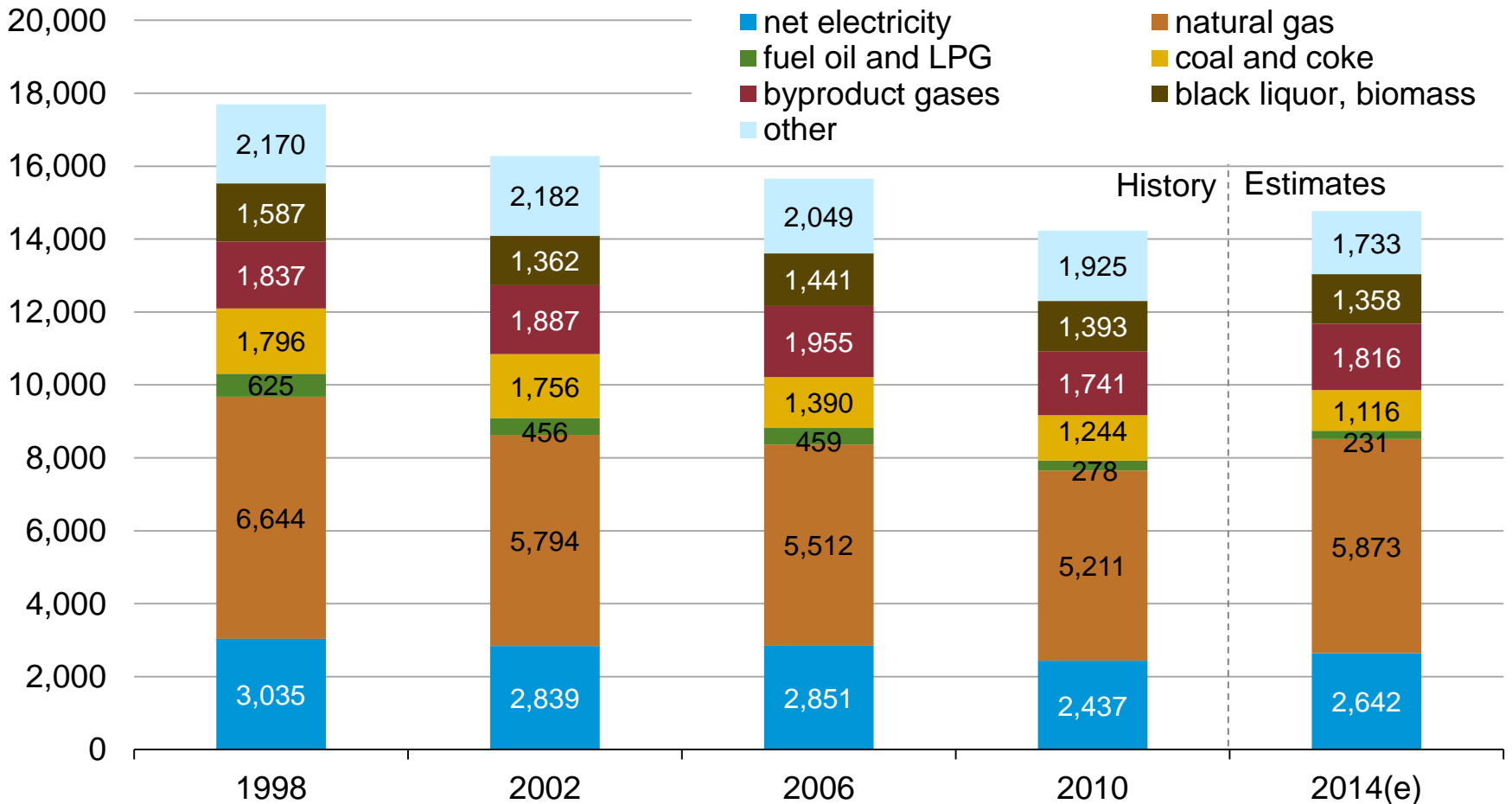
Manufacturing energy intensity has steadily declined since 1998



