

National Association of Regulatory Utility Commissioners



Who Will Do The Work?

National Association of Regulatory Utility Commissioners (NARUC)

Summer Committee Meetings

Nashville, TN

Mark Bridgers - Continuum Capital

July 26, 2016

10:00 am – 10:30 am

Objective & Agenda

► Objectives

- Introduce a solutions to the question of “Who Will Do The Work?”.

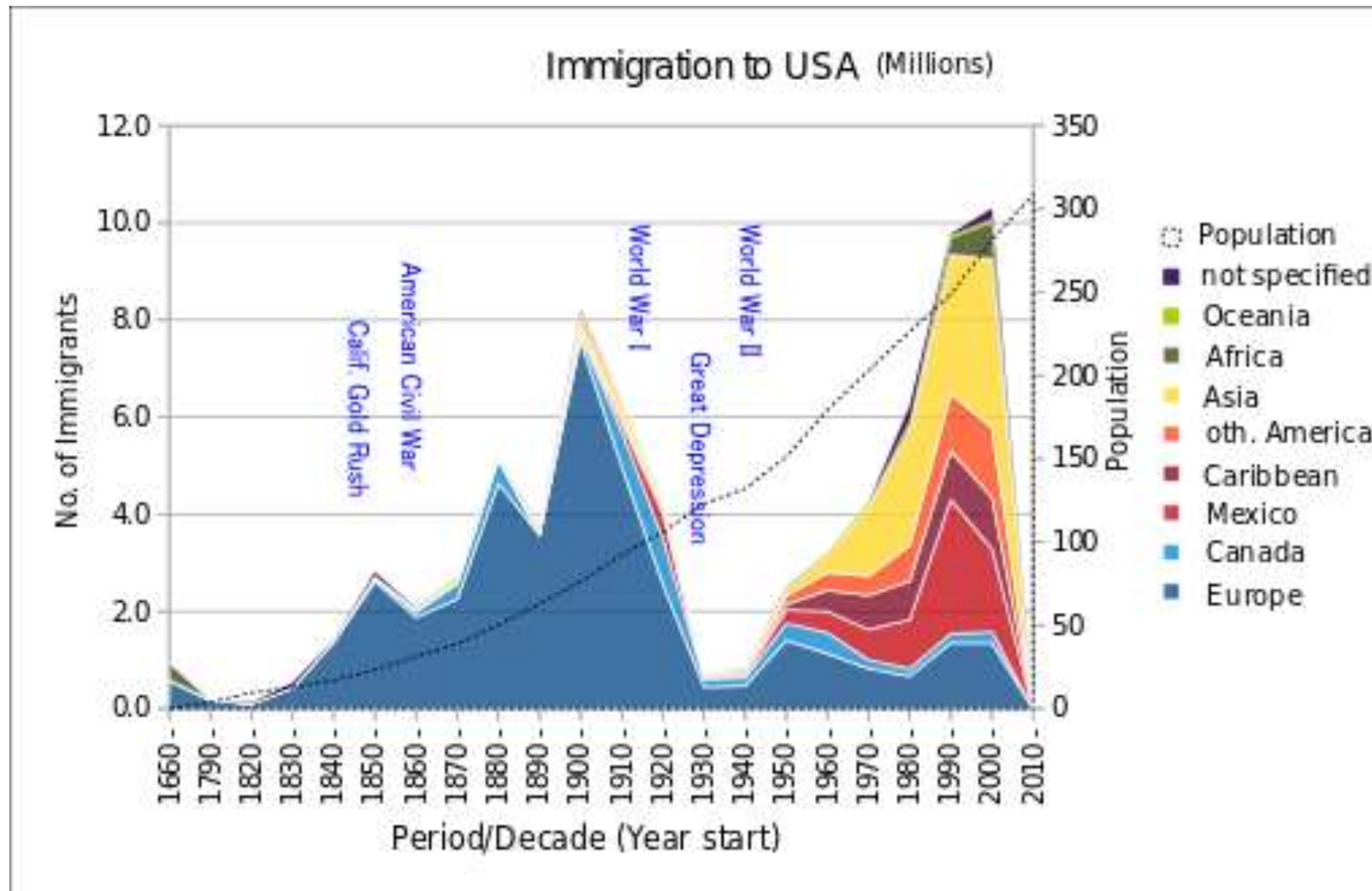
► Agenda

- Some history & perspective on construction labor shortages
- Current capacity of the combined utility and contractor workforce:
 - Natural gas
 - Electric
 - Water/Sewer
 - Telecom
- Review a forecast indicating where and when demand will exceed industry construction capacity
- Learn the implications of the forecasted shortage in workforce supply, for ratepayers, Public Utility Commissioners, utility firms, and contractors.
- Appendices – Research on each market

Agenda

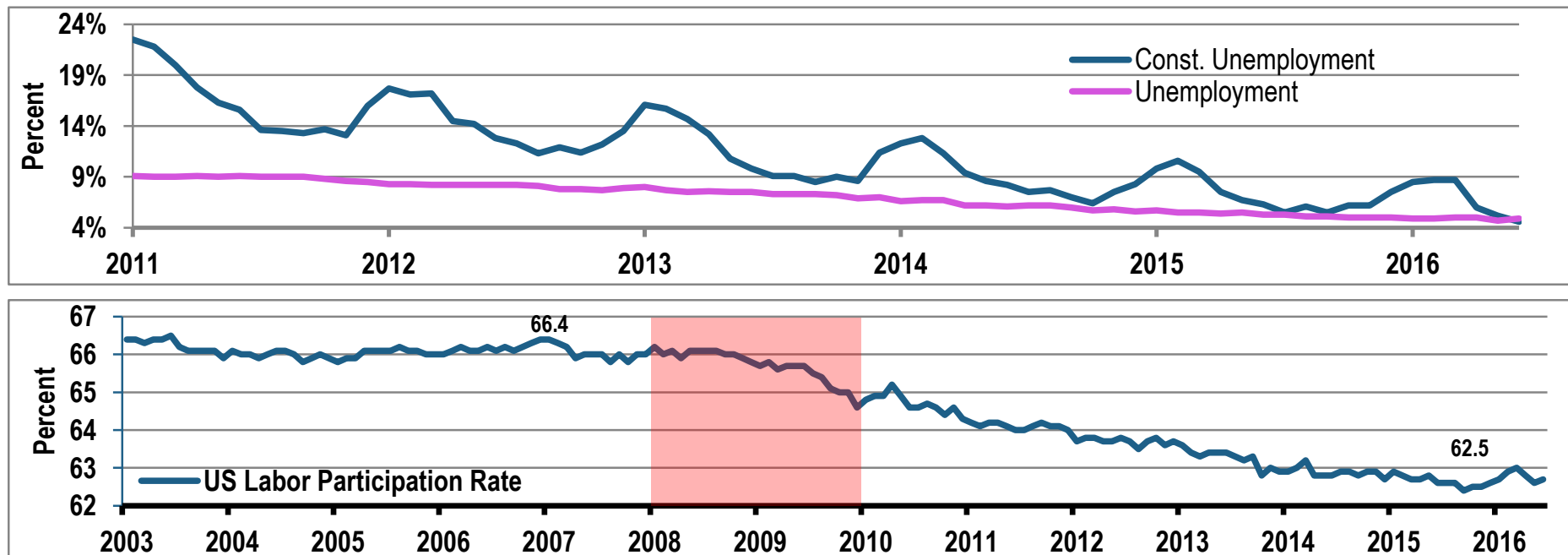
- ▶ History & Perspective
- ▶ Workforce Capacity
- ▶ Demand vs. Supply – A Solution
- ▶ Appendices

