How Does OCTC Support Ohio’s Chemical Industry?
American Chemistry: The Cornerstone of our Economy

1. Actual production of chemicals
2. Chemicals used to produce raw materials or intermediate inputs for other industries
3. Chemicals used to manufacture products and other goods
4. Wholesale, retail and services industries based on chemistry-derived products
Why Do We Need the Chemical Industry?

- Agriculture
- Automotive & Aerospace
- Construction
- Environment
- Food
- Hygiene & Health
- Painting & Coating
- Petrochemical
- Pharmaceuticals
- Sustainable Energy Solutions
Business of Chemistry
By the Numbers
U.S. Chemistry
BY THE NUMBERS

Chemistry is essential to our economy & plays a vital role in the creation of ground-breaking products that make our lives healthier, safer, more sustainable & more productive.
Ohio chemistry...

At $34.1B, is the 2nd largest manufacturing industry in the state

Makes Ohio the 6th largest chemistry producing state

Provides 43,650 direct jobs and another 59,170 related jobs

Generates $3.5B in payroll across 691 establishments

Has an average wage of $80,620, 39% higher than the average manufacturing wage

Generates $321M in state & local taxes, and $1B in federal taxes

Invests $1.1B to build & update equipment and facilities

Ships $6.5B in products to customers around the world

Generates an additional 55,960 jobs in plastics & rubber products

American Chemistry Council
RESponsible Care®
Our Commitment to Sustainability
americanchemistry.com
New Investment in Chemical and Plastics Capacity
Building began as early as 2010 with small projects to increase ethane utilization.

As of late-November, ACC is tracking 281 projects valued at $168B.

61% of projects are foreign or include a foreign partner.

Additional projects in Canada and Mexico.

In addition, ACC is tracking more than 600 plastic processor projects.
Cumulative Announced Chemical Industry Investments from Shale Gas

Source: ACC analysis, December 2010 - December 2016
Access to vast, new supplies of natural gas and natural gas liquids from shale formations is one of the most dramatic domestic energy developments in the last 50 years. The economics of shale gas have created a competitive advantage for U.S. petrochemical manufacturers that is leading to greater U.S. investment and industry growth.

Since 2010, the American Chemistry Council has been tracking announcements to build new chemical manufacturing facilities or expand capacity in the United States. As of October 2016, $6.9 BILLION of the potential investment is destined for Ohio.

In Ohio, the new investment will generate $4.9 BILLION in additional chemical industry output and support 17,710 permanent new jobs by 2023 in the chemical industry and throughout the supply chain in everything from trade and craft jobs to highly-skilled knowledge workers.

More than $1.3 BILLION in wages will go into the pockets of Ohio workers, generating nearly $167 MILLION in state tax revenue and more than $319 MILLION in federal revenue.

**NEW INVESTMENT**

- $6.9 billion capital investment
- 9 chemical industry projects due to shale gas

**PERMANENT ECONOMIC IMPACTS**

(ongoing production)

- $5 billion in industry revenue
- $167 million in Ohio tax revenue
- 17,710 Ohio jobs
- $1.3 billion in worker wages

**WHY OHIO?**

- 6th largest chemical producing state in the U.S.
- $34 billion in revenue
- and more than 43,600 Ohio jobs
- considerable shale gas deposits
- access to the Great Lakes within 500 miles of U.S. industrial base
- excellent universities
- major rail systems

www.americanchemistry.com
October 2016
Ohio has nearly $7 billion in proposed projects

<table>
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<tr>
<th>Effect</th>
<th>Jobs</th>
<th>Payroll ($ Billion)</th>
<th>Output ($ Billion)</th>
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<tr>
<td>Direct Effect</td>
<td>4,060</td>
<td>$0.5</td>
<td>$5.0</td>
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<tr>
<td>Indirect Effect</td>
<td>7,080</td>
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<td>$2.0</td>
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<td>Induced Effect</td>
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<td>$0.9</td>
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<tr>
<td>Total Effect</td>
<td>17,715</td>
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And during peak year of construction...