Note: data for 2014 are estimates using AEO2015 growth rates, except for output

Manufacturing fuel consumption has steadily declined; natural gas share has grown since 2006

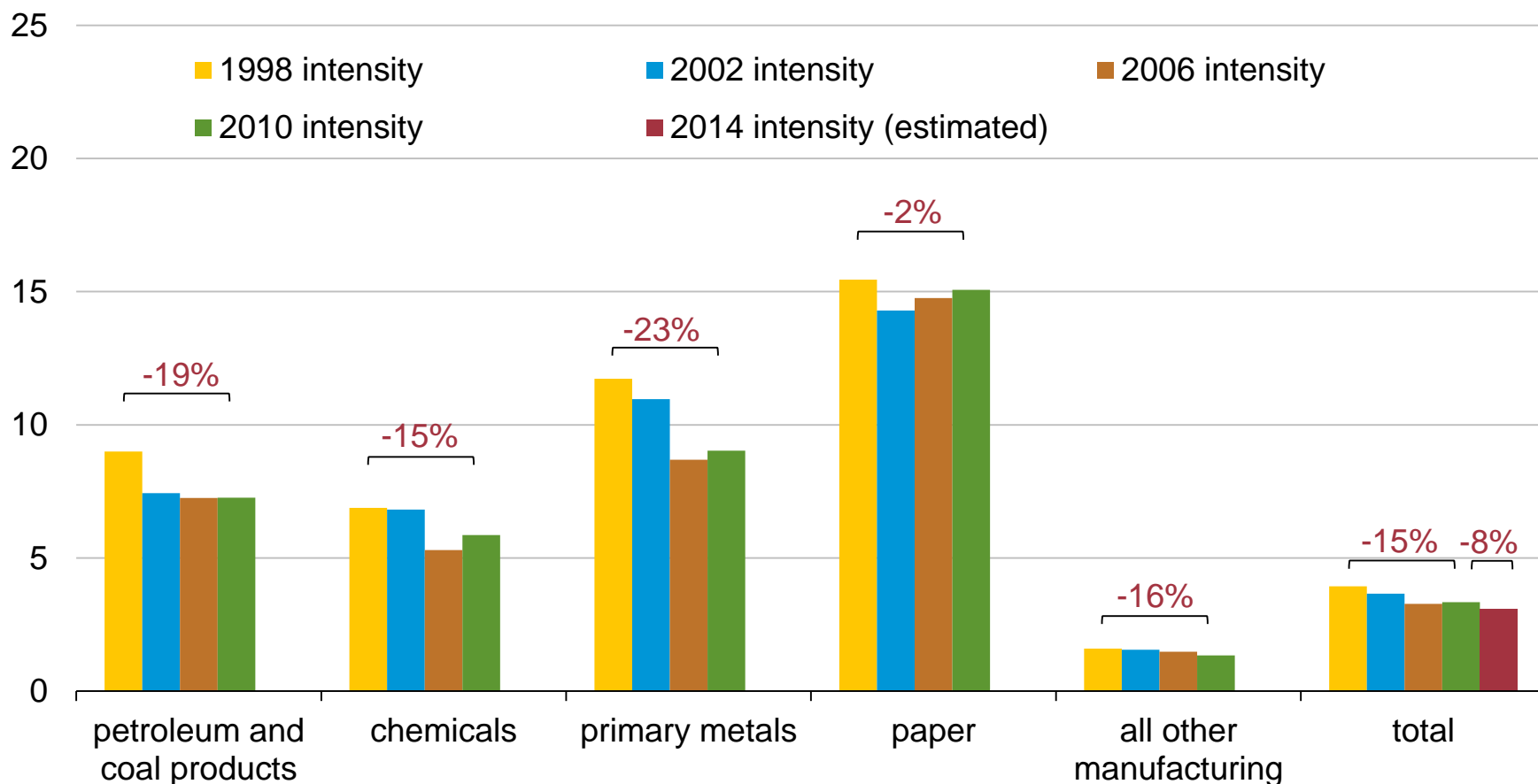
manufacturing fuel consumption
trillion Btu