Historic Immigration Statistics



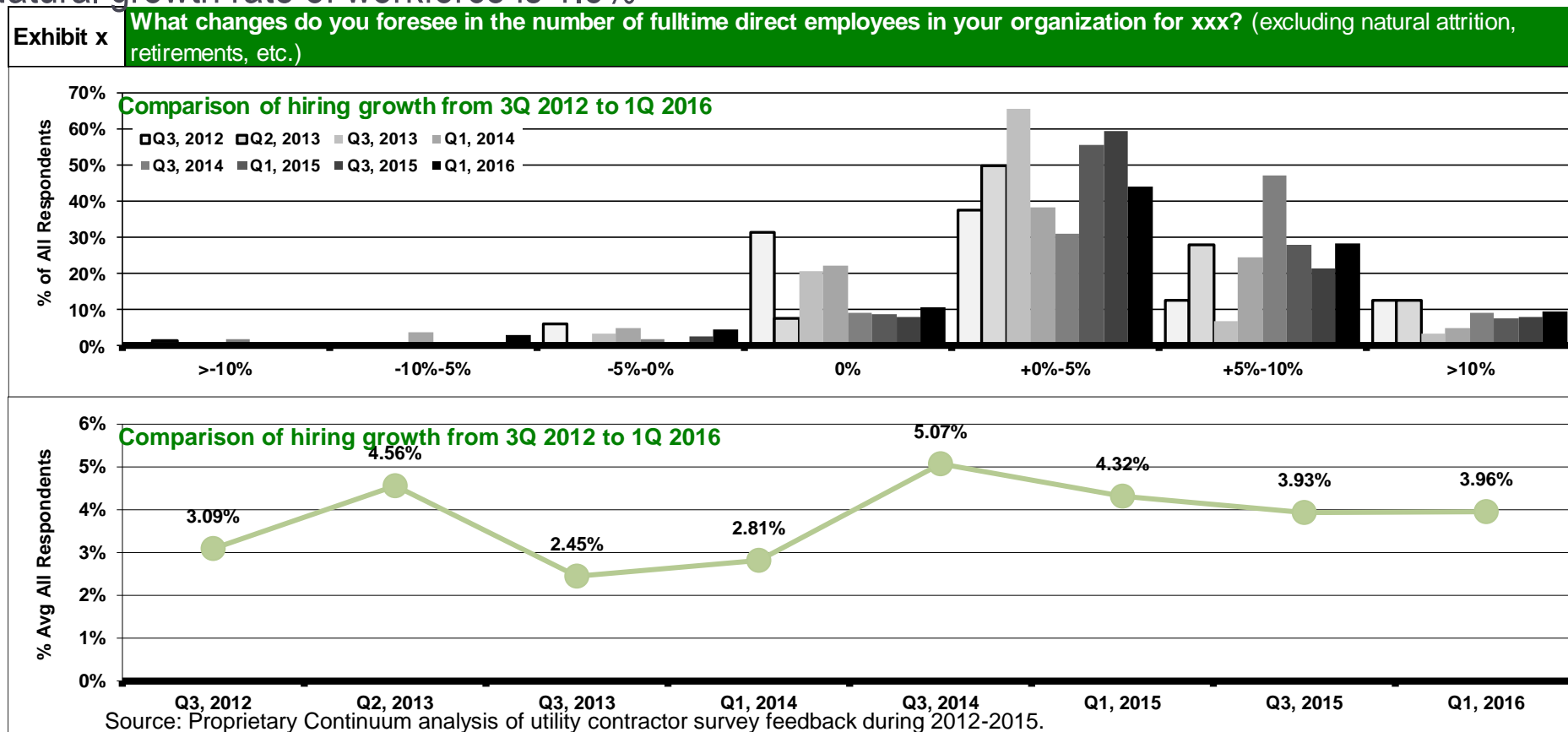
Labor Participation vs. Unemployment

- Improving but still does not feel “healthy” in many places
 - 287,000 jobs added in June; only 11,000 added in May
 - Official Unemployment Rate = 5%
 - Labor Participation still down 4% since 2003-2007 peak



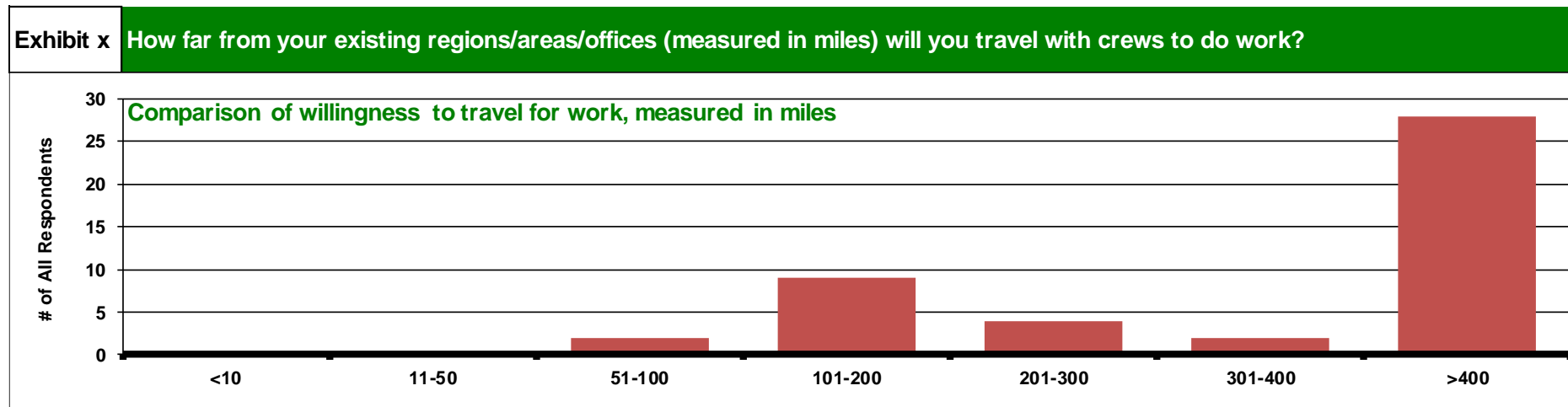
Industry Perceptions

- Overhead and underground utility survey 2012-2015
 - Hiring growth rate peaked in 2014 and remains above 4%
 - Natural growth rate of workforce is 1.5%



Willingness To Travel For Work

- ▶ Overhead and underground utility survey 2015
 - Two types of contractors, those who stay home and those that travel
 - Stay Home – 150 miles/2 hour drive
 - Travel – 400+ miles