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<tr>
<th>Effect</th>
<th>Jobs</th>
<th>Payroll ($ Billion)</th>
<th>Output ($ Billion)</th>
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<tr>
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<td>$0.7</td>
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<td>Induced Effect</td>
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<td>Total Effect</td>
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<td>$1.3</td>
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<table>
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<tr>
<th>Category</th>
<th>Jobs</th>
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<tbody>
<tr>
<td>Plant Operators</td>
<td>640</td>
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<tr>
<td>Other Production Workers</td>
<td>1,630</td>
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<tr>
<td>Maintenance &amp; Logistics</td>
<td>1,005</td>
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<tr>
<td>Engineers &amp; Technicians</td>
<td>235</td>
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<td>Scientists</td>
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<td>Management</td>
<td>110</td>
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<tr>
<td>Office &amp; Administration</td>
<td>105</td>
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<tr>
<td>Sales, Finance &amp; Other</td>
<td>120</td>
</tr>
<tr>
<td><strong>Total Jobs</strong></td>
<td><strong>4,060</strong></td>
</tr>
</tbody>
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Plastics Processor Projects

• ACC is tracking nearly 600 plastics processor projects.
  • 30% New Construction
  • 70% Expansions
    – Adding capacity
    – New lines
    – New equipment

• Since June 2012, plastics processor projects have been announced by over 500 companies in over 40 states.

Source: Plastics News, ACC analysis

NOTE: The data is based on publicly available information, which is believed to be accurate, but have not been independently verified by ACC.
Announced Plastics Processor Projects by State

Announcements since June 2012
Source: Plastics News, ACC analysis

NOTE: The data is based on publicly available information, which is believed to be accurate, but have not been independently verified by ACC.

Updated -8/1/16

Ohio is third in projects

Announced Projects

- 40+
- 30-39
- 20-29
- 10-19
- 5-9
- 1-4
- 0

Note: 1 project has been announced in AK; none in HI (not shown)
Today’s plastics can help architects, owner/managers and specifiers to meet sustainability goals for new and retrofit building solutions in commercial, residential and infrastructure construction. Advanced continuous insulation, sealants, windows, doors, siding, flooring, roofing, foundations, decking, and piping made with advanced plastics can dramatically improve energy efficiency, reduce waste and CO₂ emissions and help us to do more with less... This is building with the power of plastics.

**Energy Use Reductions**
- Continuous rigid or spray foam plastic insulation can help achieve up to 50% energy savings. Spray foam and sealants block energy-wasting air-loss, saving up to 20% on heating and cooling energy costs.+
- Plastic housewrap and sealants can reduce the infiltration of outside air into the average home by 10 to 50 percent reducing energy needs.
- Polycarbonate or acrylic skylight glazing can capture natural daylight, reducing artificial lighting consumption in commercial buildings by up to 50 percent.
- Insulated concrete foundations provide the benefits of concrete with built-in layers of foam insulation inside and outside the wall. Plastic extends the life of the concrete foundation by diminishing rot and pest.

**CO₂ Reduction**
- Vinyl window frames require three times less energy to manufacture than aluminum window frames, saving the U.S. 2 trillion Btu’s and its associated emissions in one year.
- Spray foam (SPF) roofing systems can reduce the time and labor of old-roof tear-offs, reducing landfill waste and the energy and emissions needed to remove and haul the debris.

**Waste Reduction**
- Recycled content in roofing, decking, flooring and carpeting and padding create material efficiencies and reduce energy use and waste with equal product performance and maintenance.
- Plastic pipe sprinkler systems help prevent fires, plus corrosion resistance helps assure longer performance life.

**Material Use Reduction**
- Polystyrene beads in concrete reduce weight and improve poured concrete’s flexural strength, helping to resist crack-propagation.
- Plastic insulated electrical and communications wiring can be inherently fire retardant plastic. The durability of plastic electrical components helps products last a long time.

Plastic can be an effective and continuous air and vapor retarder, reducing material deterioration and structural damage.