Note: data for 2014 are estimates using AEO2015 growth rates

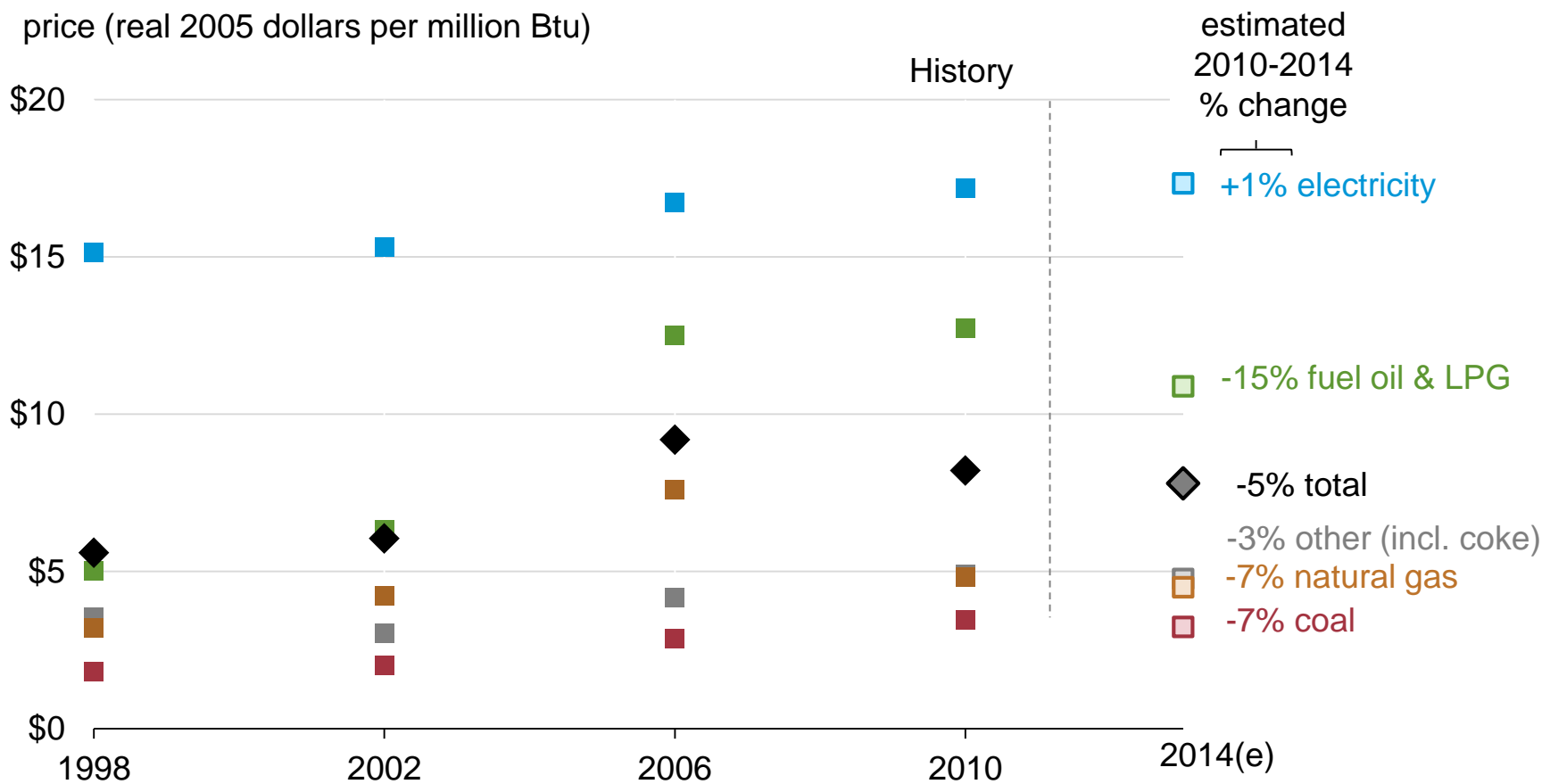
Fuel use intensity declined across all industries through 2006, but increased in chemicals, paper, and primary metals between 2006 and 2010

