
Chemical Industry Overview ... and Opportunities for P-Tech Grads

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NAPTA ISC IX
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Agenda

- Who is INEOS?
- Workforce “Perfect Storm” Context
- Industry Overview
- Workforce Implications and Opportunities
 - » Collaborate – Innovate - Advocate
- Summary

Who is INEOS?

INEOS AT A GLANCE

EMPLOYEES

19,000



HERITAGE

AMOCO, BASF,
BAYER, BOREALIS, BP,
DEGUSSA, DOW, DEA, DONG
ENERGY, ENICHEM,
ERDÖLCHEMIE, HOECHST,
ICI, INNOVENE, LANXESS,
MONSANTO, NORSK HYDRO,
SOLVAY

PRODUCTION



SITES

171 sites in 24
countries

TURNOVER

**\$60
BILLION**

INEOS O&P USA AT A GLANCE

BUSINESS

MANUFACTURER OF OLEFINS,
HIGH DENSITY POLYETHYLENE,
HIGH DENSITY POLYETHYLENE
PIPE AND POLYPROPYLENE



TURNOVER

**\$3.1
BILLION**

PERSONNEL



VOLUME

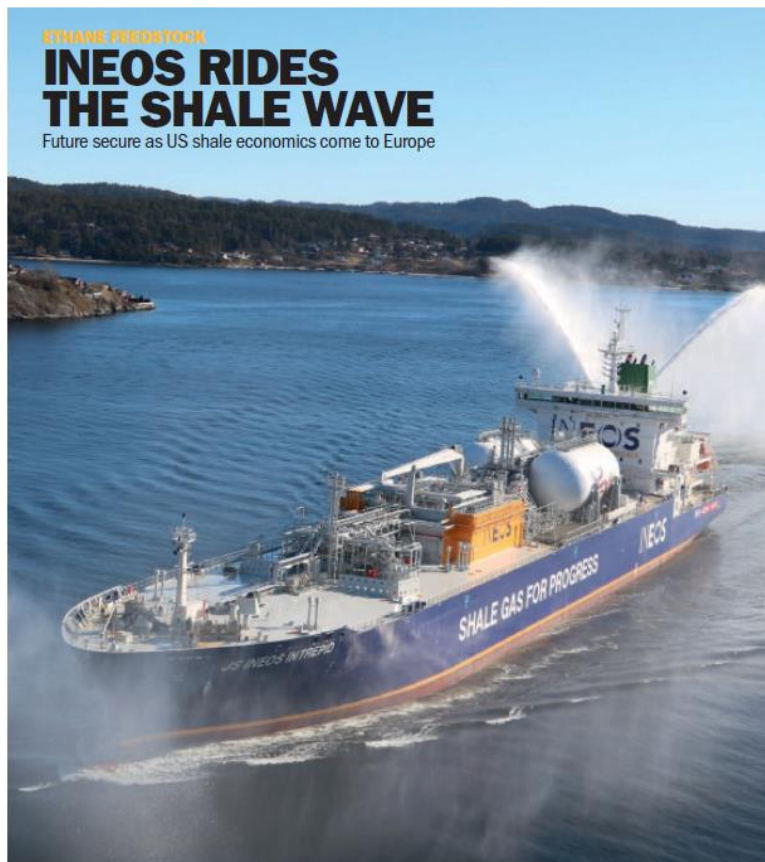
**9.1+ BILLION
POUNDS**

OF ETHYLENE, PROPYLENE,
BUTADIENE, CRUDE, BENZENE,
HIGH DENSITY POLYETHYLENE,
HDPE PIPE AND POLYPROPYLENE

PEDIGREE

AMOCO
ARCO
BP
SOLVAY
WL PLASTICS

Who is INEOS? - Recent Developments



\$2B U.S. Shale gas to Europe via
“virtual pipeline” of 8 Dragon Class
Ships 60,000bbl super-cooled
ethane/day



Europe: Oxides,
PDH, Olefins, Oil & Gas



U.S.: LAO, Cogen,
HDPE, Up/Downstream



Automotive
Division



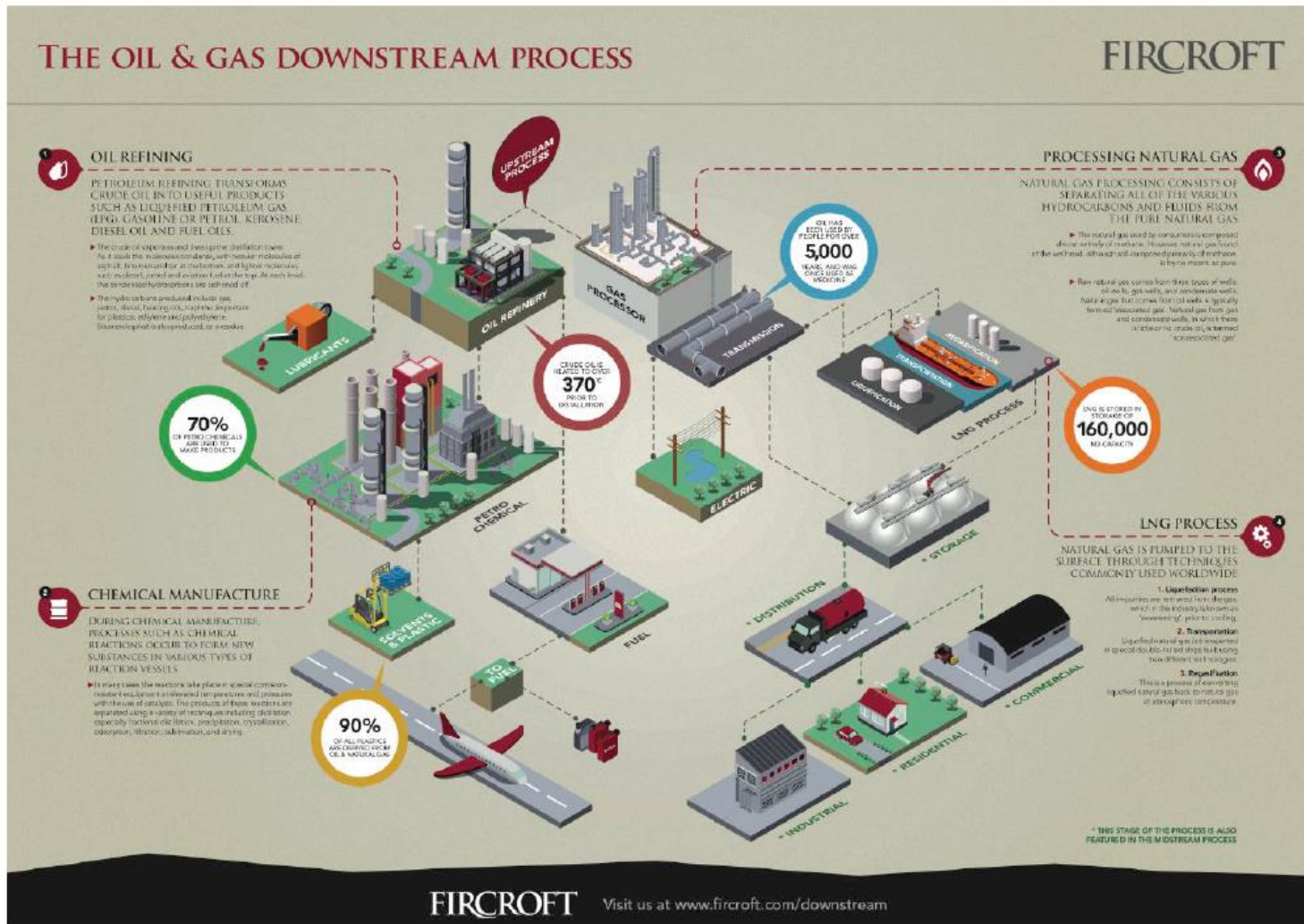
America's Cup

Workforce Words of Wisdom...

“The fate of empires
depends on the
education of youth.”

– Aristotle, Greek philosopher

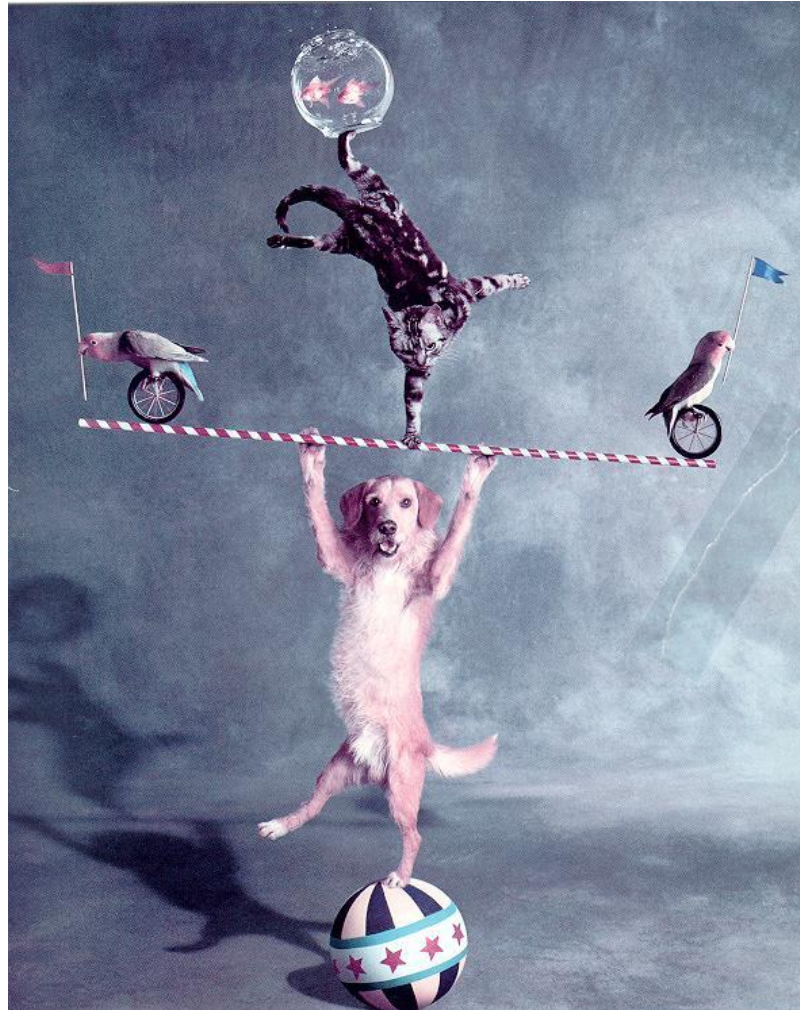
Petro-what?...



Workforce Development “Perfect Storm”

- Challenges:
 - Shale Gas Development: *Manufacturing Renaissance*
 - Aging of the Workforce – Retirements
 - Competition – Projects and Operations (all industries)
 - Implications of Harvey, Irma, Maria, Florence
 - Inadequate Supply of Skilled Candidates - 40% of Positions are “Middle Skills”
 - “Leaky Pipeline”
 - Mfg/Energy/Chemical Industry misperceptions:
 - 86% support; only 1/3 encourage children to work in it
- Opportunities:
 - Texas Education Legislation - Grade 8 Career Path
 - Industry & Education Communities Motivated
 - Under-represented: Minorities, Women, Vets
 - More of both Millennials & Gen X-ers than Baby Boomers in Labor Force