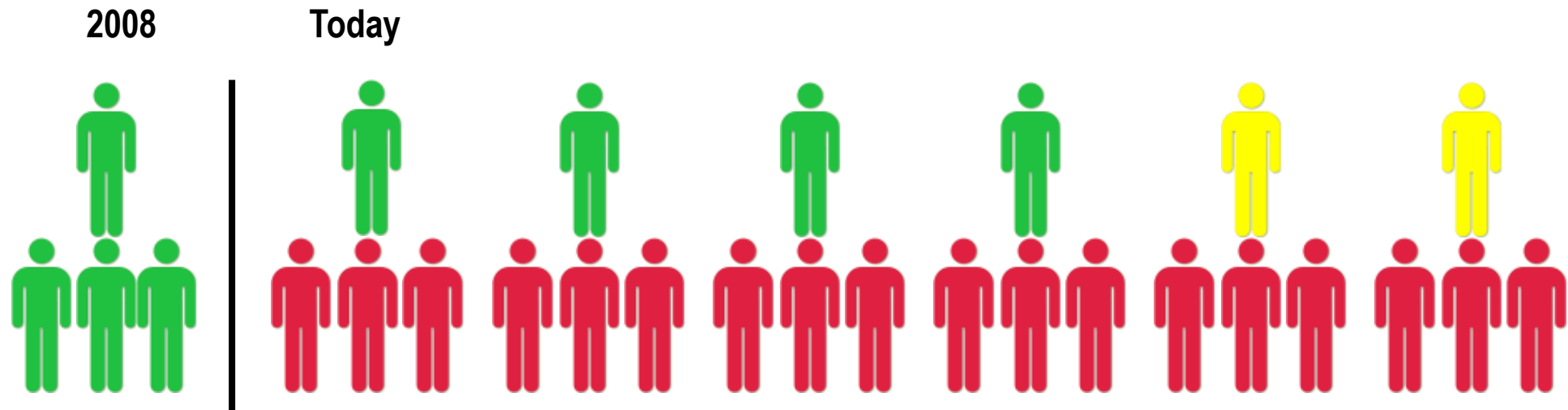


Source: Proprietary Continuum analysis of utility contractor survey feedback during 2012-2015.

Underground & Overhead Utility Infrastructure Thesis

► Who Will Do The Work?

- Thesis: That growth in spending on underground & overhead utility infrastructure between 2008 and 2016 has stretched resources in a way that makes continued expansion problematic for contractors and the utilities they serve.

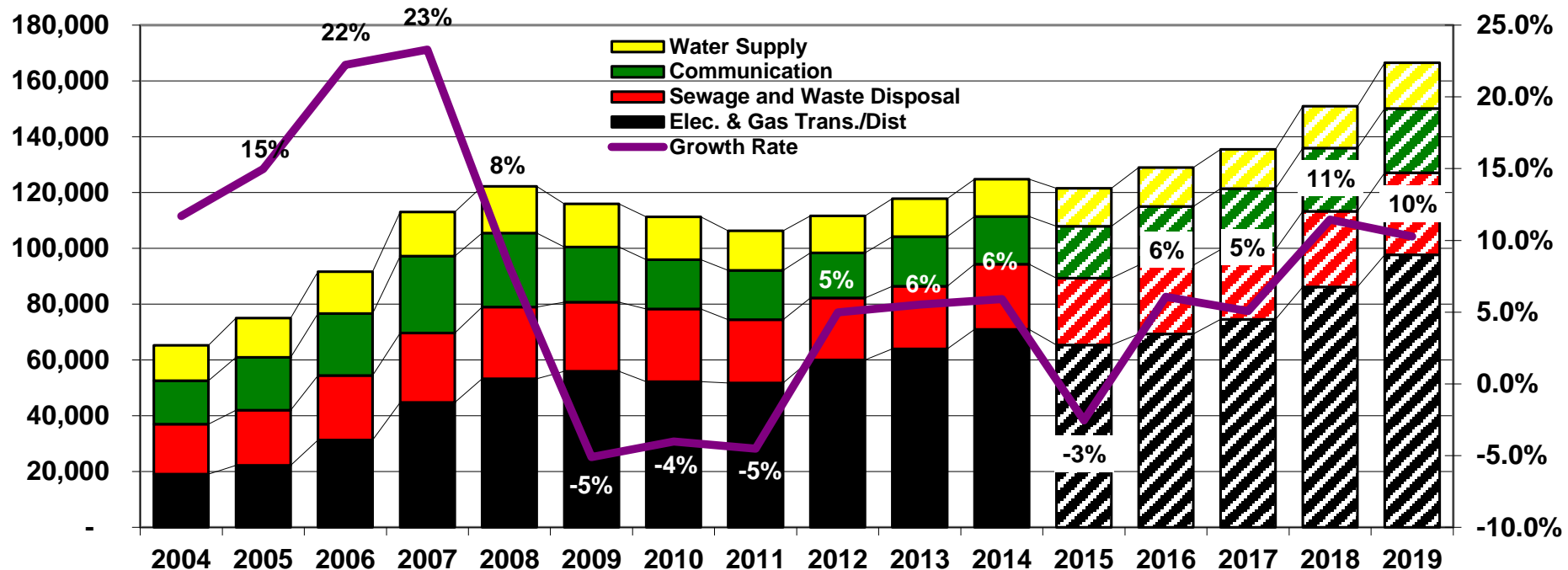


Agenda

- ▶ History & Perspective
- ▶ Workforce Capacity
- ▶ Demand vs. Supply – A Solution
- ▶ Appendices