thousand Btu/2005\$ value of shipments



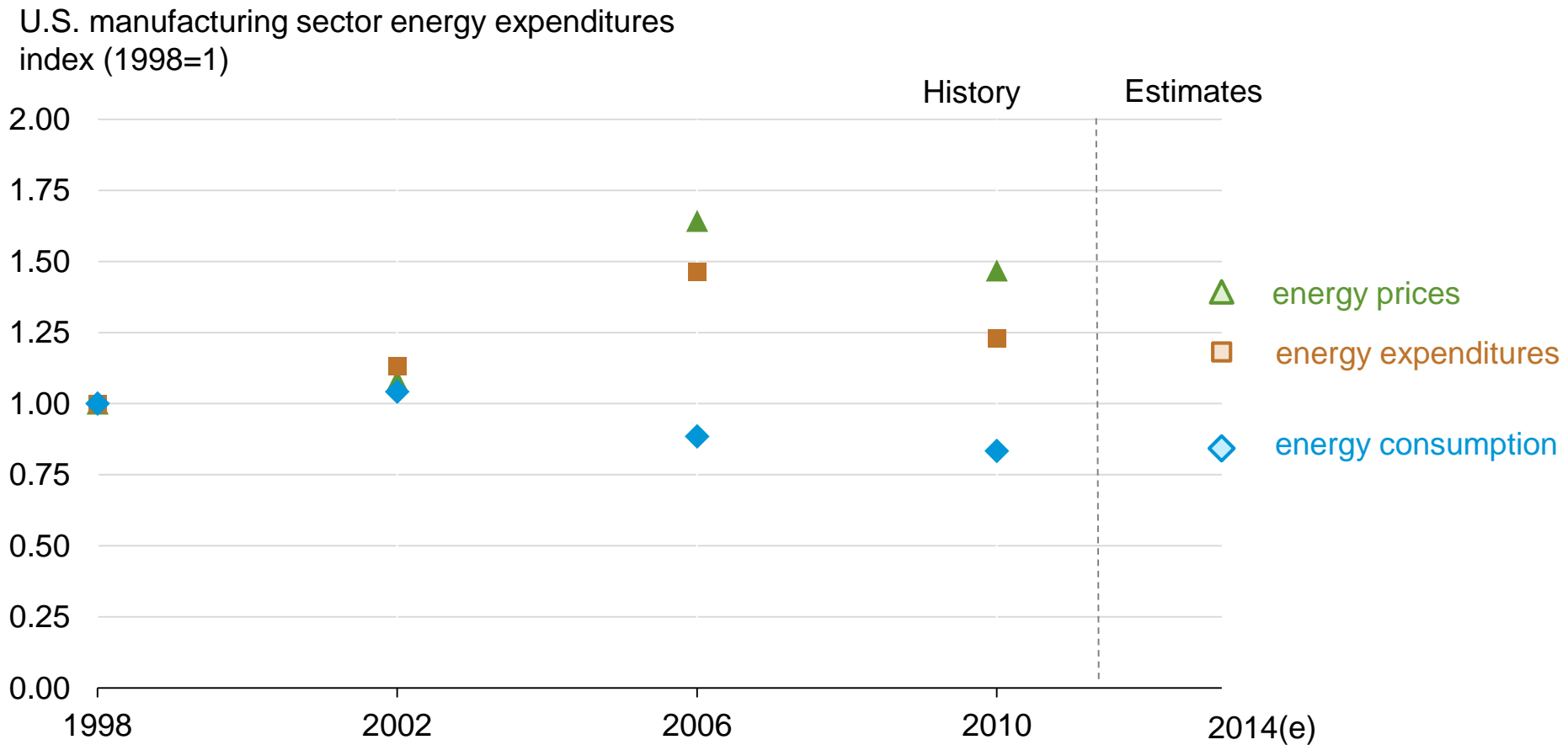
Note: data for 2014 are estimates using AEO2015 growth rates