Lots of Opportunity... but comes with Challenges

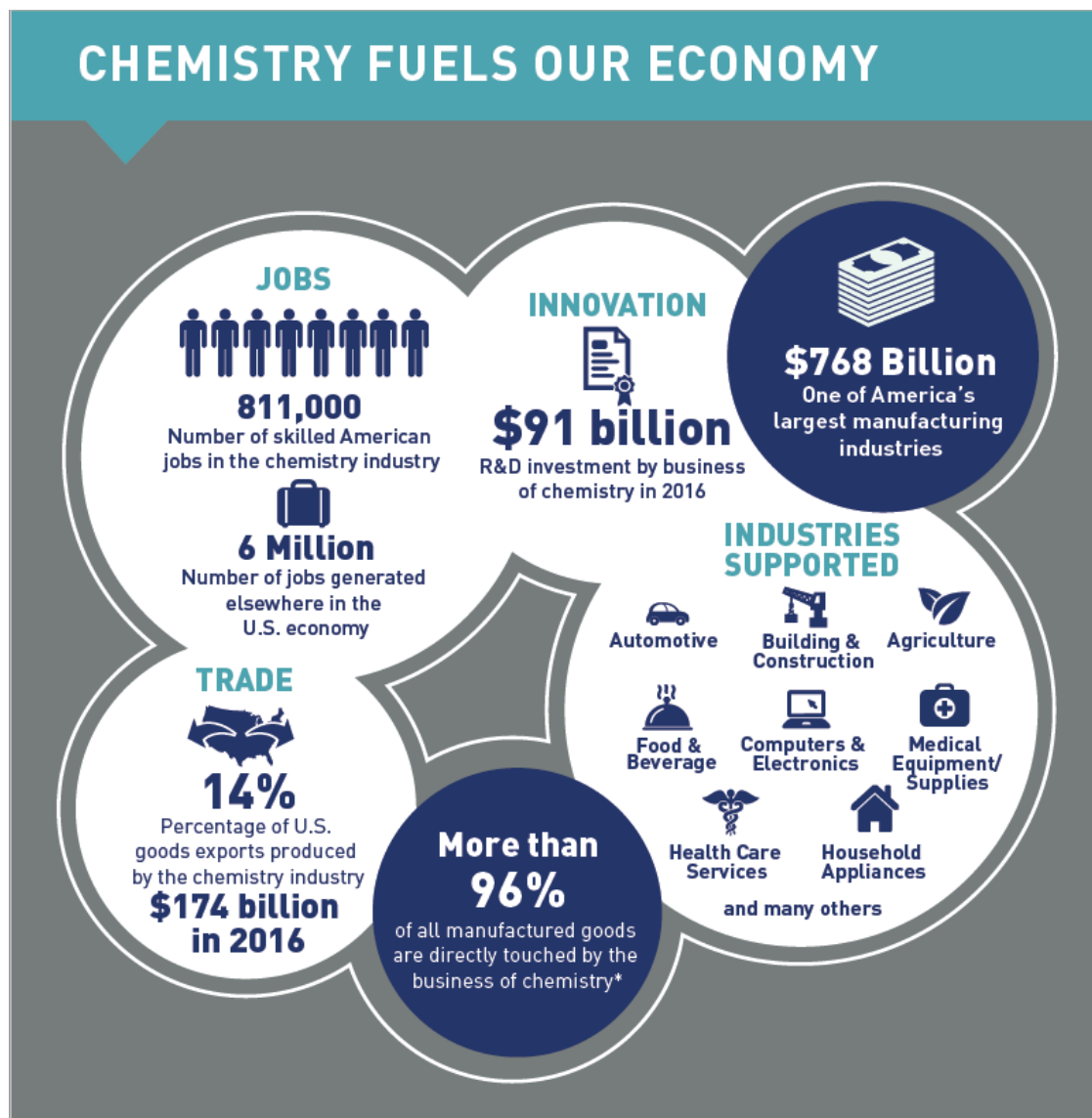


The Business of Chemistry

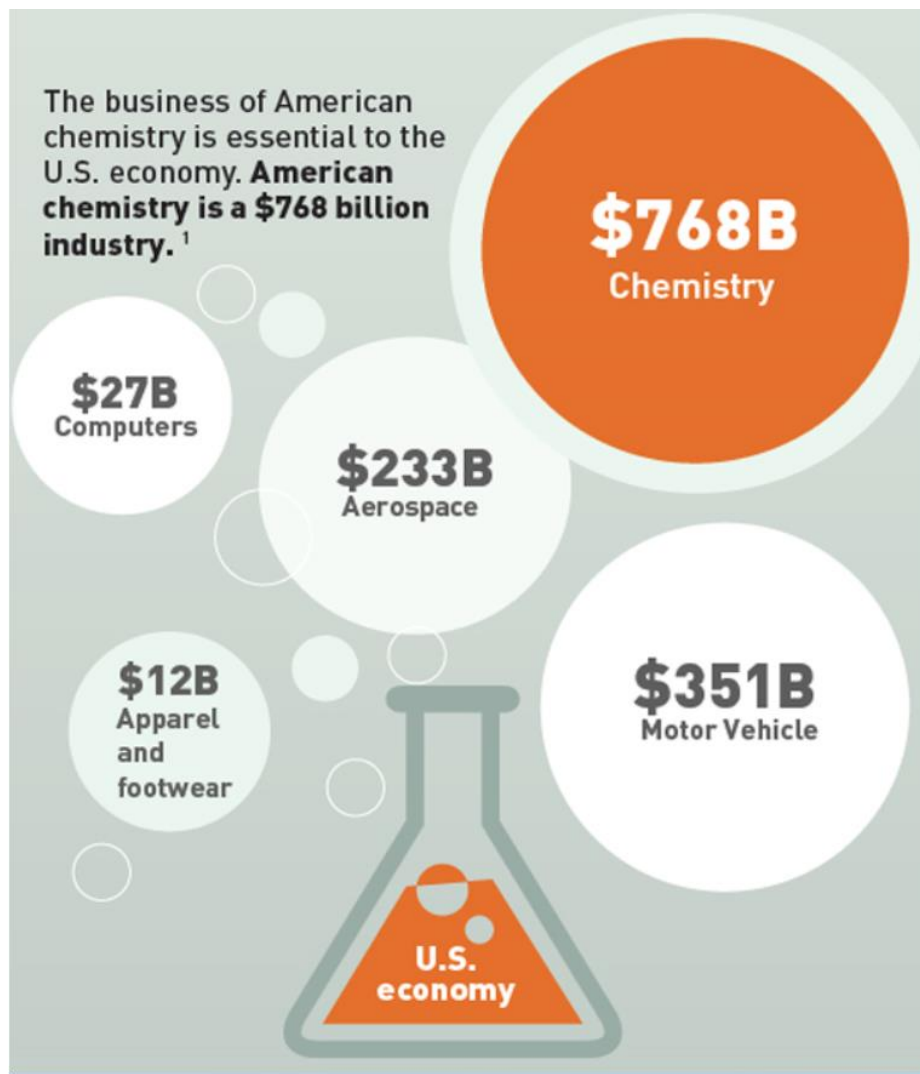


- Stats:
 - 811,000 people employed
 - Average Annual Pay @ \$94,000
 - 6.3 Job Multiplier ~ 6 million Jobs
 - \$800B Revenue
 - Supports ~25% US GDP
 - 96% of all manufactured goods touched
 - \$202B for 333 Projects (since 2010)
 - 53% Complete or in Construction
 - 786,000 total jobs
- Make the world healthier, safer, more productive and more sustainable

Industry Impact

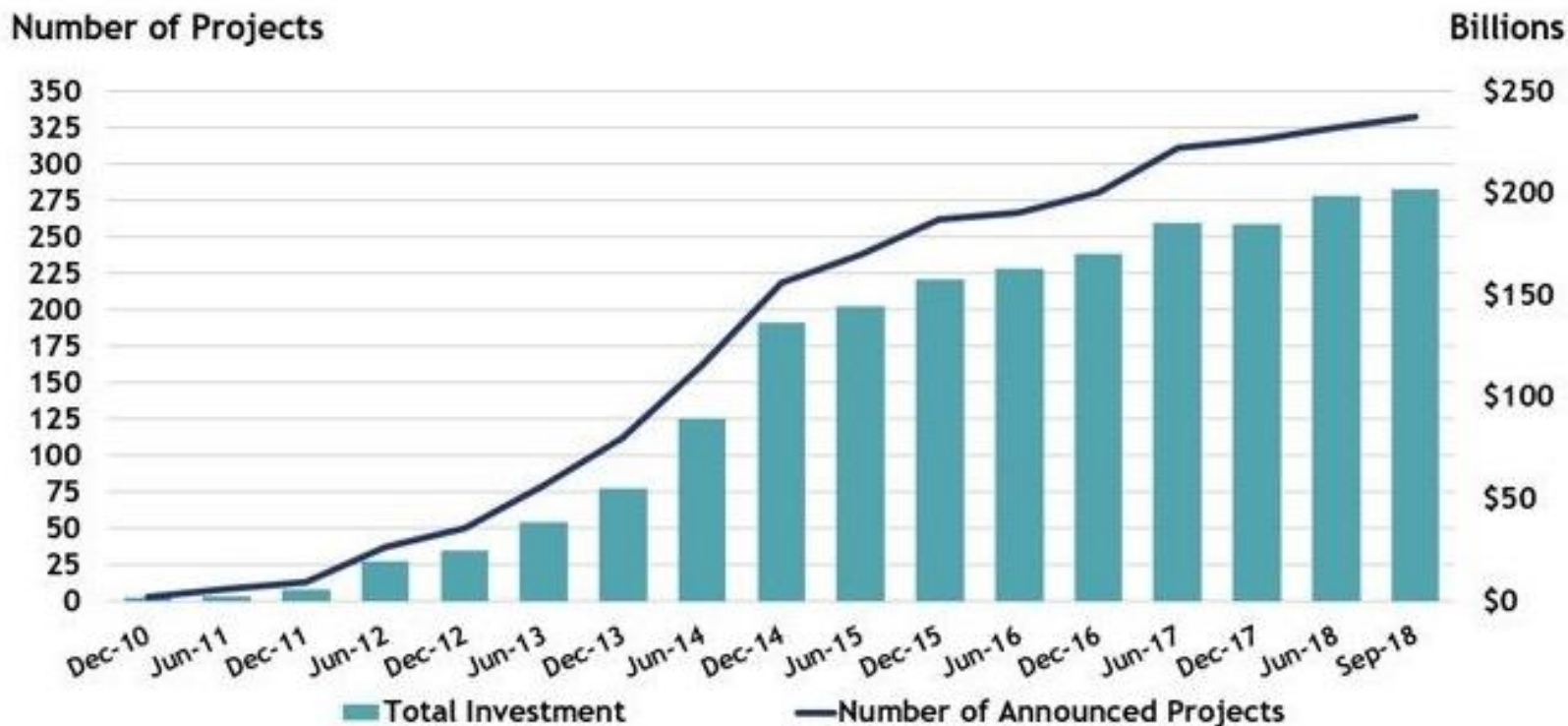


Industry...Careers



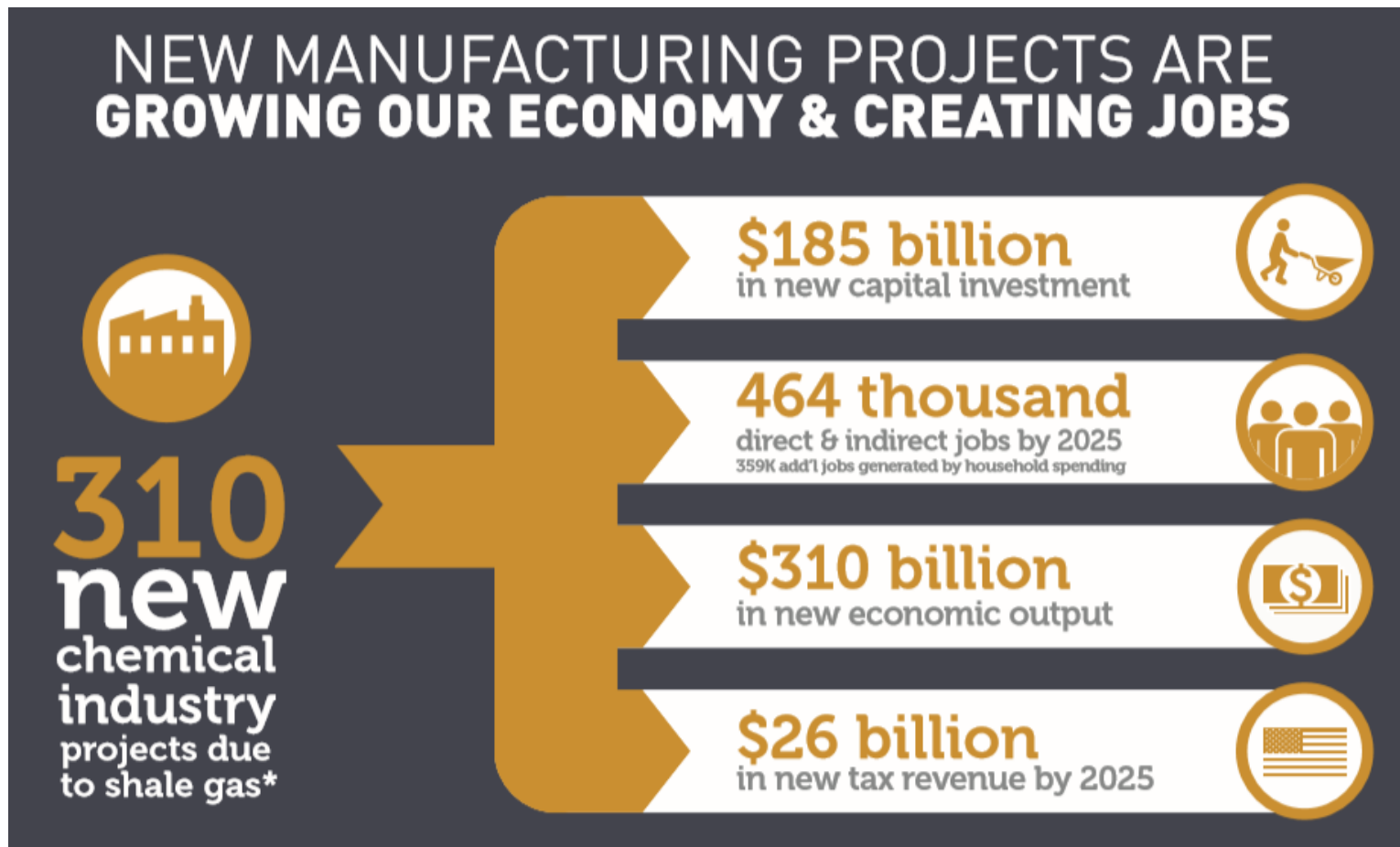
Chemicals Growth (since 2010)

Cumulative Announced Chemical Industry Investments from Shale Gas



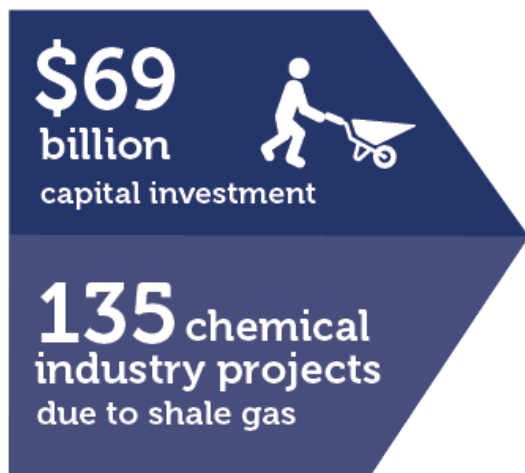
Source: ACC analysis

Chemicals Growth (since 2010)

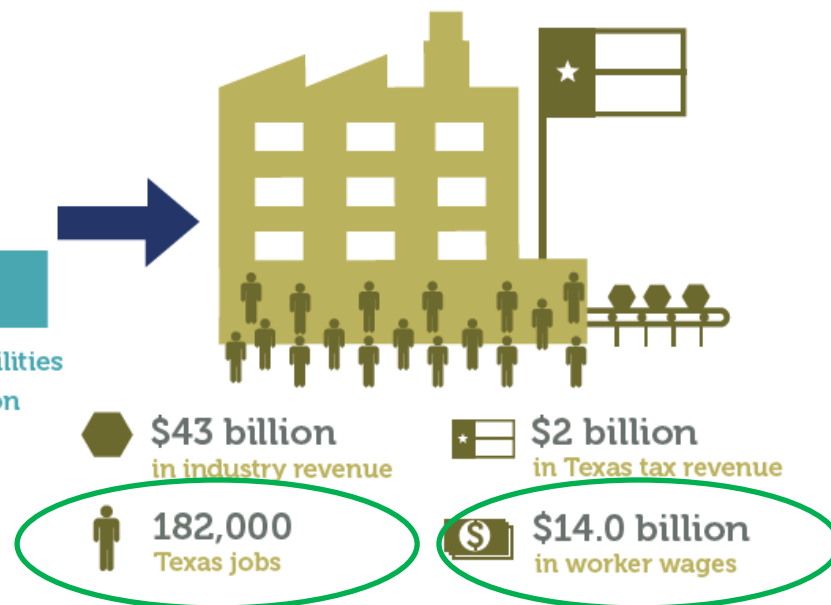


52% Complete or in Construction

NEW INVESTMENT

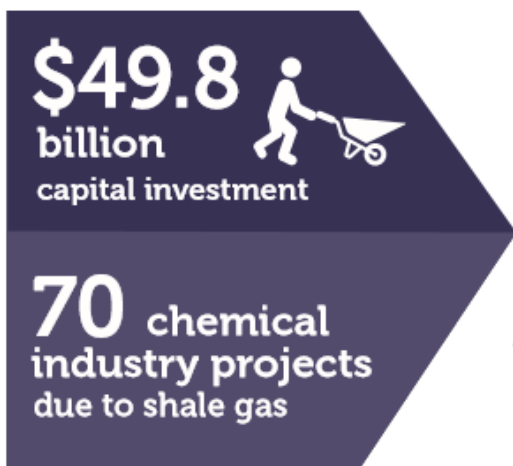


PERMANENT ECONOMIC IMPACTS (ongoing production)