Utility Construction Market Spending Overview

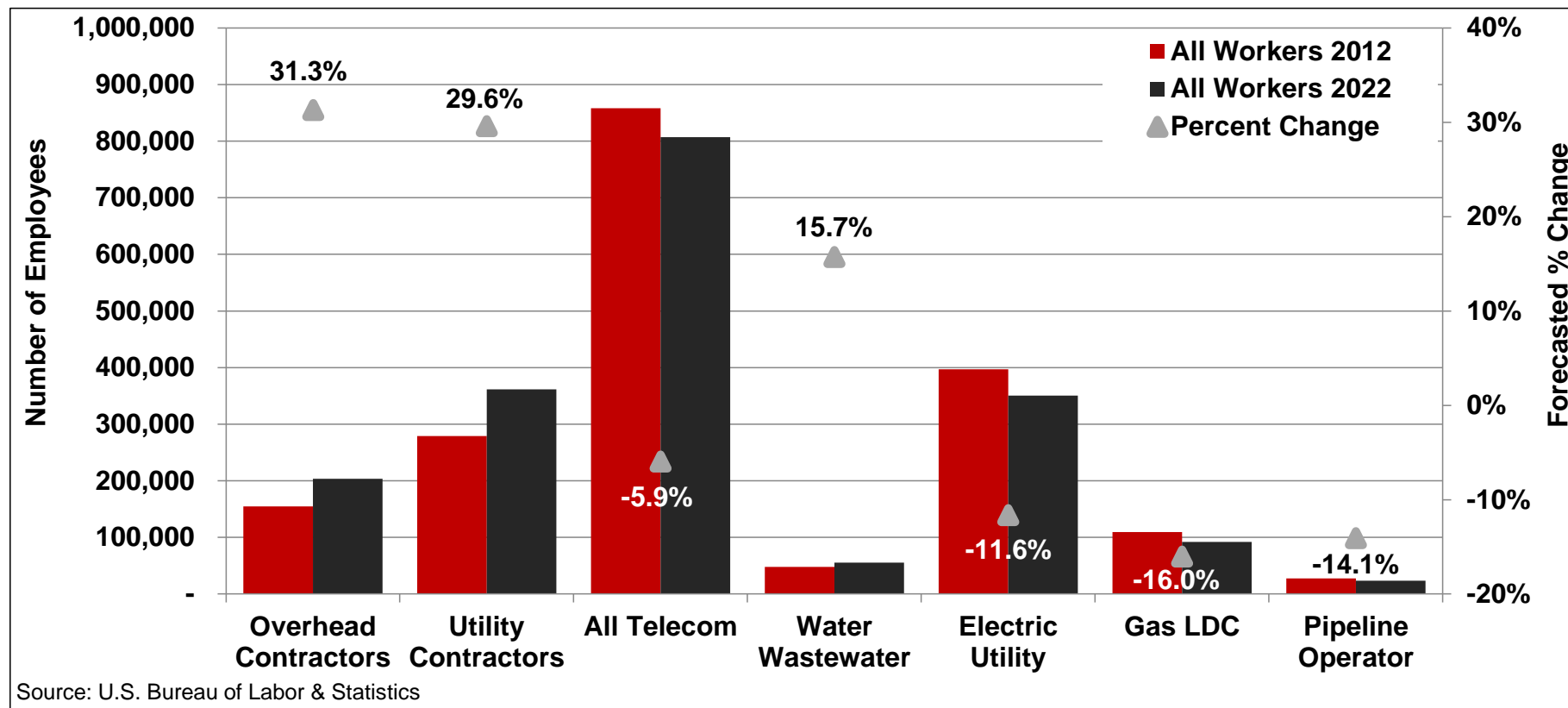
- Utility construction market spending
 - Electric & gas market experiencing the greatest growth
 - Telecom, water, sewer market recovering at different rates



Source: Building permits, construction put in place, and trade sources. Continuum prepared forecasts for 2015-2019.

Workforce Need

- ▶ 38.0% of electric and natural gas employees eligible to retire in the next decade.
- ▶ The Bipartisan Policy center predicts that U.S. utilities will need to hire an additional 150,000 workers for information technology intensive roles by the year 2030.

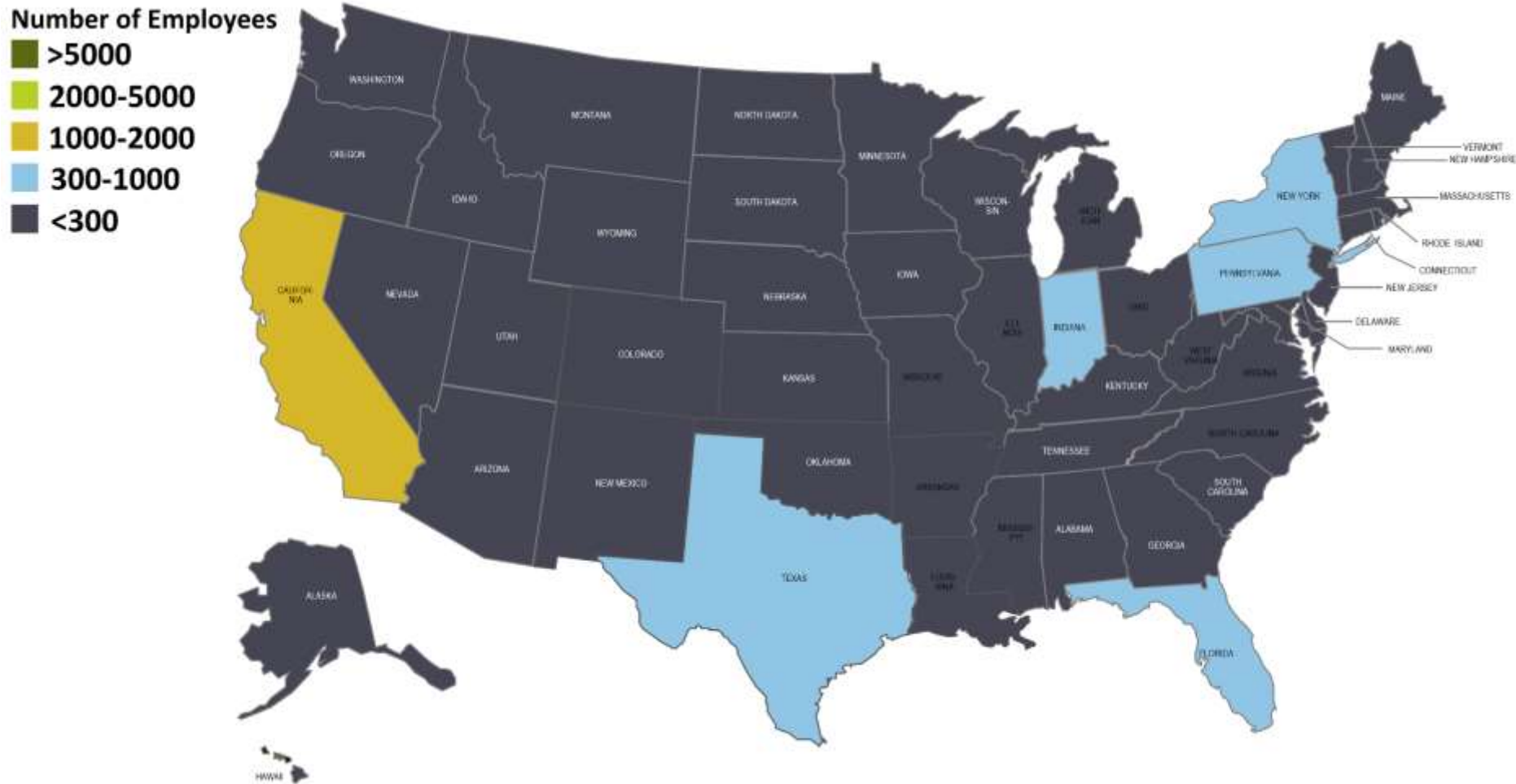


Today: Contractor Oil & Gas Pipeline Workforce



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, industry interviews, and proprietary Continuum information.