Declining natural gas prices for manufacturers since 2006 counter a steady trend of higher prices



Note: data for 2014 are estimates using AEO2015 growth rates

Manufacturers energy expenditures declined faster than their energy use since 2006 as natural gas prices fell



Note: data for 2014 are estimates using AEO2015 growth rates

For more information

Subject matter experts for this presentation:

Tom Lorenz, Survey Manager, Manufacturing Energy Consumption Survey

Thomas.Lorenz@eia.gov, 202-586-3442

Elizabeth Sendich, Operations Research Analyst, Office of Energy Markets and Analysis

Elizabeth.Sendich@eia.gov, 202-586-7145

Bob Adler, Team Leader, Manufacturing and Transportation Statistics

Robert.Adler@eia.gov, 202-586-1136

Tom Leckey, Director, Office of Energy Consumption Statistics

Thomas.Leckey@eia.gov, 202-586-3548

Adam Sieminski, Administrator

Adam.Sieminski@eia.gov, 202-586-4361

Howard Gruenspecht, Deputy Administrator

Howard.Gruenspecht@eia.gov, 202-586-6351

Steve Harvey, Assistant Administrator for Energy Statistics

Stephen.Harvey@eia.gov, 202-586-6012



Advancing each generation.



Energy Efficiency's Role in Adapting to a New Manufacturing Energy Landscape

Better Buildings Summit

May 27 2015

Innovation leader in lightweight metals, products and solutions

- Founded in 1888; 200+ locations in 30 countries
- Revenue 2014: \$23.9 billion (+ 4%)
- Leader in delivering value-add products made from a range of lightweight metals and flat-rolled aluminum
- Inventors of the original aluminum process
- Member of the Dow Jones Sustainability Index for 12 consecutive years

Number of Employees (2014)	
U.S.	26,000
Europe	17,000
Other Americas	9,000
Pacific	7,000
	59,000



Downstream - EPS

- Alcoa Fastening Systems and Rings
- Alcoa Power & Propulsion
- Alcoa Wheel & Transportation Products
- Alcoa Building & Construction Systems
- Alcoa Forgings & Extrusions



Midstream - GRP

- Alcoa Global Packaging
- Aero, Transportation and Industrial
- China and Consumer Electronics



Upstream - GPP

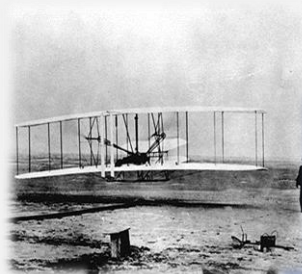
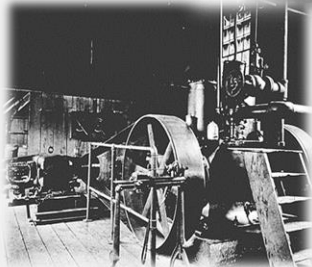
- Alcoa Mining
- Alcoa Refining
- Alcoa Smelting
- Alcoa Casting
- Alcoa Global Energy Assets

Transforming the business – Advancing each generation

Invented Aluminum

Aluminum Applications & Globalization

Multi-Material Solutions



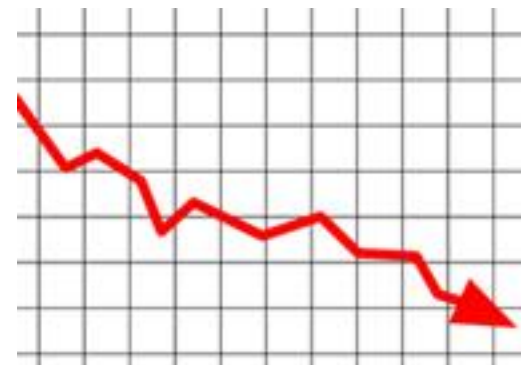
What's New in the Energy Universe....?