* 2010 – 2018 announcements for new
or expanded capacity

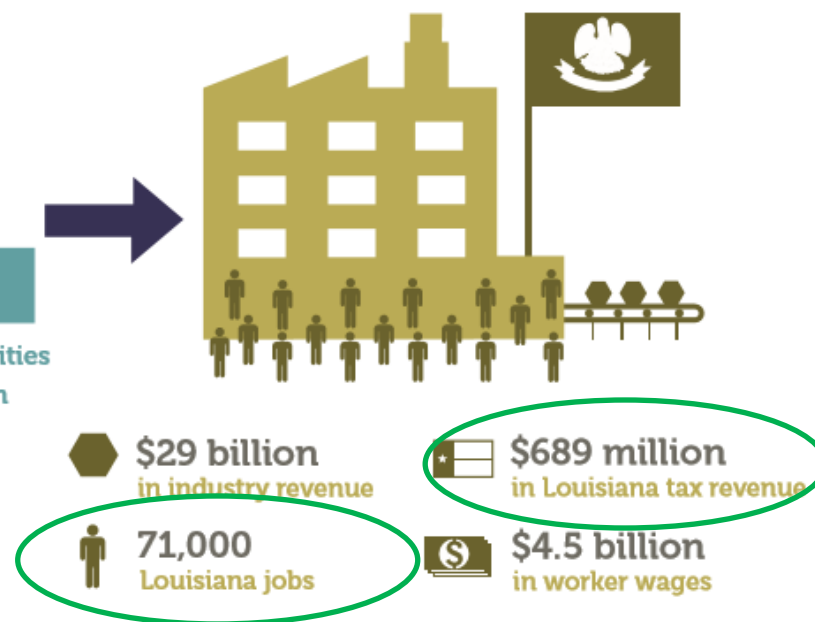
NEW INVESTMENT *



* 2010 – 2016 announcements for new
or expanded capacity



PERMANENT ECONOMIC IMPACTS (ongoing production)



New Opportunities – Appalachia



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

Headlines



Global petrochemicals growth shifts from Middle East to Gulf Coast

Houston Chronicle April 12, 2018



U.S. Chemical Investment Linked to Shale Gas: \$202 Billion and Counting

American Chemistry Council September 2018

Exporters rush to build Gulf Coast Oil terminals

Houston Chronicle 9/9/18

Turnover of Millennials and Other Workers Challenge North American Chemical Companies as Retirement Surge Looms
Accenture June 2018

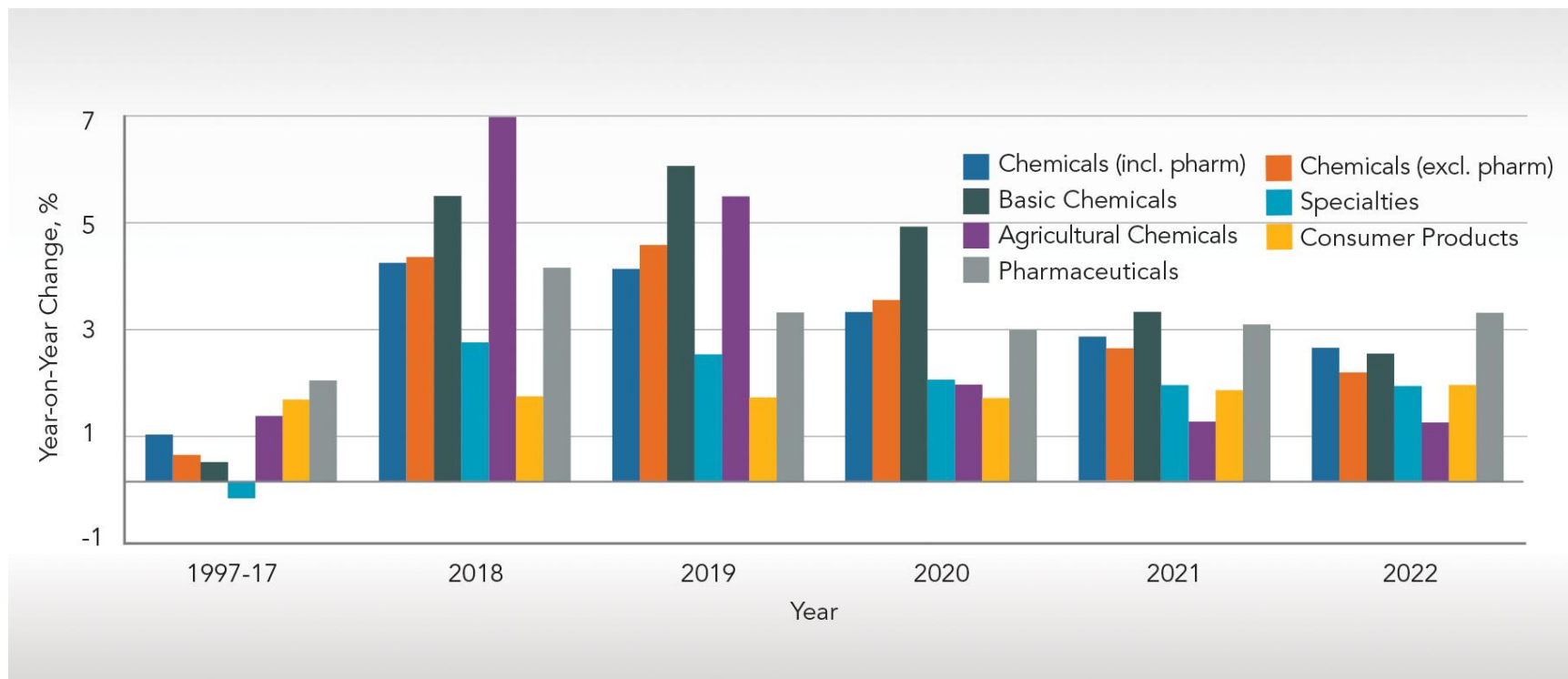


“The US remains the most attractive place in the world to invest in chemical manufacturing”

– Cal Dooley, ACC Sep 2018

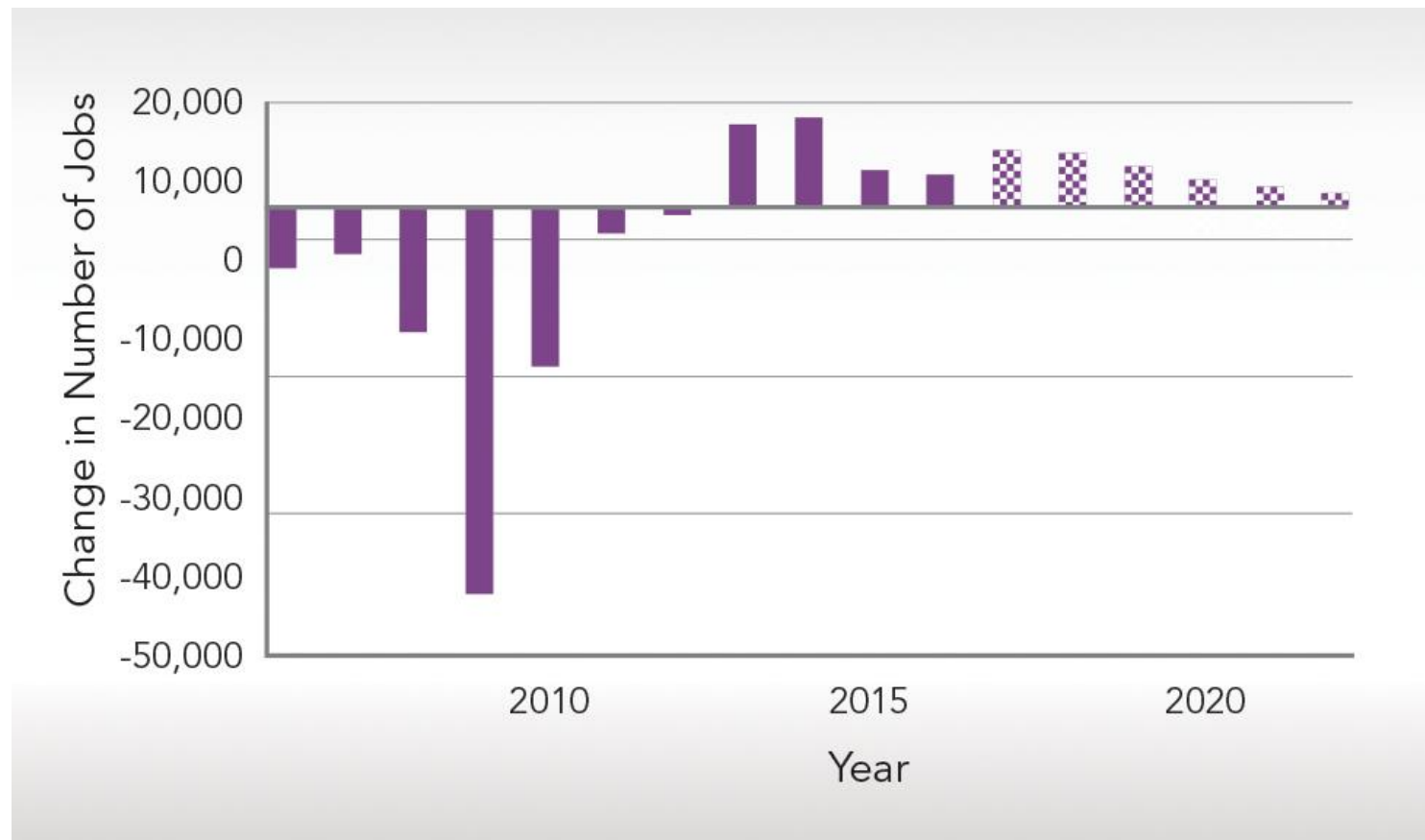
INEOS
THE WORD FOR CHEMICALS

Chemical Output Growth



Exports of basic chemicals will spur significant expansion in production.

Industry Employment



New investments will underpin an ongoing increase in jobs.

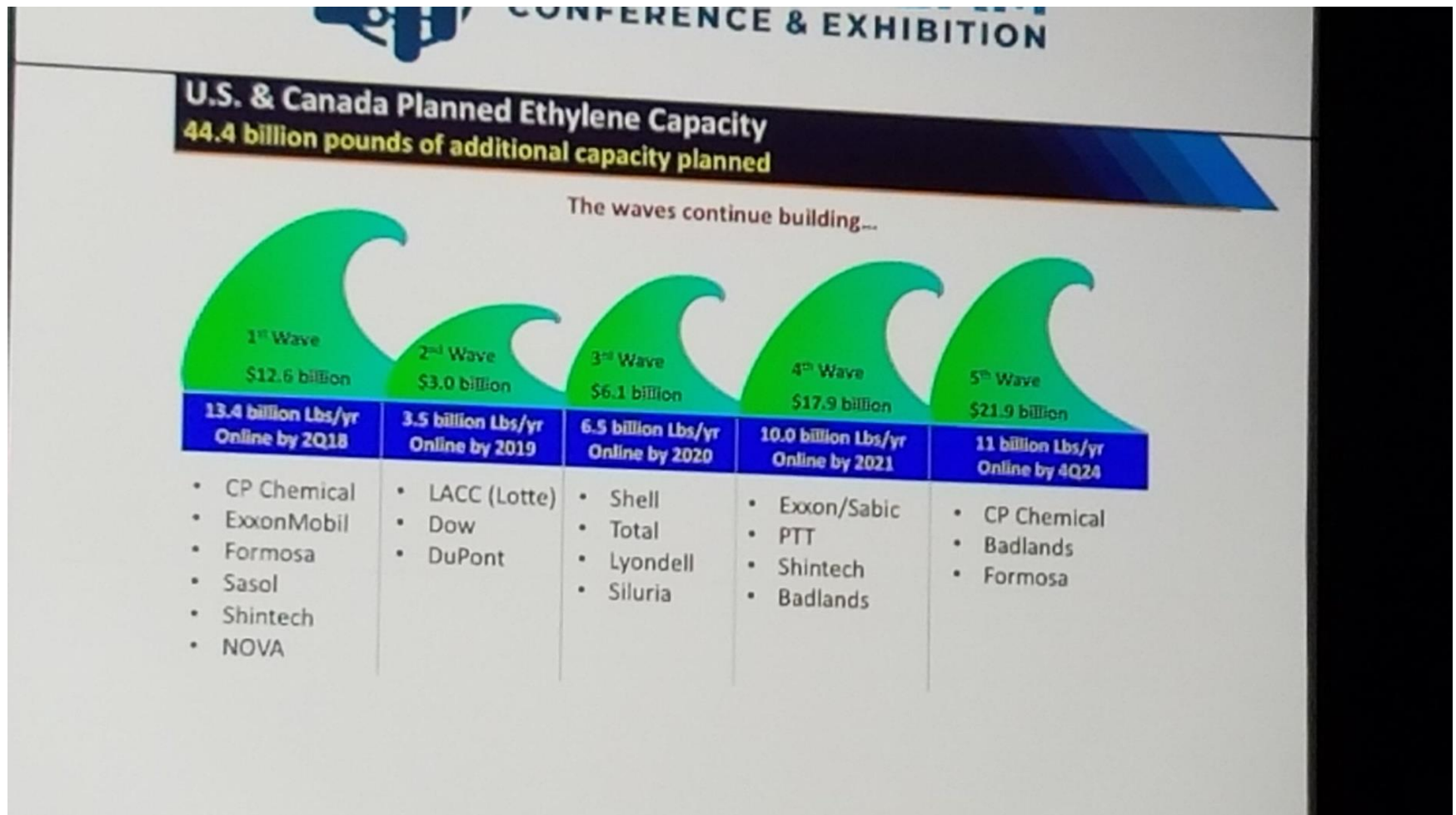
Industry Impact

OVER 5 MILLION JOBS

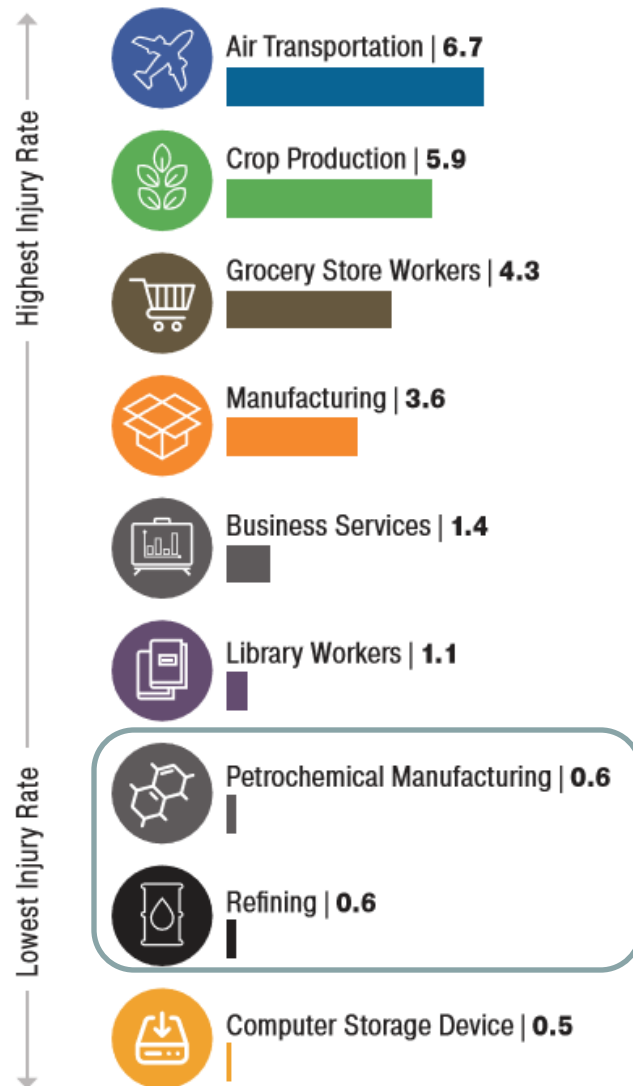
Supported by the Refining and Petrochemical Industries



5 Waves



Safety Performance



Environmental Performance - Improving

TEXAS

Ozone levels are down around the nation and Texas is a leader in this trend.