* Savings vary. Find out why in the seller’s fact sheet on R-values. Higher R-values mean greater insulating power.
PLASTICS IN AUTOMOTIVE

REDUCING A VEHICLE'S WEIGHT BY

10%

CAN IMPROVE THE FUEL ECONOMY OF THE VEHICLE BY

6-8%

IF JUST ONE QUARTER OF THE LIGHT-DUTY VEHICLES IN THE U.S. USED LIGHTWEIGHT COMPONENTS AND HIGH-EFFICIENCY ENGINES, WE COULD SAVE MORE THAN 5 BILLION GALLONS OF FUEL ANNUALLY BY 2030

= 5 BILLION

CARBON FIBER HAS THE POTENTIAL TO REDUCE THE WEIGHT OF SOME VEHICLE COMPONENTS BY 75 PERCENT

CF PLASTIC COMPOSITES CAN ABSORB UP TO 12 TIMES THE CRUSH ENERGY OF STEEL

THE USE OF ADVANCED PLASTICS AND COMPOSITES IN AUTOMOTIVE HAS DOUBLED IN THE LAST 20 YEARS

TODAY'S PLASTICS TYPICALLY MAKE UP 50% OF THE VOLUME OF A NEW LIGHT VEHICLE BUT LESS THAN 10% OF ITS WEIGHT, WHICH HELPS MAKE CARS LIGHTER & MORE FUEL EFFICIENT, RESULTING IN LOWER GREENHOUSE GAS EMISSIONS

CARBON-FIBER [PLASTIC] COMPOSITES COULD... IMPROVE FUEL EFFICIENCY BY ABOUT 35% WITHOUT COMPROMISING PERFORMANCE OR SAFETY.

THESE ADVANCED LIGHTWEIGHT PARTS ARE ESSENTIAL TO HELPING MANUFACTURERS REDUCE VEHICLE MASS AND ACHIEVE INCREASED FUEL ECONOMY STANDARDS BY THE YEAR 2025
APPALACHIAN REGION COULD BECOME A PETROCHEMICALS & PLASTICS MANUFACTURING HUB

SHALE-RELATED INVESTMENT COULD GENERATE NEW JOBS, WAGES, AND TAX REVENUE

NEW ACC REPORT

Report examines the potential economic impacts of new petrochemicals and plastics manufacturing capacity in the quad-state region of West Virginia, Pennsylvania, Ohio, and Kentucky. Abundant and affordable energy raw materials from shale formations are attracting new investment.

POTENTIAL ECONOMIC BENEFITS OF AN APPALACHIAN PETROCHEMICAL INDUSTRY*
(Permanent, by 2025)

- **$36 billion** in capital investment
  - $32.4 billion in petrochemicals, resins, and derivatives
  - $3.4 billion in plastics products

- **101 thousand** jobs created & supported
  - 68,706 direct + indirect jobs
  - 32,112 payroll-induced jobs in local communities

- **$28 billion** economic expansion
  - $23.0 billion in chemicals + plastic resins
  - $5.4 billion in plastics compounding + plastics products

- **$2.9 billion** in tax revenues annually
  - $1.7 billion in federal tax revenues
  - $1.2 billion in state & local tax revenues

NEW ENERGY INFRASTRUCTURE

- Natural gas liquids (NGLs) such as ethane and propane are key feedstocks for chemical making in the United States.
- Developing a robust Appalachian chemical and plastics industry will require a storage facility and pipeline network for NGLs and chemicals.
- A timely and efficient regulatory permitting process is essential.

POLICY PRIORITIES

- Uncertainty around financing is a key barrier to the development of Appalachian energy infrastructure. Policymakers can help by affirming that NGL storage and distribution projects are eligible for existing private-public financing programs.
- As Congress and the Administration consider infrastructure modernization legislation, the Appalachian Hub must be a priority.
- The Appalachian Ethane Storage Hub Study Act of 2017 will inform efforts to maximize America’s domestic energy and manufacturing potential.

*ACC’s report presents a hypothetical scenario that includes five ethane crackers and two propane dehydrogenation facilities. Three of the crackers would produce polyethylene and two would supply downstream petrochemical derivatives. Each PDH facility would contain a polypropylene resin plant. These capital investments are underway and will likely continue through the mid-2020s.

www.americanchemistry.com/Appalachian-Petrochem-Study
OCTC Members
Questions?

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