- **Energy Prices**
- **Focus on value creation**
- **Shorter horizons for projects**
- **Increased interest in sustainability**
- **Different view of energy**
- **Energy benefits of our products, during full life cycle**
- **Customer interest in energy use**



Energy Prices - downward trend

- Natural gas prices are lowest in years
- Electricity prices are low or stagnant
- Reducing natural gas use is more difficult to justify
- CHP can be more viable with low gas prices



Spend reduction and value creation is tracked carefully for all aspects of the business

Energy is a specific category

- Individual business targets are set
- Regular review of progress
- Businesses are held accountable



Energy and Sustainability – Clear Targets

TRANSFORMING

ALCOA SUSTAINABILITY REPORT 2014



Reducing Our Footprint

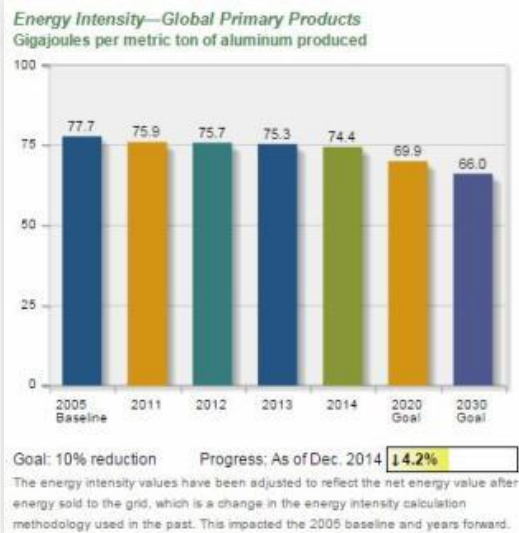
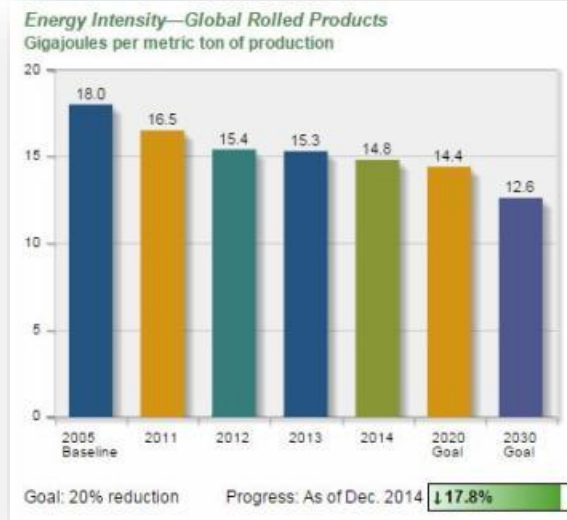
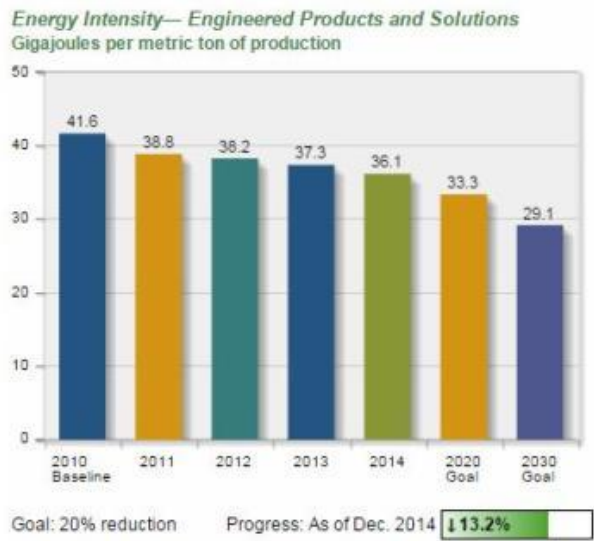


Efficient use of resources and effective control of emissions, waste, and land use drive improved environmental performance.