Since 2000, the decline in Texas cities' ozone levels have been close to double the national average



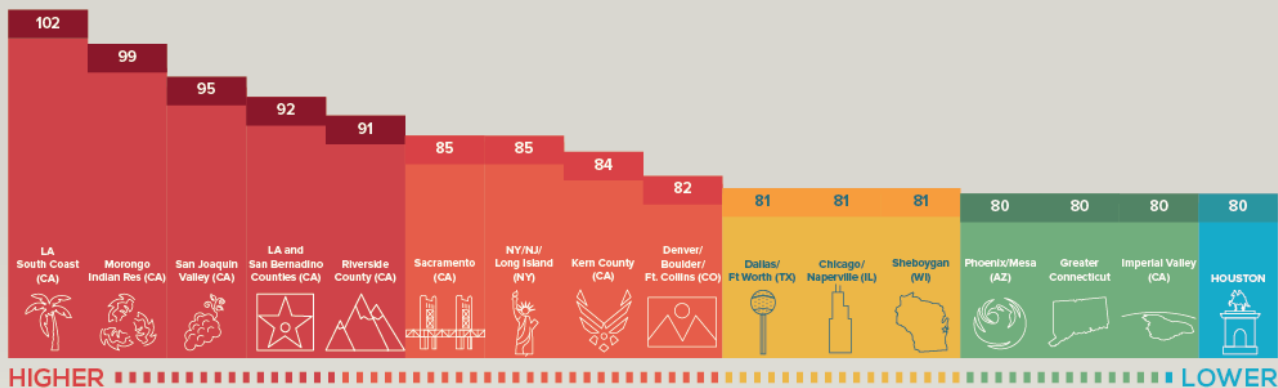
HOUSTON



While the population increased by 38% from 2000 to 2014, Houston ozone levels decreased.

HOUSTON COMPARED TO OTHER MAJOR CITIES

The EPA calculated the ozone design value for cities in the United States in 2014. Houston ranked among the lowest of the top 15 urban regions with the highest ozone levels in the nation.



Ozone in Parts per Billion

Note: EPA's new ozone standard is 70 ppb. Houston is making progress in reducing ozone levels.

Houston Regional Monitoring Network
and Greater Houston Partnership

INEOS
THE WORD FOR CHEMICALS

Our Products



Helmet
epoxy - a resin which starts with propylene

Gas Mask
Butadiene as a starting material for Hycar rubber

Outer Shell
Nomex® and Kevlar® blends - use benzene and xylene as foundational components

Thermal Layer
(beneath Outer Shell)
Nomex® and Kevlar®, nylon, treated cotton or cellulose, and elastic - such as spandex

Moisture Barrier
Nomex® as a substrate, to which either an expandable polytetrafluoroethylene (ePTFE) or a polyurethane membrane is attached

Did you know?

Over **80 percent** of materials used in Personal Protection Equipment or PPEs by firefighters originate from petrochemicals.



Gulf Coast Petrochemical Opportunities

- Feedstock Advantages
- Infrastructure
- Pipelines
- Logistics: Rail, Truck, Port
- Skilled Workforce





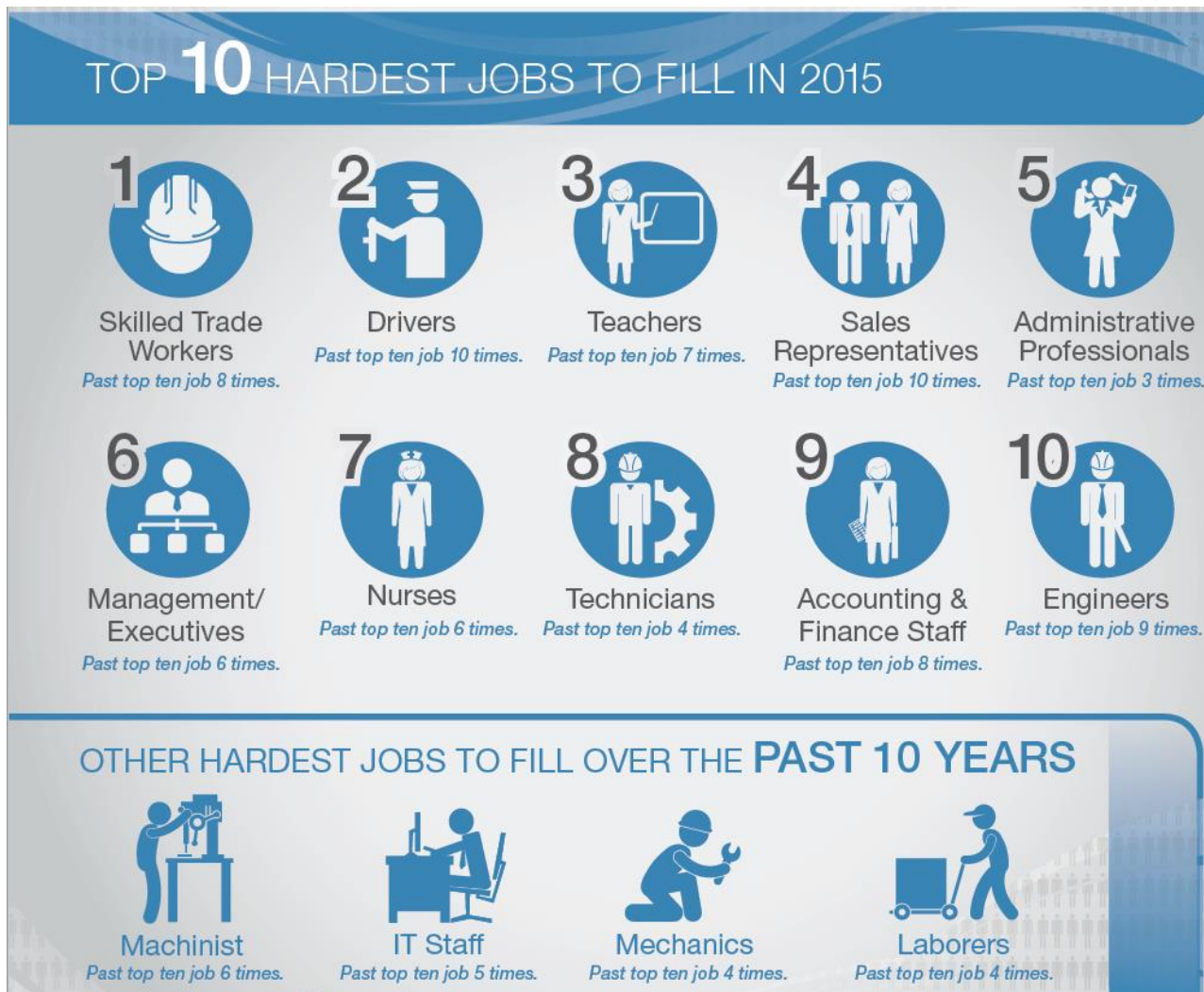
Key Facts: Workforce Demand

- Between January 2018 and December 2021, approximately 4,500 direct employees and resident contractor hires will be needed to replace attrition and fill newly created positions.
- Within the EHCMA region, CLMA projects demand for industrial craft workers will exceed supply between 2018 and 2022 @~5000 crafts/year.
- Digital technology will continue to reshape the petrochemical manufacturing and industrial construction industries and increase operational and project efficiencies.
- Based on projected workforce demand and supply, the petrochemical manufacturing and industrial construction industries continue to confront a long-term skills gap.
- Industry efforts to attract and retain talent are critical to addressing the skills gaps and must be continued to improve the productivity and competitiveness of the industry.

(Mis)Perceptions Cost Us Candidates

Overall Respondents		Generation Y (ages 19-33) Respondents	
Industry	Rank	Industry	Rank
Technology	1	Technology	1
Healthcare	2	Healthcare	2
Financial services	3	Financial services	3
Energy	4	Retail	4
Manufacturing	5	Communications	5
Communications	6	Energy	6
Retail	7	Manufacturing	7

Top 10 Jobs Most Difficult to Fill



WHERE ARE THE HOT JOBS IN HOUSTON?

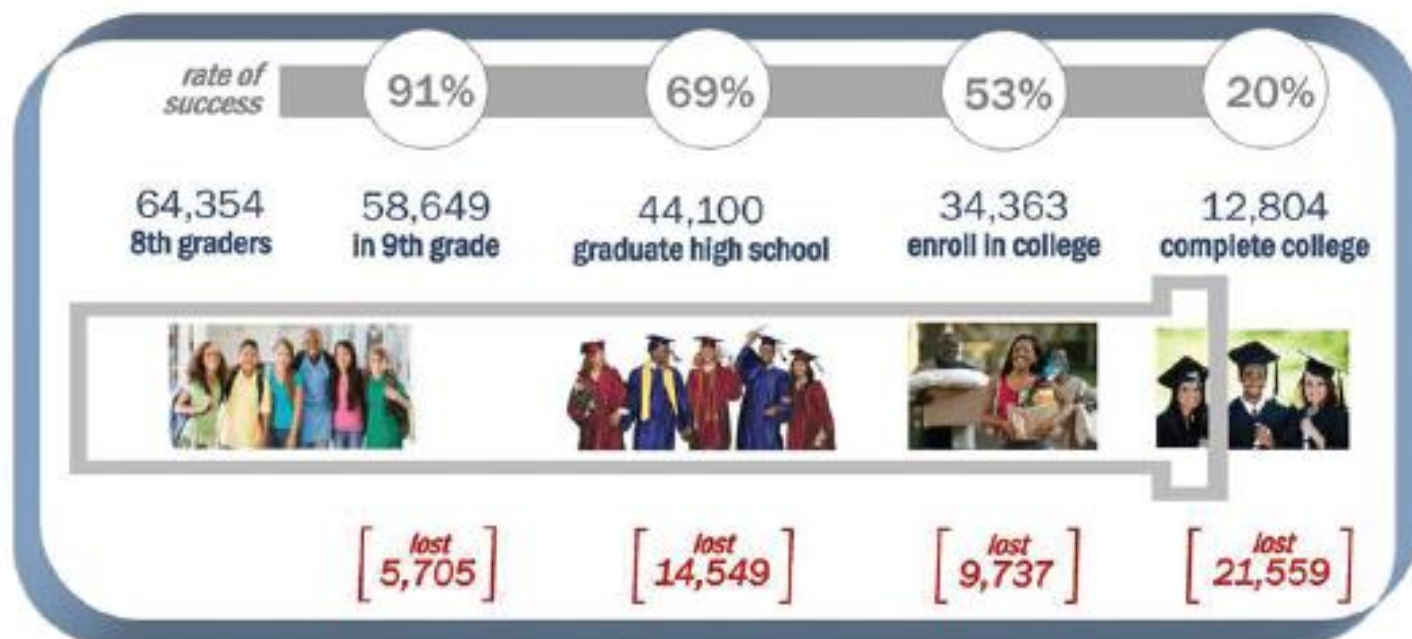


- Petrochemicals
- Construction
- Maritime
- Logistics
- Transportation

But...there's a Leaky Pipeline

Urgency : THE LEAKY PIPELINE

Start with all the 8th graders in Greater Houston public schools in 2000. Follow them to 9th grade, then high school graduation, then onto college. We find that only 12,804 out of 64,354 (20%) completed a post-secondary credential: a training certificate, 2-year or 4-year degree. And for economically disadvantaged students, success is only half of that.

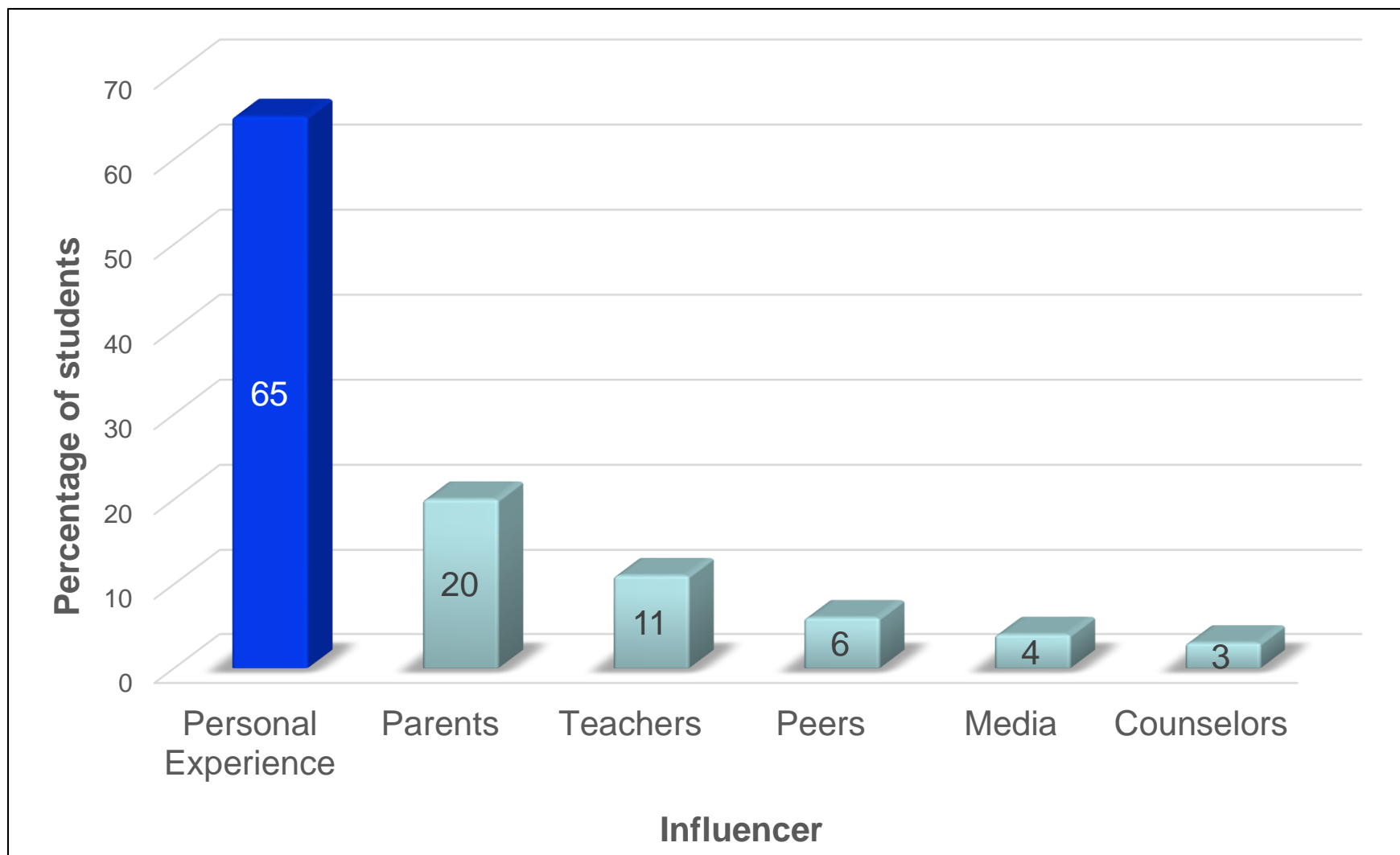


A New Measure of Educational Success in Texas: Tracking the Success of 8th Graders Into and Through College, Houston Endowment, Inc., 2013 edition. Data are for seven of our eight counties: Harris, Fort Bend, Galveston, Brazoria, Chambers, Liberty, and Waller counties

Manufacturing Opportunities

- Over next decade, nearly **3.5 million manufacturing jobs likely need to be filled**
- Skills gap is expected to result in **2 million of those jobs being unfilled.**
- Employees will be required due to retirements (2.7 mm) and expansion (0.7 mm)
- Other Factors: Negative Industry Image, lack of STEM skills, decline of High School Technical Education Programs
- ***CHANGE the PERCEPTION!***

What Influences Career Decisions?