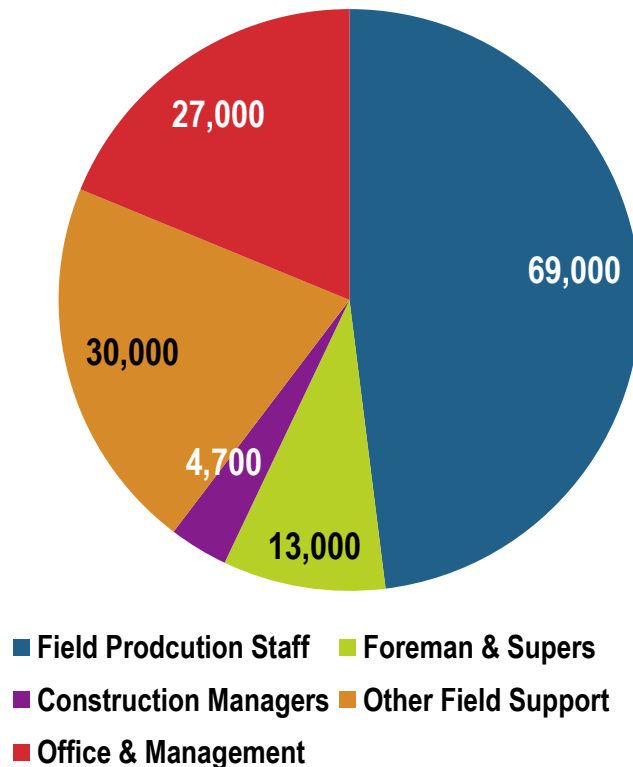
Today: Gas Utility Construction Workforce



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution, distribution utility and industry interviews, and proprietary Continuum information.

Today: Combined Underground Workforce – 17,000 Crews

Combined Workforce Breakdown



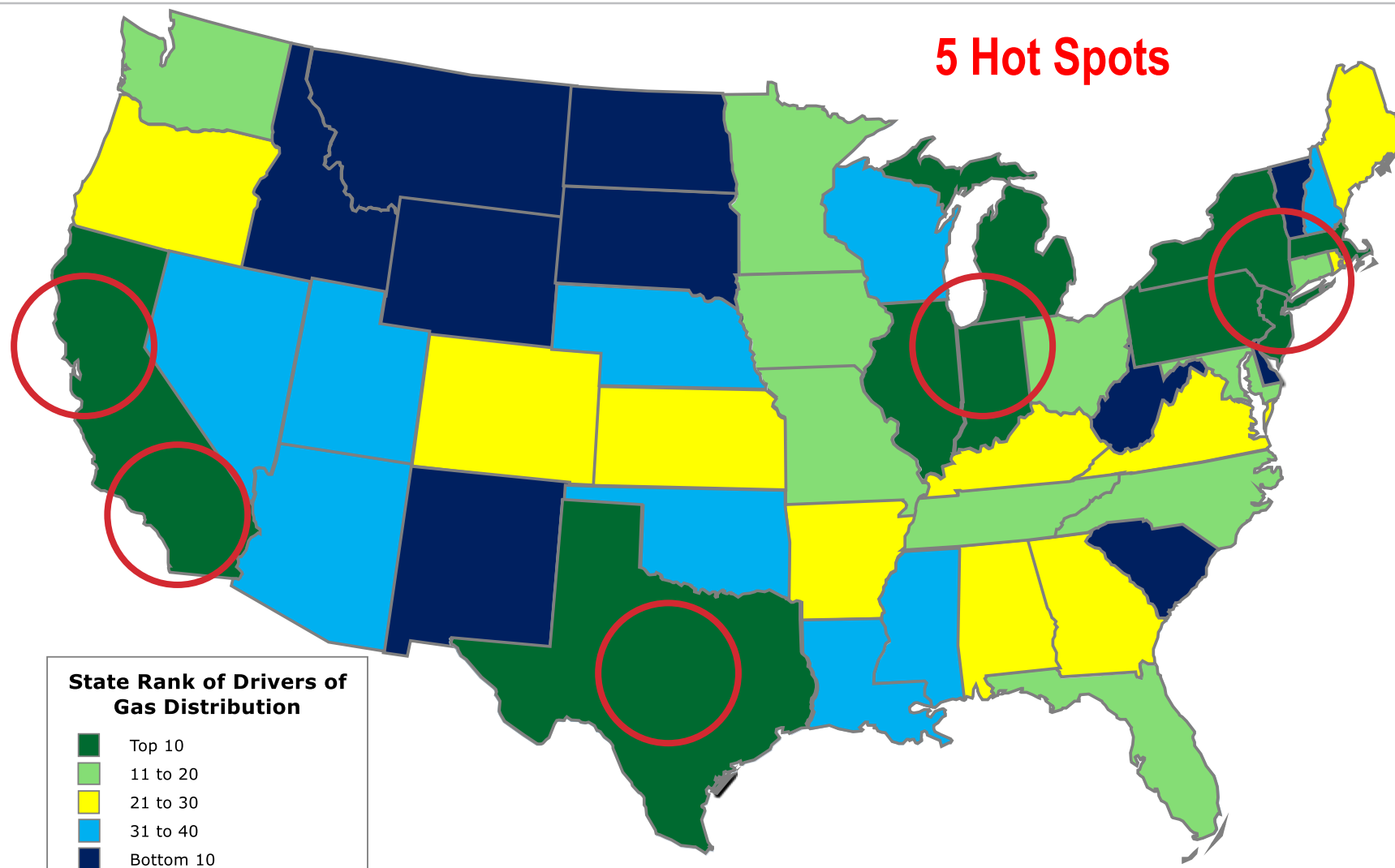
- ▶ Field production staff consist of the following
 - Construction Laborers
 - Operating Engineers and Other Construction Equipment Operators
 - Plumbers Pipefitters and Steamfitters
 - Helpers--Pipelayers Plumbers Pipefitters and Steamfitters
 - Welders Cutters Solderers and Brazers
- ▶ Foreman & Superintendents are classified as first-line supervisors of construction trades
- ▶ Other field support includes truck drivers, inspectors, mechanics, pavers, landscapers, etc.
- ▶ Assuming 4 staff per crew on average equals 17,000 available crews

Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution and gas distribution contractor, utility, and industry interviews, and proprietary Continuum information.

Agenda

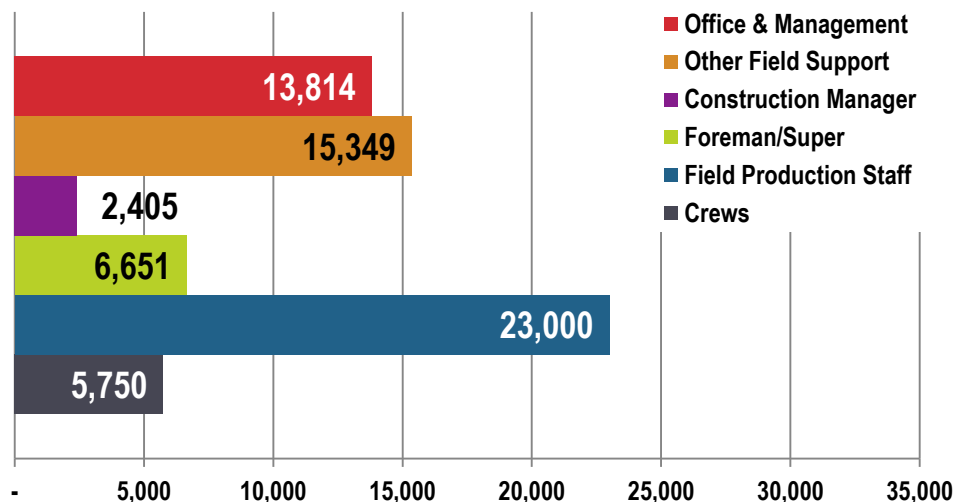
- ▶ History & Perspective
- ▶ Workforce Capacity
- ▶ Demand vs. Supply – A Solution
- ▶ Appendices