We have set the following long-term strategic targets to reduce energy use in all three of our business groups:

- From a 2005 baseline, a 10% reduction in the energy intensity of GPP by 2020; 15% by 2030; and
- A 20% reduction in the energy intensity of Global Rolled Products (GRP) and Engineered Products and Solutions (EPS) by 2020 from their baselines of 2005 and 2010, respectively; 30% by 2030.

Energy and Sustainability – Clear Targets, per Business



Designing sustainable products and solutions

- The global markets in which we compete are increasingly driven by significant challenges, including urbanization, climate change, and resource scarcity.
- Our inherently sustainable products are making significant contributions to the world by addressing those challenges.
- Lightweight, strong, durable, and recyclable, our products save energy and reduce greenhouse gas (GHG) emissions. They allow engines to run faster and hotter. They enable smart buildings, sustainable food and beverage packaging, high-performance defense vehicles, deeper oil and gas drilling, and more efficient power generation.



Thanks

EASTMAN



Growth in Sustainability Fuels Eastman's Energy Program

Sharon L. Nolen, PE, CEM
Better Buildings Summit
May 27, 2015

Who we are

EASTMAN

- A global specialty chemical company headquartered in Kingsport, Tennessee
- Approximately 15,000 employees and over 50 manufacturing sites around the globe
- Serving customers in approximately 100 countries
- A company dedicated to environmental stewardship, social responsibility and economic growth
- 2014 revenue of \$9.5 billion



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2015 World's
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the Ethisphere[®]
Institute



ENERGY STAR
AWARD 2015
PARTNER OF THE YEAR
Sustained Excellence

2015 ENERGY
STAR[®] Partner
of the Year
Sustained
Excellence
following 2012, 2013, and
2014 ENERGY STAR
Partner of the Year



Bloomberg
Businessweek

#7 in Bloomberg
Businessweek
Top 50



Proud Recipient of the Freedom Award
SGR[®]
EMPLOYER SUPPORT OF
THE GUARD AND RESERVE

2013 Secretary
of Defense
Employer
Support
Freedom Award



RESPONSIBLE CARE[®]
OUR COMMITMENT TO SUSTAINABILITY

2013
Responsible
Care[®] Company
of the Year –
large category

Sustainability

- The trend towards sustainability is being adopted as a business approach by organizations to maintain competitive positions
- At its core, Eastman's sustainability strategy is focused on identifying ways to reduce our environmental footprint while continuing to produce the products that our global customer base and consumers require
- Eastman became a signatory of the United Nations Global Compact and the first U.S.-based company to join Together for Sustainability last year

“At Eastman, sustainability serves as a lens for how we do business and encompasses the triple bottom line – environment, social and economic. Not only does sustainability influence the way we think; it determines the way we act. Without a doubt, our approach to sustainability is crucial to the future success and growth of Eastman.

Sustainability is about creating innovative products that help make the world a better place while driving improved cost and **energy efficiencies** throughout our operations.”

Mark Costa

Chairman and Chief Executive Officer



External commitments

- The drive to improve energy efficiency led Eastman to join two external programs that have industrial focus groups
- These programs offer many benefits and resources to help companies reduce energy use
- Public goals associated with membership increase the time, money, and focus dedicated to energy efficiency



DOE Better Plants Challenge Partner

- Became a Partner in 2010 and Challenge Partner in 2014
- Public pledge to reduce energy intensity 20% by 2020 with a baseline of 2008