EMpower

*let's tell **our** story*

No industry has done more to improve standards of living than the fuel and petrochemical industries



AFPM EMapower is a suite of resources for industry employees to use to better tell the story of the fuel and petrochemical manufacturing industries.

Change the Narrative

School +
Community
Presentations

Constructive
Conversation
Guide

Virtual Reality
Tour

WHAT DO WE DO WITH THIS INFORMATION?

- Tell **your** story to friends and family
- Correct misconceptions if you can
- Give a presentation at your local school or community group
- Engage elected officials through your company's programs
- Share the EMpower site with someone else!

A parody of the classic movie 'The Wizard of Oz'. The characters are walking along the yellow brick road in a field of orange flowers under a purple and blue sky. From left to right: the Scarecrow is holding a bundle of straw and has a speech bubble above him; the Tin Man is holding an axe and has a speech bubble above him; Dorothy is in the center; and the Cowardly Lion is on the right with a speech bubble above him.

Frackin'

Pipelines

& Chem
Plants

...Oh
My!

**Expansions on the Gulf Coast:
Collaboration is a Necessity for Survival**

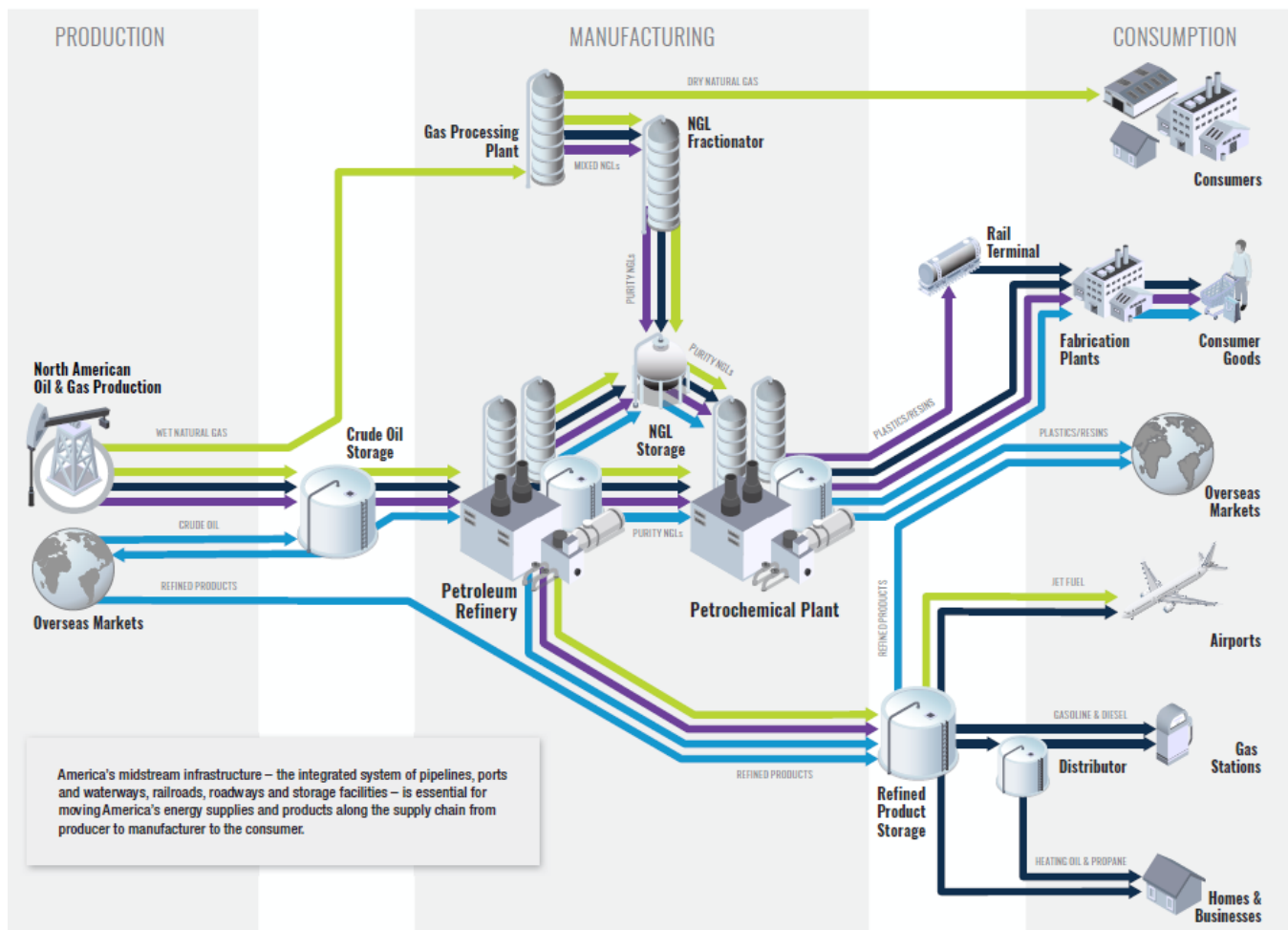
Challenges / Opportunities

- Policy / Regulation
- Tariffs
- Skilled Workforce
- Infrastructure Investment
- Plastics in the Ocean

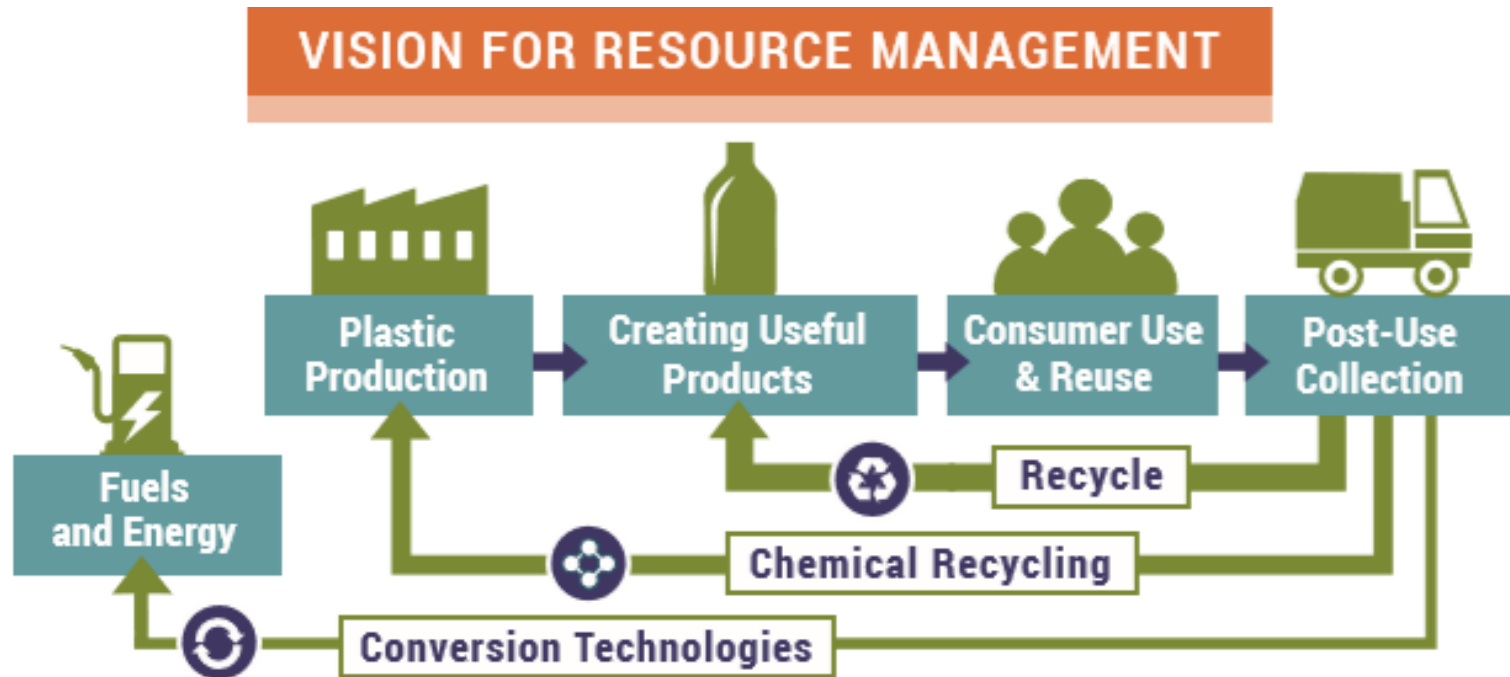
Challenges – Infrastructure

America's Fuel and Petrochemical Supply Chain

PIPELINE RAIL TRUCK WATER



Challenges – Plastics in the Ocean

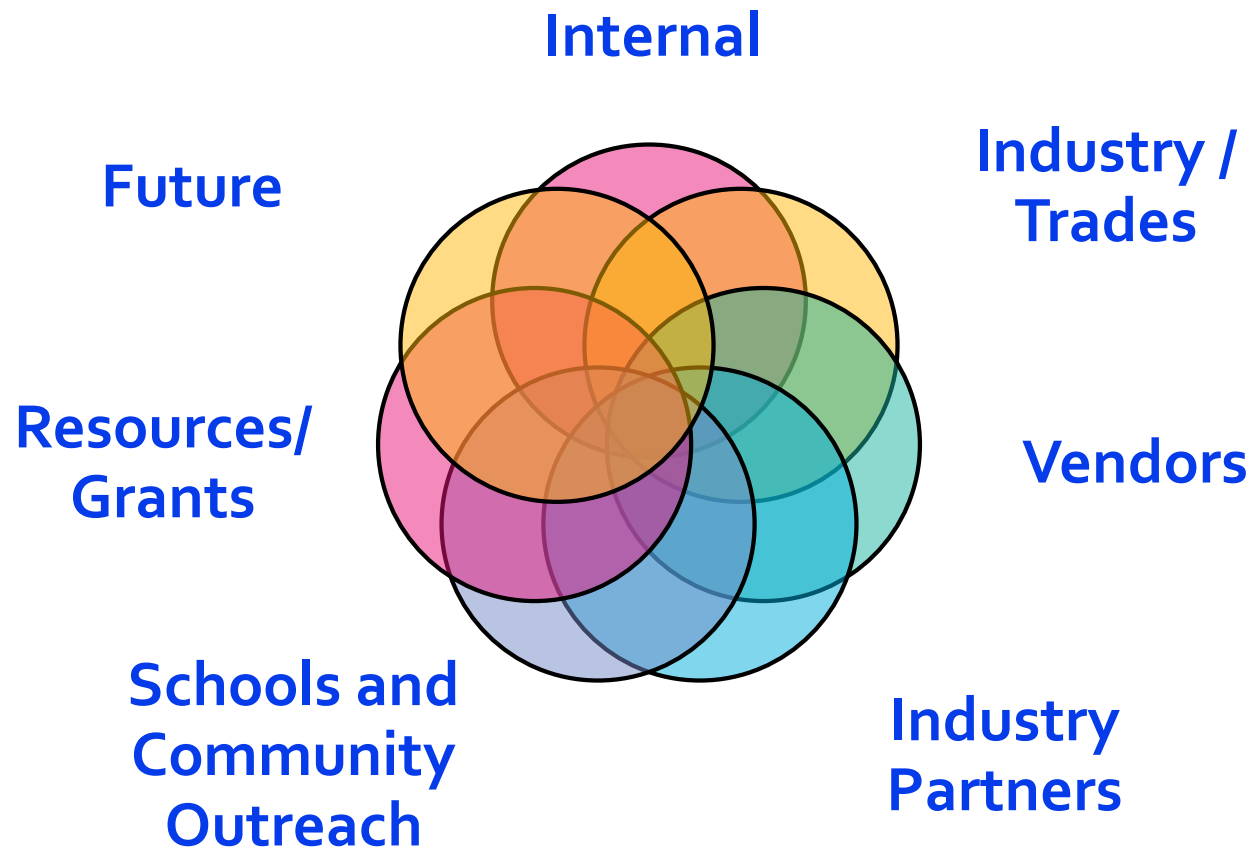


⁶ Stemming the Tide: Land-based strategies for a plastic-free ocean.
<https://oceanconservancy.org/wp-content/uploads/2017/04/full-report-stemming-the-gdf>