State Specific Drivers of Pipeline Spending



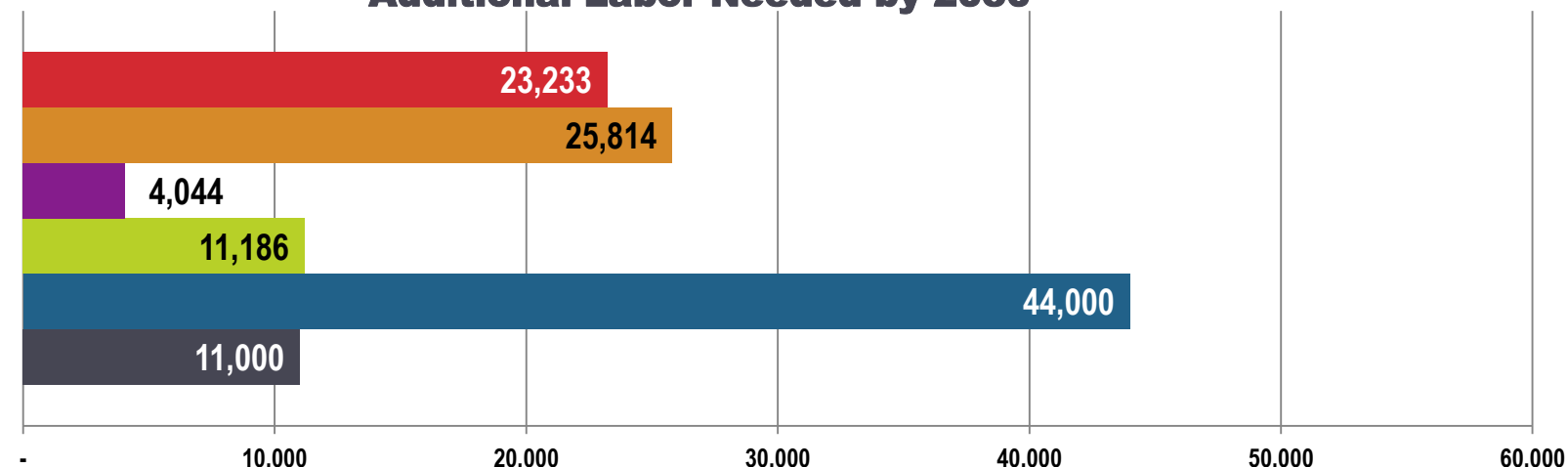
Future Pipeline Labor & Management Need?

Additional Labor Needed by 2020



From Today:
2020 = 5,750 Additional Crews
2030 = 11,000 Additional Crews

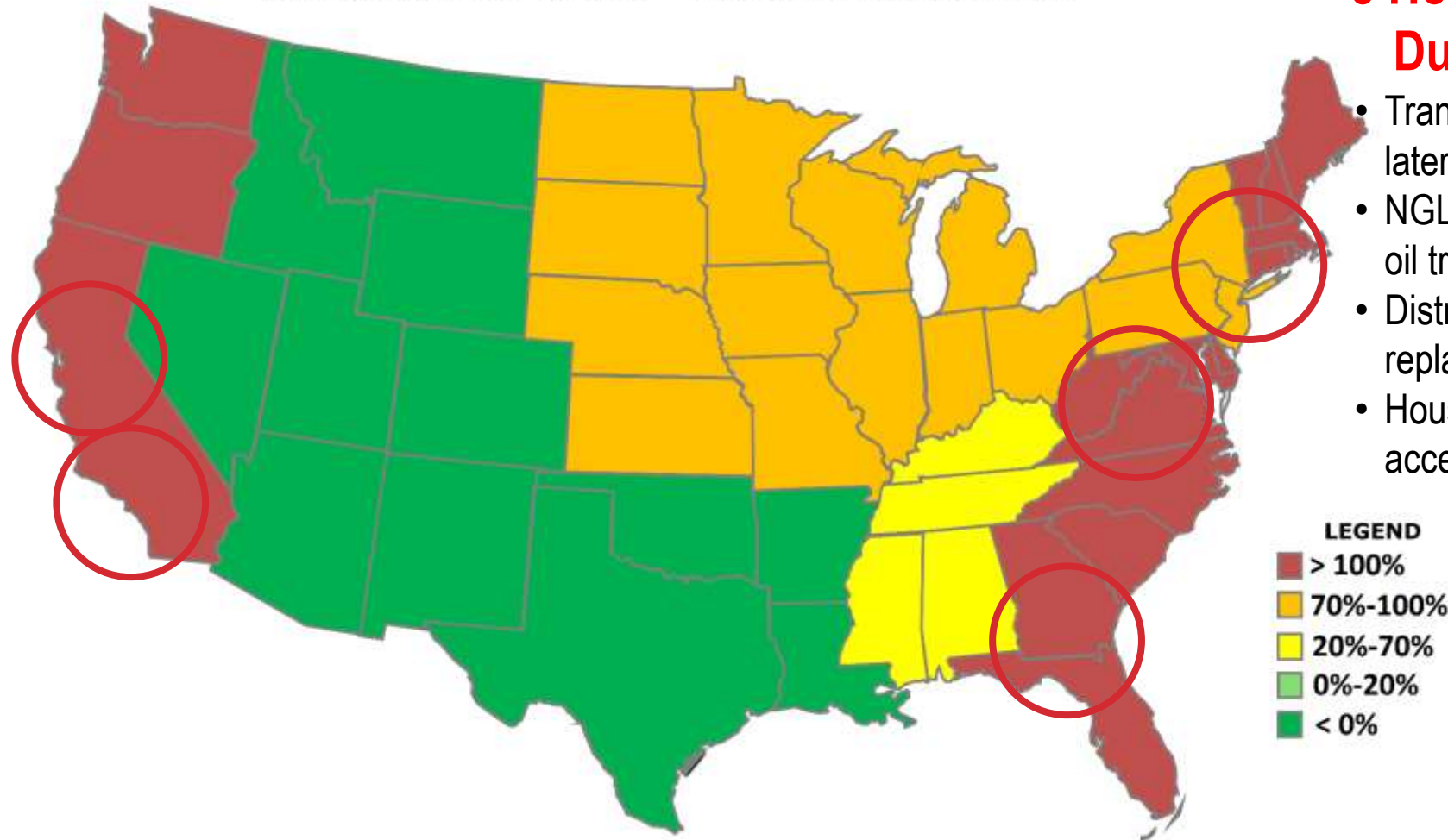
Additional Labor Needed by 2030



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution and gas distribution contractor, utility, and industry interviews, and proprietary Continuum information.