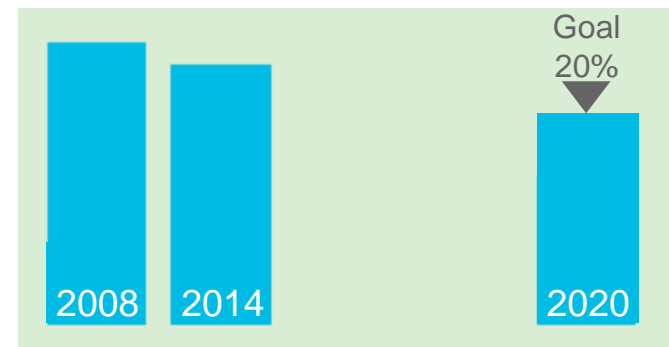


ENERGY STAR® Partner

- Eastman became an ENERGY STAR Partner in 2008
- Partner of the Year awards in 2012 and 2013
- Sustained Excellence awards in 2014 and 2015

Transparency in reporting

- External goals for energy intensity have led to more transparency in energy measures
- Calculation methodology has been reviewed internally and externally to validate approach
- Emphasis on improvement of normalized energy use
 - Remove impacts of production volume and weather
 - Ensure that models used are statistically valid



Employee awareness



- Energy program was originally only project-focused
- As employees hear more about sustainability and energy efficiency (both internally and externally), they've shown more interest in the energy management program
- Employee energy fairs have been held annually since 2011
- Site "Green Teams" have been established for many sites around the world

Energy efficiency products

- Outside trends to move towards more sustainable and energy efficient products drive consumer demand
- Eastman has many products that deliver improved energy efficiency for customers – examples include:
 - **Window films** that improve building HVAC efficiency and acoustics
 - **Tire additives** that decrease rolling resistance and increase life
 - **Non-phthalate plasticizers** that take less energy to manufacture
 - **BPA-free plastics** with lower processing energy requirements
- These products are among the fastest growing for the company

Eastman **TRITAN**[™]
copolyester



Eastman **CRYSTEX**[®]
insoluble sulfur



Eastman **168**[™]
non-phthalate plasticizer

EnerLogic[®] 

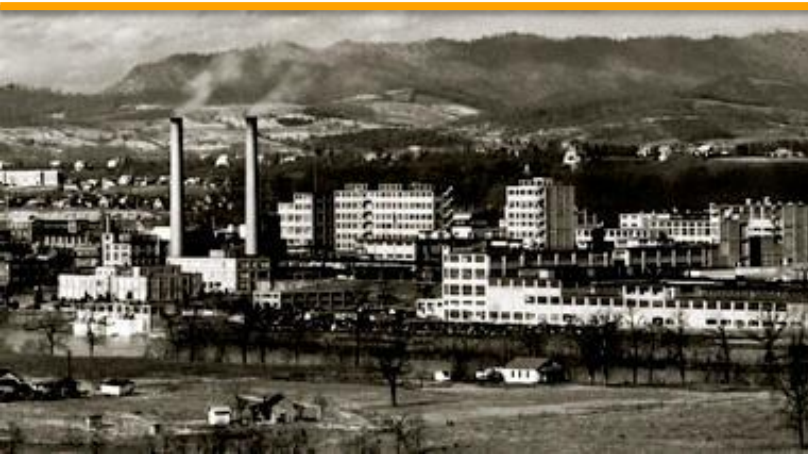
Added benefit for infrastructure

- Eastman's Tennessee Operations was founded in 1920 in Kingsport, Tennessee, at the edge of the Great Smoky Mountains
- Today, Tennessee Operations employs approximately 7,000 of Eastman's 15,000 employees and is one of the largest chemical manufacturing sites in North America
- Although the Kingsport site has grown significantly over time, energy efficiency has increased as well
- Efficiency gains have greatly reduced the need for additional utility infrastructure (generation and distribution to meet the sites' utility demand (e.g. steam, electricity, water, refrigeration))
- The last major capacity increase for the steam system was in 1993

~1940

Kingsport, TN Site

2015



EASTMAN



Questions?

Four years in a row!

Eastman has been named an **ENERGY STAR® Partner of the Year.**

Be a star. Help the planet.

Find out how at www.eastman.com/ENERGYSTAR.