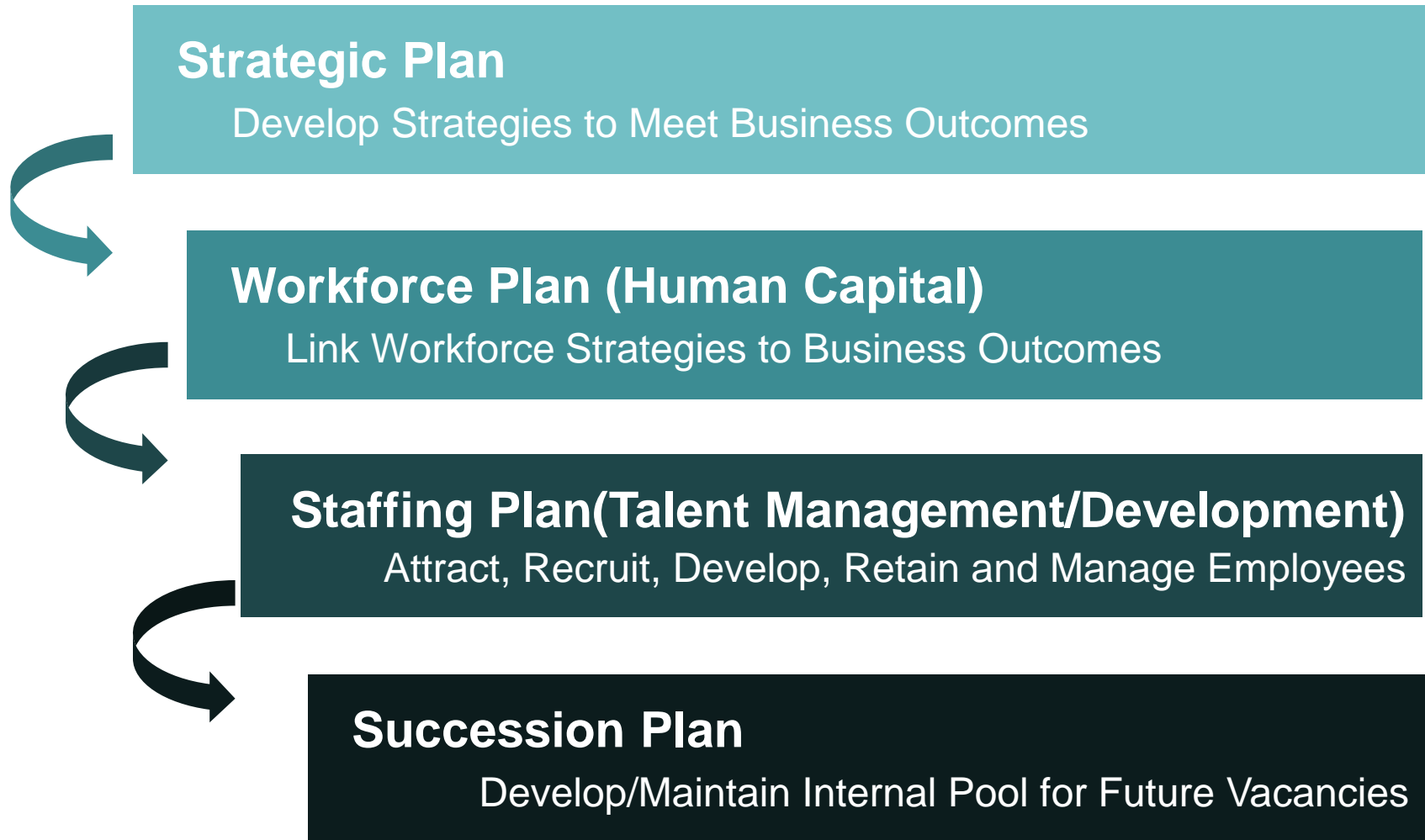
Major Sources are 10 Rivers in China, Africa, India

Let's talk about Workforce Development

Collaborate - Innovate - Advocate



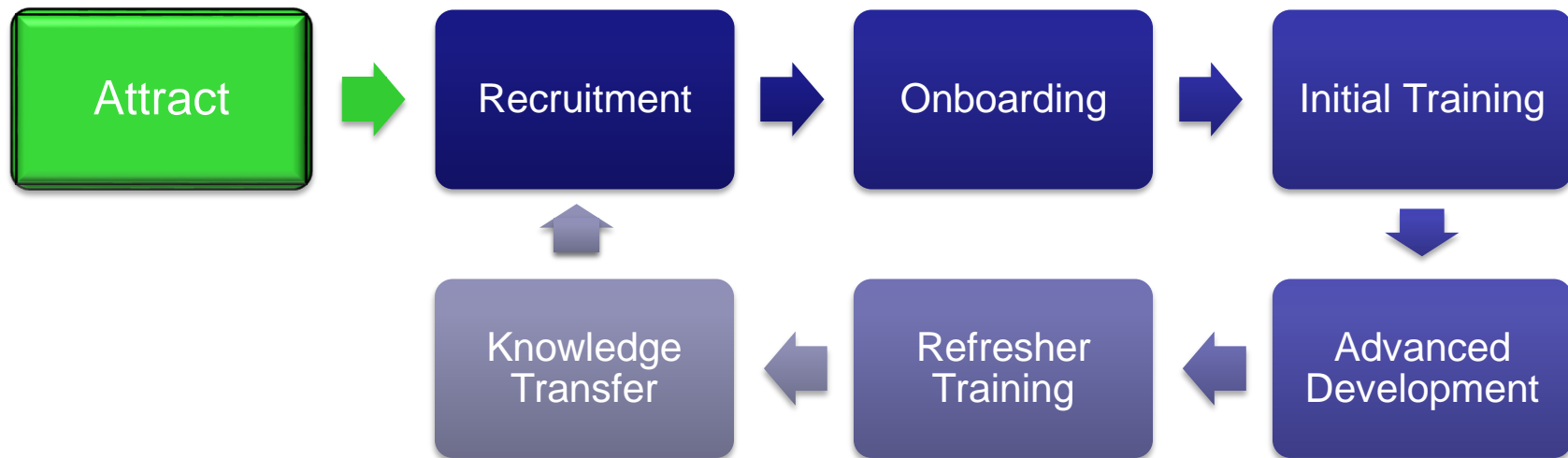
INEOS Strategic Workforce Planning



Development Continuum

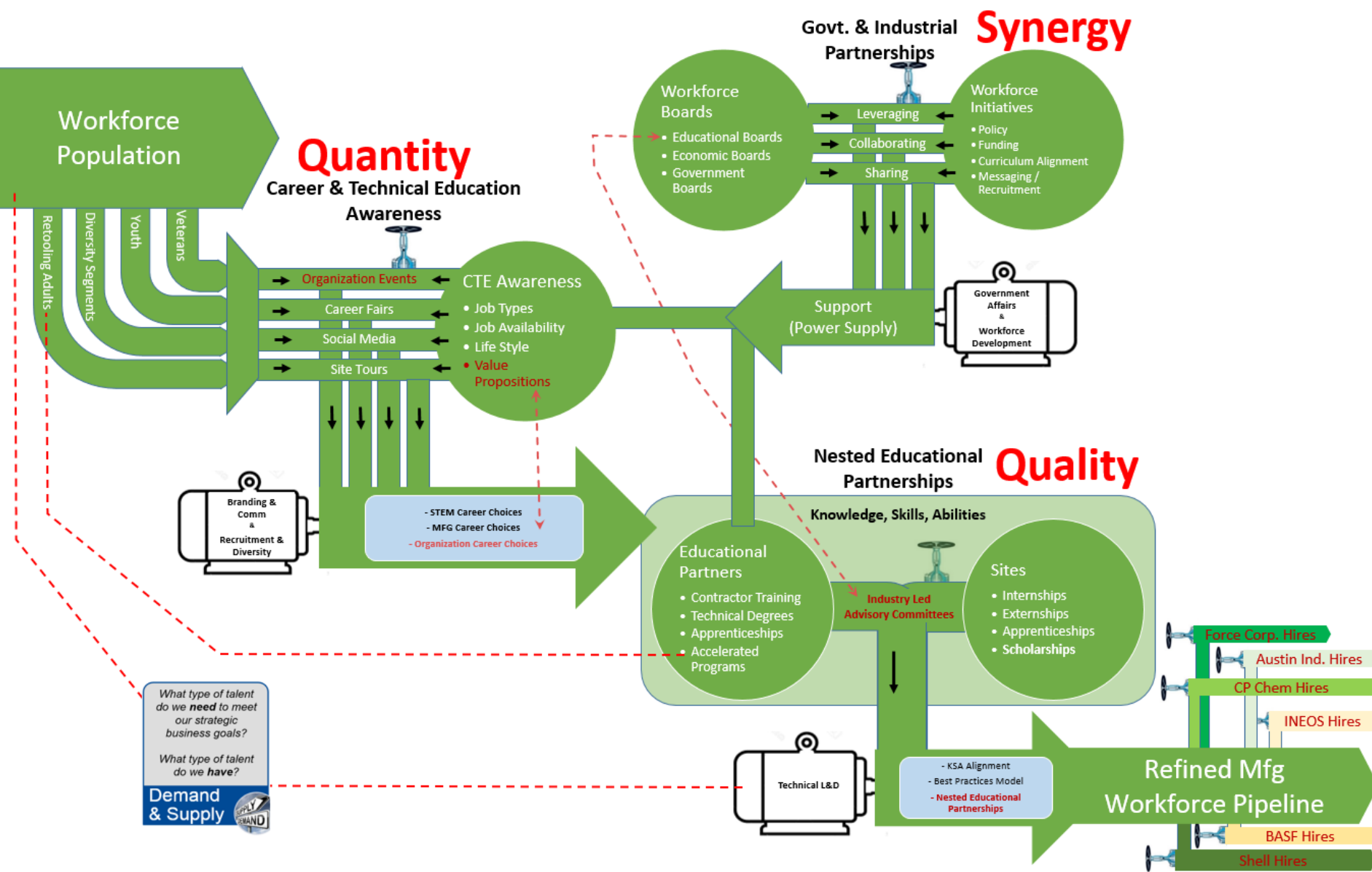
Hire to Retire, Entry to Expert, etc...

Integrated training and development process beginning with workforce screening and selection process and continuing with Tools/Training/Technologies throughout Career

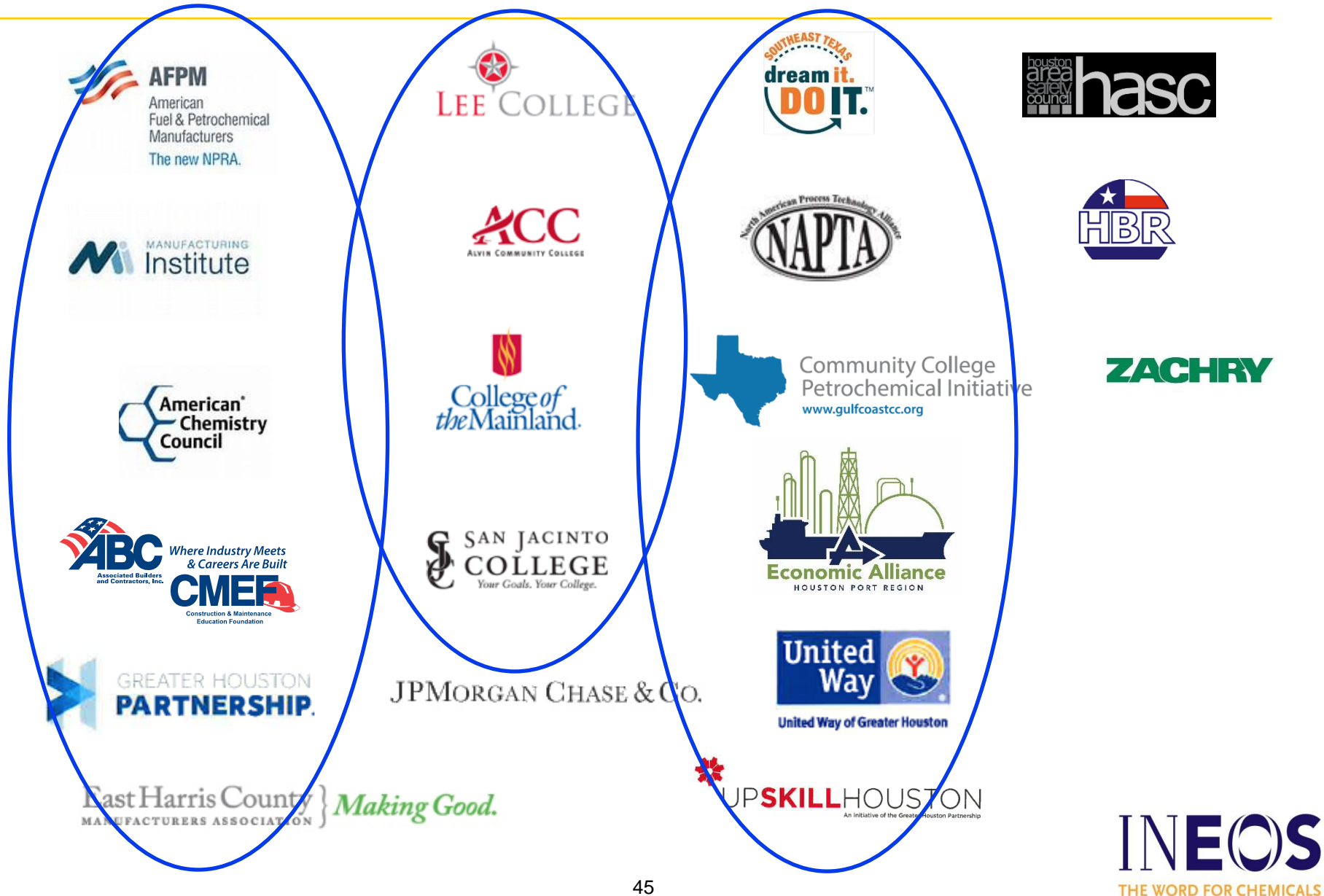


Collaborate

Workforce Development Model – G. Johnson



Collaborate – East Harris County



Industry Call to Action: PetrochemWorks



The graphic features a background image of a person in a yellow hard hat and safety gear. Overlaid on this is the word "HOUSTON" in large white letters. Below it, the text "We Have a [WORKFORCE] Problem" is written in a smaller font, with "Problem" crossed out and "Opportunity!" written in red script. Below the main image are four icons representing the workforce lifecycle: a group of diverse people (ATTRACT), a person training others (TRAIN), a "now hiring" sign (PLACE), and a person in a hard hat (RETAIN).