2020: Pipeline Supply vs. Demand

2020 Labor Need - Balanced Market



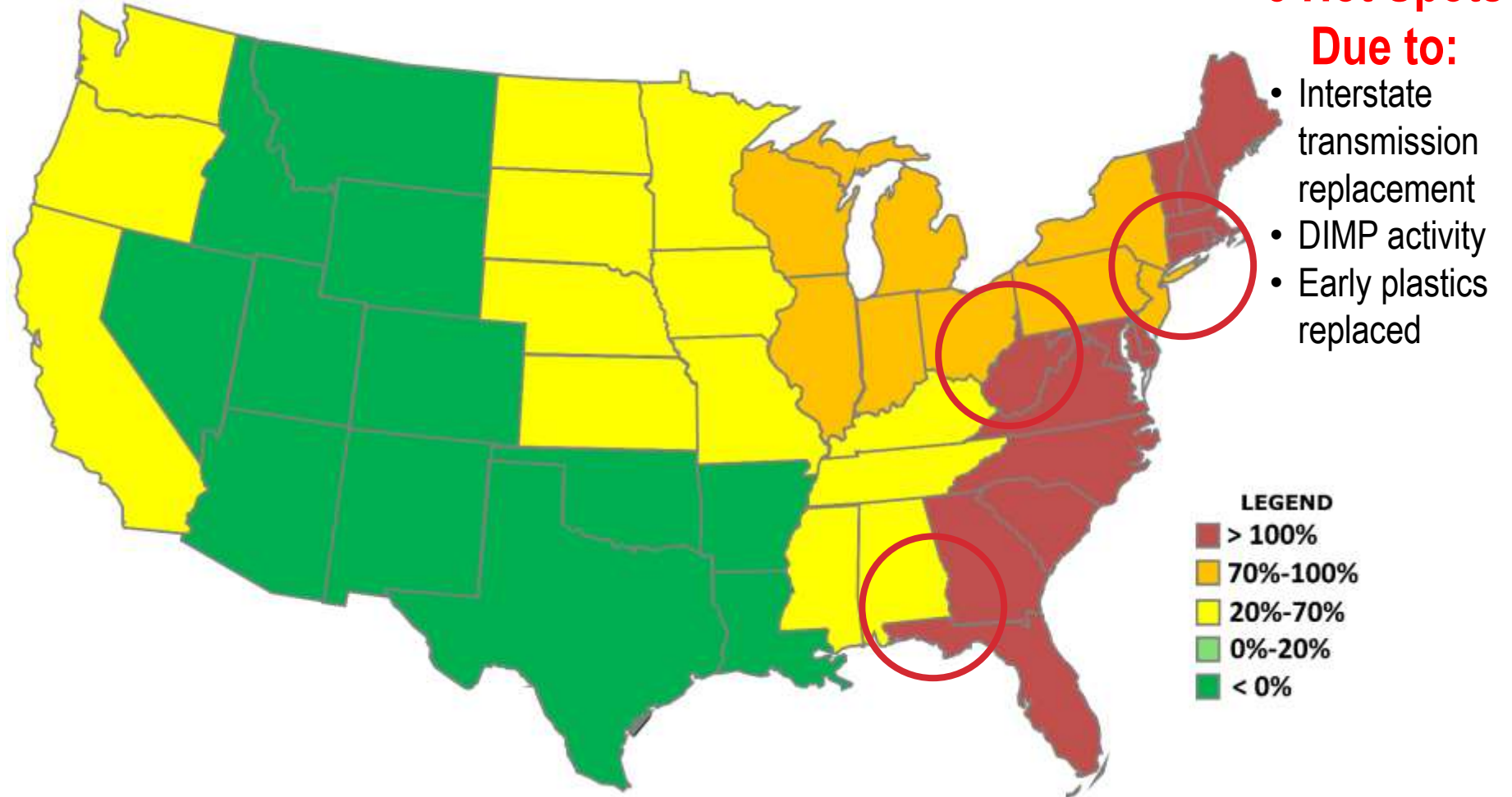
5 Hot Spots Due To:

- Transmission lateral
- NGL and shale oil transmission
- Distribution replacement
- Housing starts accelerating



2030: Pipeline Supply vs. Demand

2030 Labor Need - Balanced Market



A Solution

Utility Example



- ▶ Vision:
 - Where the industry speaks with one voice for a single purpose – Companies adequately staffed with a diverse workforce with the right skills to safely keep the energy flowing.
- ▶ Mission:
 - Build the alliances, processes, and tools to develop tomorrow's energy workforce.
- ▶ Goals:
 - Career Awareness - Build awareness of high skilled positions in the energy industry.
 - Workforce Development/Education - Implement short and long term education solutions to build a pipeline of skilled workers.
 - Workforce Planning - Identify critical workforce needs and measure the success of workforce development initiatives.
 - Member Value and Support - Support the needs of CEWD members

For more information: www.cewd.org

Seed An Industry Solution (1 of 4)

Underground Construction Workforce Alliance (UCWA)



- Long-Term Objective:
 - Solve underground workforce and field leadership availability over a 10-year time horizon covering 2015-2025.

- Short-Term Objective:
 - Build a coalition made up of Industry Associations, Unions, Material / Equipment Suppliers, Engineers, Contractors, and Utility / Pipeline firms that develop the strategy and tactics necessary to achieve the long-term objective.

For more information: Contact Mark Bridgers, (919) 345-0403, Mbridgers@ContinuumCapital.net

Seed An Industry Solution (2 of 4)