HOUSTON
We Have a [WORKFORCE] Problem *Opportunity!*

ATTRACT **TRAIN** **PLACE** **RETAIN**

- Best Practices
- Labor Demand Survey
- Talent Pool Study
- Public Education
- Benchmark Onboarding
- School Advisory Panels
- Career Fairs
- Plant Tours
- Sponsorships
- Regional Leadership Council



PetrochemWorks.com
CAREERS FOR A LIFETIME

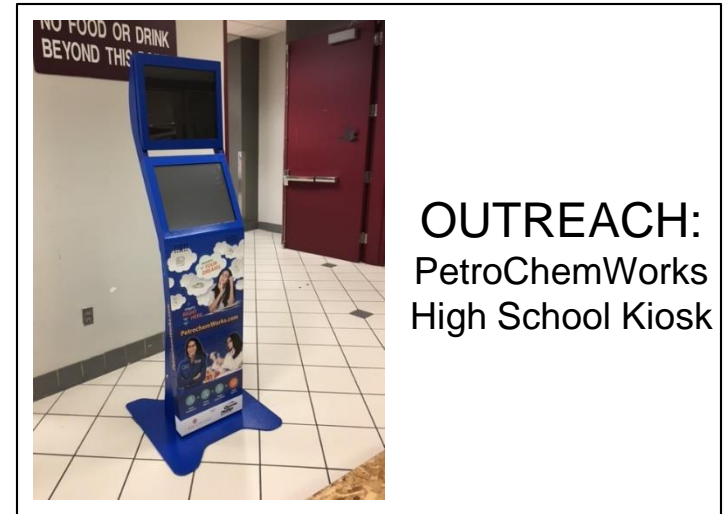
Annual Golf Tournament
\$1.6 million raised to date for Scholarships

Career Matching

www.petrochemworks.com

The screenshot shows the PetroChemWorks website homepage. At the top, the logo reads "PETROCHEMICAL THRIVING GULF COAST INDUSTRY" with navigation links: "TYPES OF JOBS", "WHO IS HIRING", "WHERE TO GET TRAINING", and "ABOUT PETROCHEM". The main headline is "PETROCHEM NEEDS YOU Discover The Path To **YOUR** Dream Job". Below this is a row of five images showing diverse workers in industrial settings. A yellow-bordered box highlights the "GET STARTED NOW!" section, which includes the text "Find Petrochemical Jobs that Fit Your Interests" and a visual equation: "YOUR INTERESTS + YOUR SKILLS + YOUR EDUCATION = YOUR MATCH". To the right of this equation is a button that says "MATCH ME TO THE PERFECT CAREER". Below the yellow box, three statistics are displayed: "PETROCHEMICAL INDUSTRY IS **HIRING NOW**", "YOU CAN MAKE **\$70K OR MORE**", and "THOUSANDS OF **OPEN JOBS**".

Job Matching Algorithm



OUTREACH:
PetroChemWorks
High School Kiosk

The screenshot shows the INEOS Olefins & Polymers USA website. The header includes the PetroChemWorks logo and navigation links: "TYPES OF JOBS", "WHO IS HIRING", "WHERE TO GET TRAINING", and "ABOUT PETROCHEM". Below the header, there are links for "MY SKILLS", "MY INTERESTS", "MY EDUCATION", and "SEE MY MATCHING JOBS". The main content area features the text "THE WORD FOR CHEMICALS INEOS Olefins & Polymers USA" and a sub-headline "Our products significantly contribute to enhancing standards of living for people around the world." A large image of a smiling worker in an orange safety vest and white hard hat is on the right.

Company Profiles

Innovate

College Investment - Supporting the Pipeline



SAN JACINTO COLLEGE | **CENTER FOR PETROCHEMICAL,
ENERGY, AND TECHNOLOGY**

Opening Fall 2019



Opening Fall 2018



INEOS
THE WORD FOR CHEMICALS

Other Workforce Development “Wins”



- **POWER: Women in Industry**
- CCPI – 400+ attendees
- Sponsored CTE & CC Women



- AFPM, Next Op
- Energy Industry focus



- **Houston Hispanic Forum: NAPTA**
- 13,000 Attendees; 60% Students, 25% Parents
- 74 ISD's, 372 Schools



- **Junior Achievement**
- Schools in our Site locales
- Cross-Section of employees

Engineer Experiential Programs Day in the Life Of (DILO)

1. Zachry Craft Experience

- Welding/Electrical, Alignment, Heights, etc.
- Target: Maintenance, Reliability, Projects Engineers

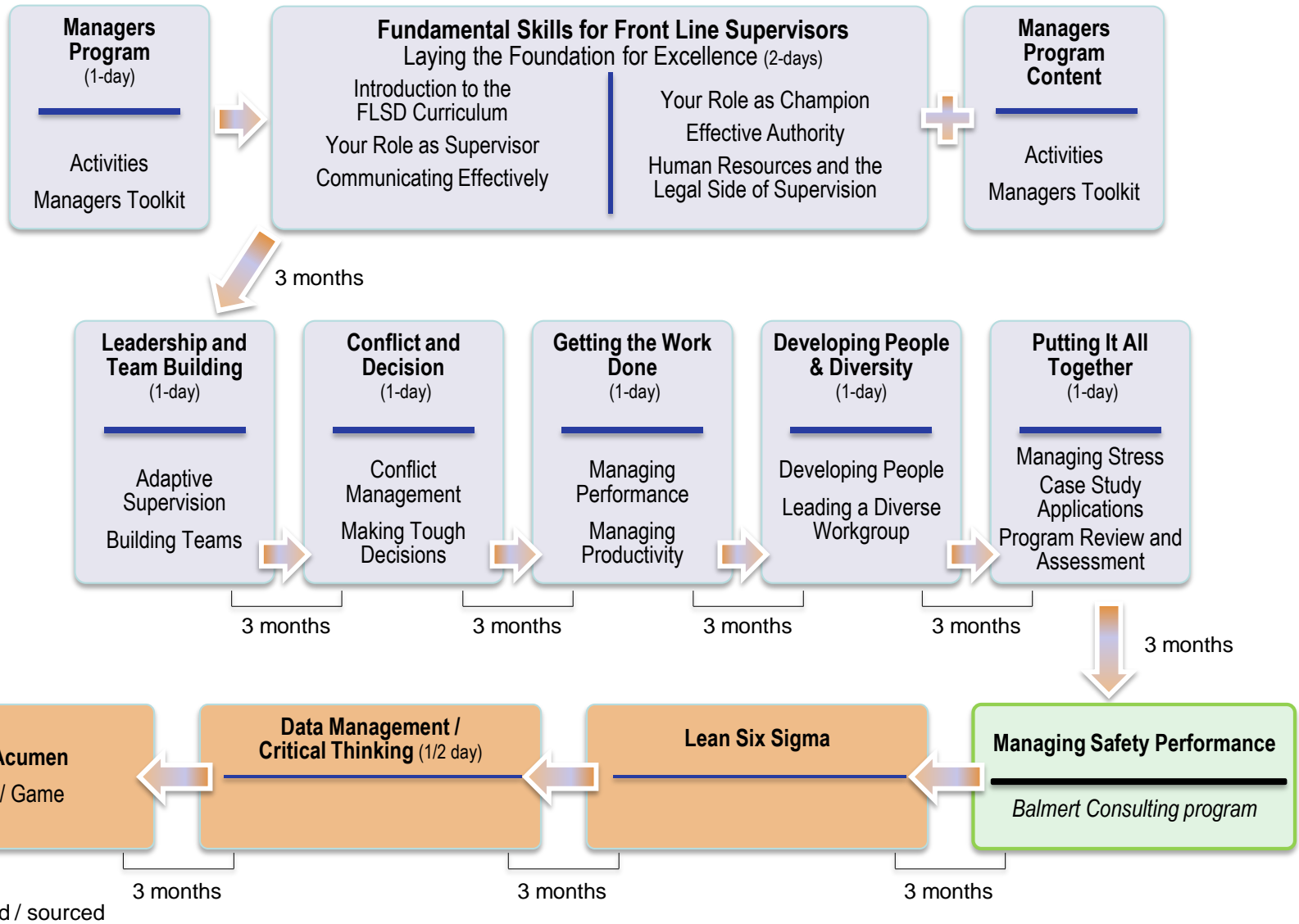


2. Process Equipment Trainer

- Actual Operation of Unit including Control System
- Target: Process, Mechanical, Electrical, Control Eng



Front Line Leader Development Program Course Map



Creating the Pipeline



Manufacturing Workforce Development



What Do Employers Want?

Do *you* have what employers are looking for?

Skills/Competencies

Reading

Able to comprehend written material and take appropriate action

Speaking

Expresses ideas clearly and concisely to individuals and groups; has good customer communication skills; gives clear directions

Writing

Spells correctly; writes legibly; expresses ideas clearly and concisely; fills out forms properly

Listening

Able to comprehend what is said and take action

Math Computation

Able to accurately apply basic math skills (addition, subtraction, division, multiplication, fractions, and percentages)

Problem Solving

Can identify the source of a problem; demonstrates good common sense; is creative and innovative

Information Management & Technology

Able to use computers to process information; familiar with common technology applications and tools in the workplace

Knowing How to Learn

Able to self-teach new skills; able to seek and use new information appropriately

Applying What is Learned

Possess high-level skills such as reasoning, analysis, and problem solving

Working with Others

Able to work as a productive team member; able to share information

Business Process

Eager to learn the principles of business

Looking for Work

Able to identify job opportunities, to complete a job application, to prepare a resume, and to promote himself/herself during an interview

Work Attitudes

Responsible / Self Disciplined

Is a self-starter; committed to and accountable for work assigned; does more than the bare minimum; is a loyal employee

Wants to Learn / Pride in a Job Well Done

Is flexible, willing, and able to respond to changes in work assignments or learn new technologies; is willing to adjust work until it is correct

Safety-Conscious

Puts safety first in every aspect of the job; takes responsibility for own actions; notices and corrects unsafe situations; always uses safety procedures; is concerned for the safety of others

Manages Stress and Personal Problems

Deals with job pressure in a positive way; does not let personal problems interfere with work

Positive Outlook

Views the good in situations and works constructively to solve problems; has a positive self image; is self-confident; sets personal goals

Follows the Rules

Performs tasks in a prescribed manner; does not break rules but helps management modify rules as needed

Good Team Member

Shares information; works well and credits (praises) others; puts the team above personal interests

Respects Others

Has good manners; shows common courtesy; appreciates multicultural diversity

Willing to Earn Rewards

Able to see long term results of efforts on the job and put in time and effort before expecting a promotion

Work Ethic

Honesty and Integrity

Bases actions on a personal set of values; can be trusted to follow the rules even when supervisors are not present; trustworthy

Good Manners

Always shows courtesy and respect toward others

Accepts Advice, Supervision, Criticism

Has high self-esteem and does what is asked; accepts criticism and uses it to improve future performance

Dependability / Follow Through

Works diligently to complete tasks, alerts supervisor to problems or delays so there are no surprises about work not being done

Good Attendance / On Time

Can be depended upon to be at work; ready to begin work on time

Accuracy of Work / No Waste

Is careful and avoid mistakes; if mistakes are made, will correct the errors; takes pride in work well done; holds high standards

Pride & Productivity in Work

Shows initiative; is ambitious; figures out how to get the job done; work as efficiently as possible to get the job done well

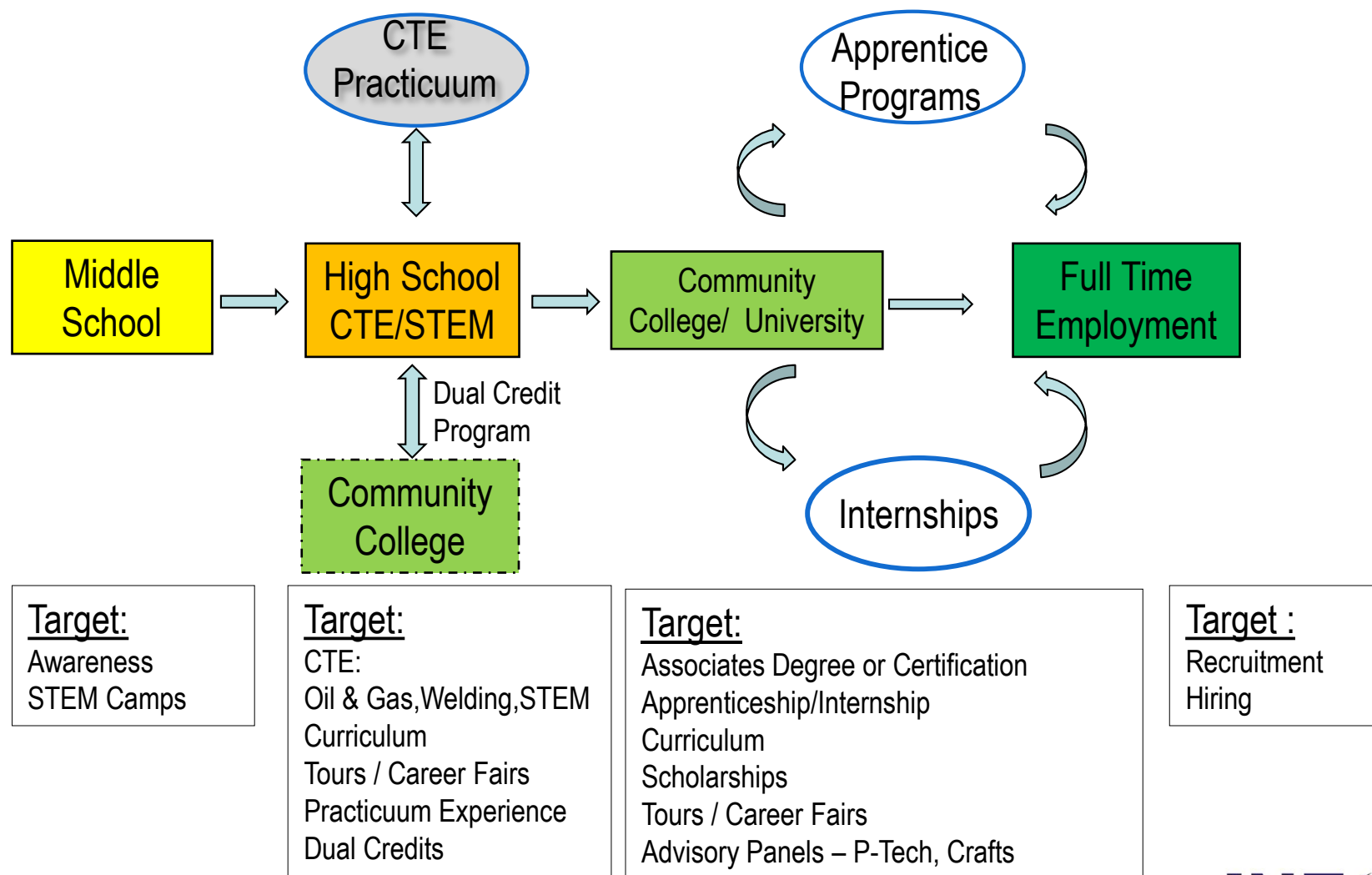


Process and Maintenance Technician

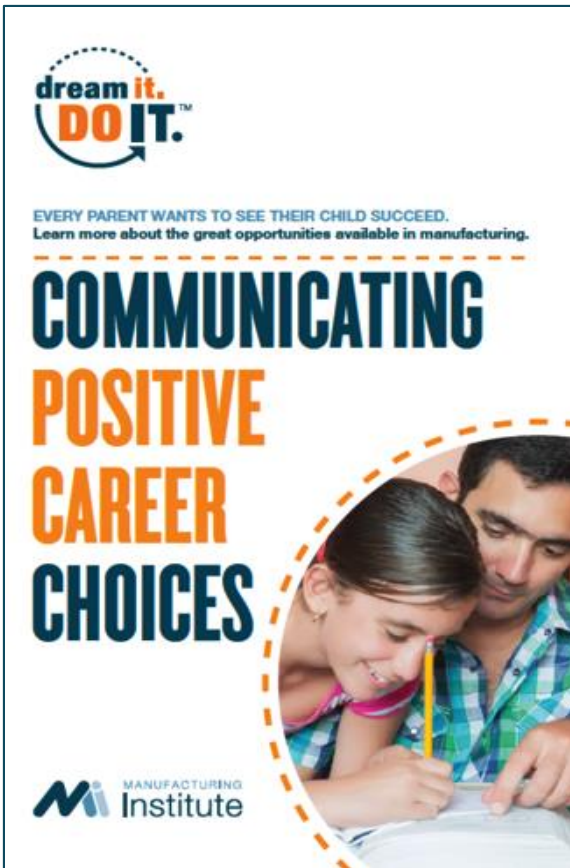
Minimum Qualifications

- A high school diploma or equivalent, AND:
- Successful completion of a related two (2) year Associates Degree or Industry Certificate.
- Required skills include strong safety orientation; teamwork; good work habits; good attitude; communications; like to work, learn and problem solve, reliability.
- **Drug Free & No Criminal Record:**
 - ❑ **Transportation Worker Identification Credential (TWIC) Card eligibility.**

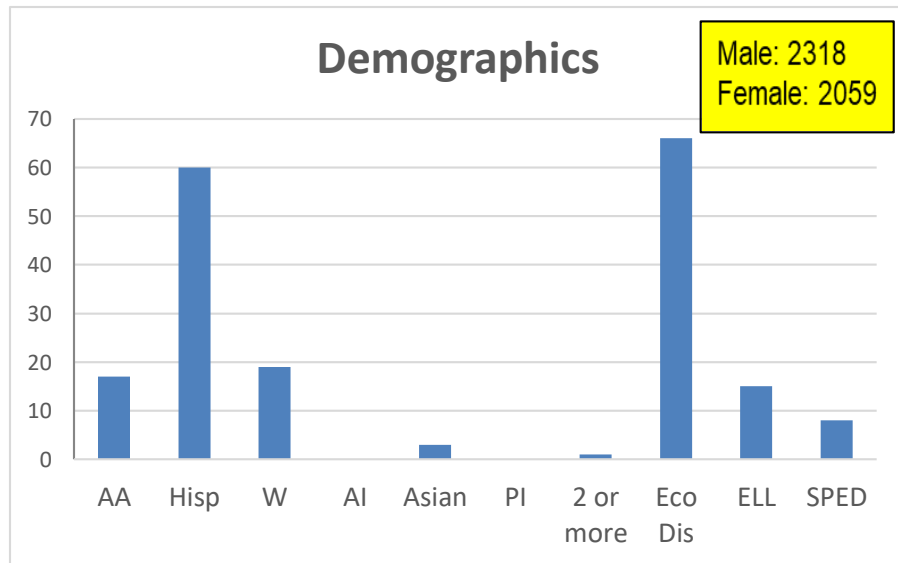
Multi-Level Effort



Dream It. Do It. – Changing Perceptions



- Inform Students, Empower Parents, Assist Educators and Engage Manufacturers
- Young Manufacturers Academy
- Ambassadors Bureau Network
- Champions (Teachers) Network
- Manufacturing Week - October



Manufacturing Institute – Dream It, Do It

MANUFACTURING DAY AT A GLANCE

Developing positive perception of manufacturing with educators



91%

The activities/tours
were interesting and engaging



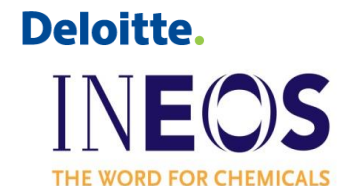
93%

More convinced it provides
careers that are interesting and
rewarding

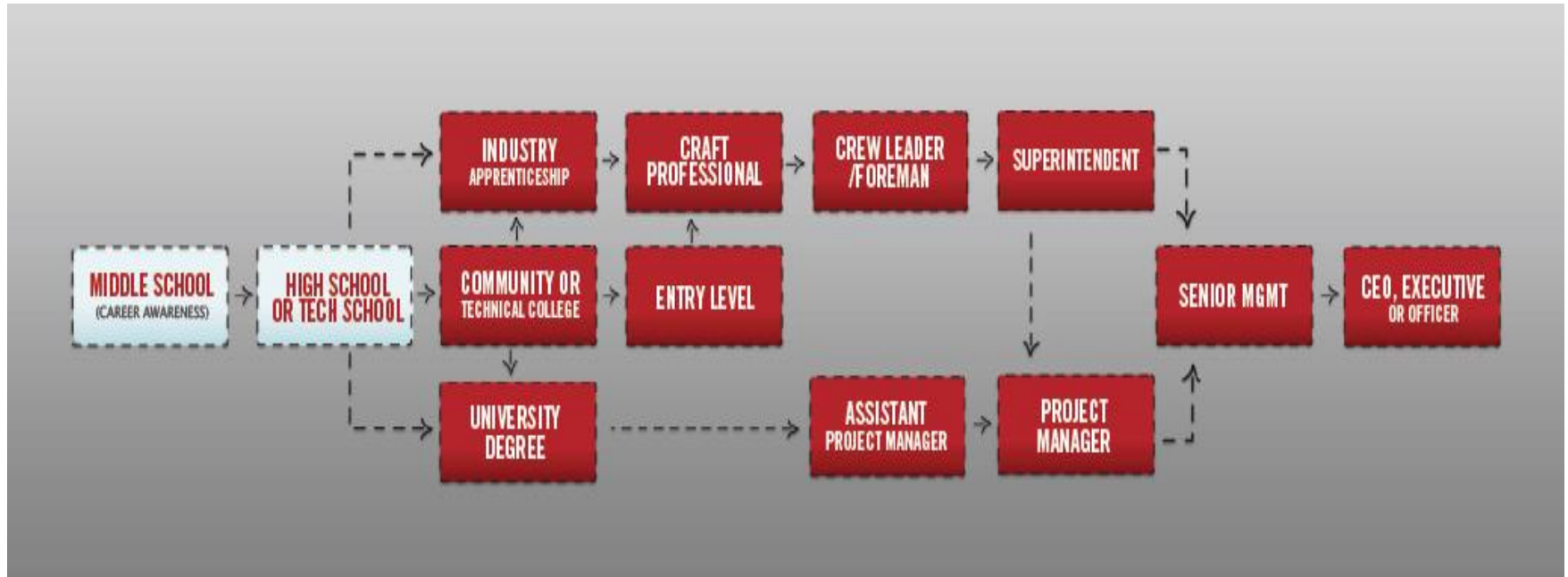


88%

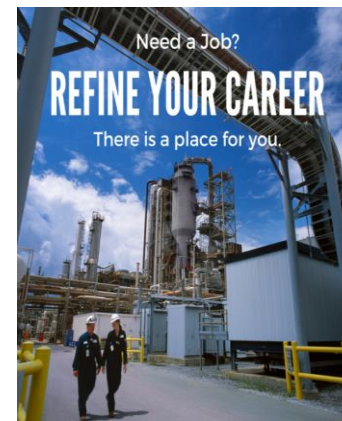
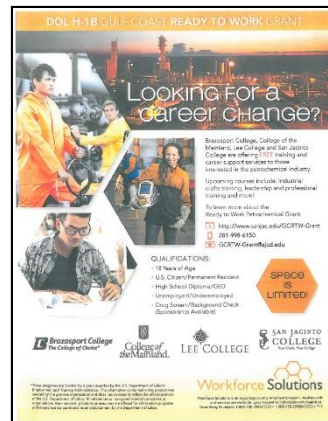
More aware of manufacturing
jobs in my community



Create Career Line of Sight and Access to Resources



- Resources
- Scholarships
- Internships
- Apprenticeships



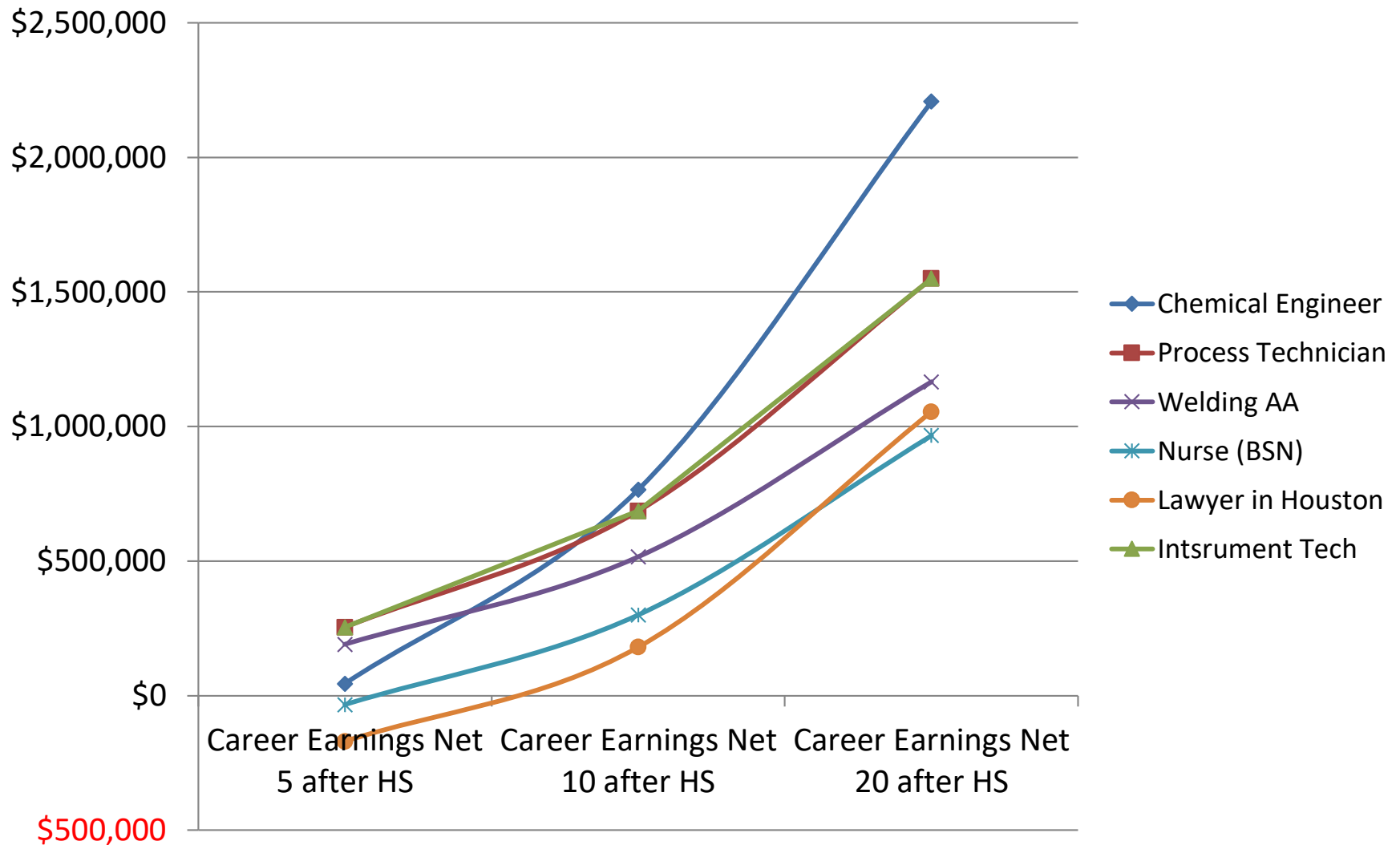
Academic Outreach

- Advisory Panels at ISD's and Community Colleges
- Career Preparation: Job Fairs and Mock Interviews
- CTE Toolkit
- Plant Tours (Career Counsellors, Teachers, Students)
- Special Projects:
 - Women in Industry: Sponsorships of CTE and College students
 - Project Lead the Way – STEM National Accreditation
 - GEMS (Girls in Engineering, Math & Science): 300% increase
 - Equipment and Material Donations
 - NAPTA - National Trouble-Shooting Competition
- Scholarships
- Internships and Apprenticeships
- CCPI: Externships with College Faculty

Not Your Grandfather's Manufacturing



5, 10 & 20 Year Earnings post High School



AFPM Outreach Feedback

RECOMMENDATIONS



Showcase
High Salary



Career
Opportunities



Job Stability



Target
Women

Advocate

Advocacy – National and State Levels

- Broad representation
 - Industry, Colleges, Local Officials, Students
- Legislator Visits
 - Congressional – Senate and House
 - House Education and Labor Committees
 - Office of the Vice - President
- Focus
 - CTE Reauthorization and Higher Education Acts
 - STEM Programs and Community College Support
- Industry: AFPM / ACC / TCC
 - Opportunity and Advisory Councils Participation
 - Integrate/Leverage Local and National Workforce efforts
 - Performance Verification
 - “Changing the Narrative” about the Industry

EMpower

*let's tell **our** story*

No industry has done more to improve standards of living than the fuel and petrochemical industries



AFPM Peer Recruitment Competition

A photograph of a large industrial refinery or chemical plant at sunset. The sky is filled with dramatic, colorful clouds in shades of orange, yellow, and blue. The silhouettes of various industrial structures, including tall distillation columns, pipes, and storage tanks, are visible against the bright horizon where the sun is setting.

Refine Your Career

From a GED to a PhD, there is a place for you.

INEOS Community Advocacy



Career and Education Resources

Industry Resources

PetrochemWorks – www.PetrochemWorks.com

East Harris County Manufacturing Association – www.ehcma.org

Dream It, Do It – www.dreamitdoittx.org

Manufacturing Institute – www.themanufacturinginstitute.org

Build Your Future – <http://byf.org/path>

AFPM – <http://workforce.afpm.org>

American Chemistry Council – www.americanchemistrycouncil.com

Economic Alliance Workforce – <http://allianceportregion.com/resources/parent-student-resources/>

INEOS – www.ineos.com

Community College Petrochemical Initiative: www.energizehouston.com

Summary

- **Industry is strong and expanding**
 - Gulf Coast, Appalachia and Globally
- **Great Careers Possible: P-Techs, Skilled Crafts**
 - Safe, Well Paying
- **Collaborate:**
 - Schools, Industry, Government, Community
- **Innovate:**
 - Customize Programs: needs, culture, location, Technology
- **Advocate:**
 - Funding, Legislation, Community
- **NAPTA plays role in preparation and promotion**

A final word on Learning...

LEGACY

Thank You for your time and attention