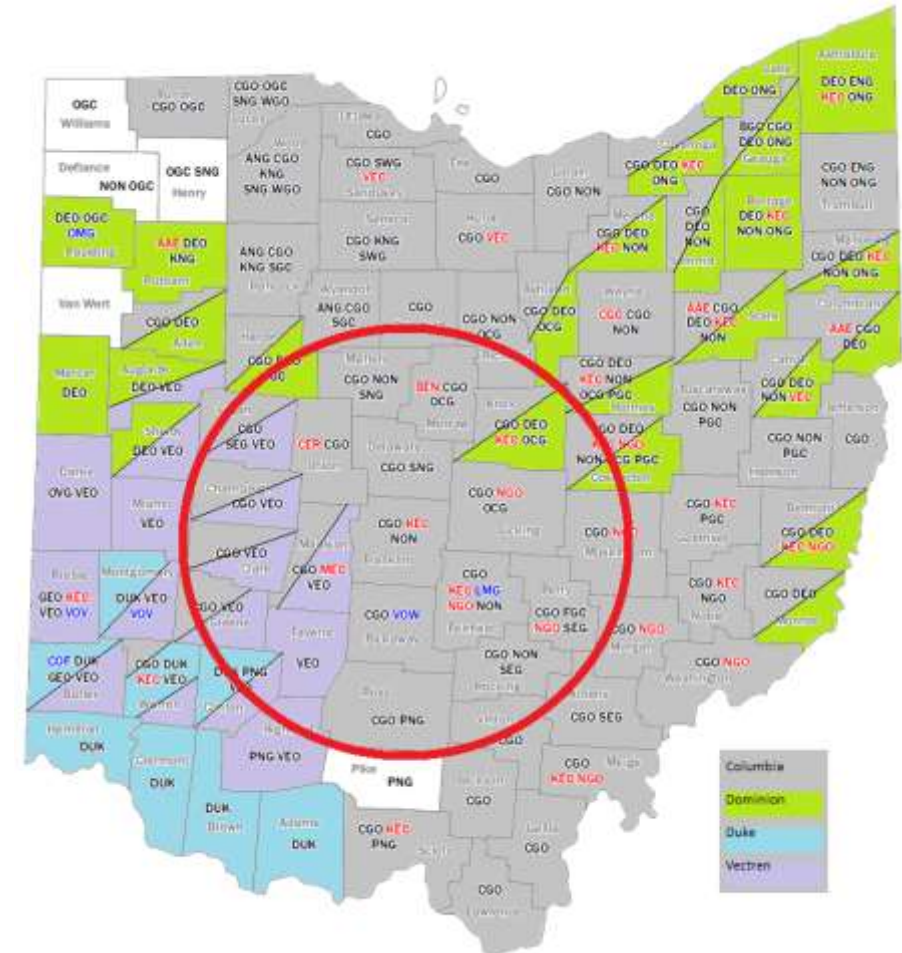
► UCWA Leadership Team

- Doug Banning – CEO - Miller Pipeline
- Robert G. Darden - Executive Vice President - Distribution Contractors Association (DCA)
- Peter Fojtik - General Manager - Gas Distribution - Michels Corporation
- Chuck Shafer - Vice President – Engineering & Construction - NiSource Inc. - NiSource Gas Distribution
- Kyle Slaughter - Director Operations Support - Atmos Energy Corporation
- Dave Wisniewski - Senior Director, Underground Installations - Vermeer Corporation
- Eben Wyman – President - Wyman Associates



Seed An Industry Solution (3 of 4)

- ▶ Pilot Local Implementation Team:
 - Central Ohio in coordination with CEWD
 - Confirmed shortage of workforce and continued growth in spending over 10 year horizon
 - Touches 4 large LDCs
 - Touches 5 large contractors and as many as 10 medium to small contractors



Seed An Industry Solution (4 of 4)

Free Trial

Continuum has negotiated a free trial for companies interested in both participating in and utilizing this resource.

Contact Mark Bridgers for information.



The CLMA® is an online application that helps owners, contractors, labor providers and the construction industry overall understand the skilled labor market and manage labor risk.

- ❑ More than 4M projects
- ❑ Value of projects ≈ \$4.2T
- ❑ About 77% of U.S. non-residential construction
 - About 79% Industrial construction
 - About 76% Non-Industrial construction
- ❑ Tracks 49 craft disciplines
- ❑ Now tracking 14 professional positions

The CLMA® Database

Value of Projects Put in Place - United States

Project Type	Industrial	Non-Industrial	All Projects
Capital (TIC < \$25M)	\$16.5 B	\$1.8 T	\$1.8 T
Capital (TIC: \$25M - \$250M)	\$63.7 B	\$472.7 B	\$536.4 B
Capital (TIC: \$250M - \$1B)	\$167.1 B	\$53.0 B	\$210.0 B
Capital (TIC > \$1B)	\$719.1 B	\$9.8 B	\$719.9 B
Capital - Annual Spending	\$109.7 M	\$0	\$109.7 M
Ongoing Maintenance	\$303.8 M	\$0	\$303.8 M
Shutdown/Turnaround/Outage	\$67.3 B	\$0	\$67.3 B
Totals	\$1.1 T	\$2.3 T	\$3.4 T

VALUE OF PROJECTS PUT IN PLACE - UNITED STATES



www.myCLMA.com

Practical Training Examples

- ▶ State Technical College of Missouri (www.statetechmo.edu)
 - Collaboration Opportunity
 - Networking Systems Technology
 - Electrical Distribution Systems
 - Heavy Equipment Operations
 - Welding Technology
 - Program Objectives
 - Cause future employees to self-select out during education rather than after employment
 - Build clarity on graduate skill level and experience

- ▶ Northeast Wisconsin Technical College (www.nwtc.edu)
 - Leverage Opportunity
 - Gas Utility Construction & Service
 - Program Objectives
 - Train individuals to become gas distribution worker, gas service person, gas meter and regulation mechanic, gas clerk-estimator, gas inspector, gas appliance repair mechanic, underground facilities locator, pipeline welder, pipe layer, PE pipe fusion, and equipment operator.



Training Structure

General Utility Construction & Maintenance Training Program							
Basic Computer	OSHA 10	Class A CDL (with tanker endorsement)	Plan & Blueprint Reading	Basic Power Awareness	Work Zone Safety	Utility Locating	One Call
Basic Permit Requirements	Construction Math	Basic Power Tools	Basic Rigging	Basic Electric (AC/DC Theory)			
Underground Utility Training Program				Overhead Utility Training Program			
Pipe Fusion	Shoring & Trench Safety	Asset Separation	Environmental Impact	Pole Climbing	Basic Aerial	Bucket & Digger Derrick Operation	Advance Power Awareness
Trenching Techniques	Direction Boring Operation	Cross Bore Risk Management	Enclosed/ Confined Space	Pole Attachment Points	Pole Setting & Replacement		
Water/Sewer	Broadband	Electric	Pipeline	Broadband	Electric Dist.	Electric Trans.	Other Overhead
Heavy Equipment Operation	Light Equipment Operation			Cable Stringing			
Tunneling	Fiber Splicing	Cable Pulling	Steel & Alloy Welding	Fiber Splicing	Energized vs. Non-Energized		
	Cable Blowing	Copper Splicing	Pressure Testing		Line Splicing		

What Should Regulators and Utilities Do Today?

What Should Regulators and Utilities Do Today?

► Regulators

- Awareness: Use today as a starting point for understanding workforce dynamics in the states and regions you regulate and more specifically the unique circumstances of your state and region.
- Vision: Much of the underground construction activity pulls from the same local workforce and developing this workforce over a decade is necessary.
- Strategy vs. Cash: Pouring cash or increased rates onto this challenge in and of itself is not the solution; encouragement of mitigating strategies, similar to the below, especially when paired with innovative rate making schemes is a solution.

► Utilities

- Upgrade Service Providers: Lock in effective and efficient service provider resources with 5-7 year contracts.
- Project Delivery: Develop a structured project delivery system selection for type, geography, and pace of work.
- Upgrade Skills: Improve talent acquisition and retention for the replacement of baby boom generation.
- LEAN Construction: Develop partnering, collaboration, and integration skills with service providers to drive out waste.
- Scarcity Environment: Identify strategies, processes, & technologies to operate in a “scarcity” environment - labor constraints, equipment constraints, etc.
- Asset Management: Mitigate long-term economic, regulatory and technological developments with the potential to lower demand and strand long lived assets.

Thank You

MARK BRIDGERS

shipping:

405 Forsyth Street
Raleigh, NC 27609

mailing:

PO Box 31026
Raleigh, NC 27622

www.ContinuumCapital.net

919.345.0403

MBridgers@ContinuumCapital.net

Twitter: @MarkBridgers

Skype: mark.bridgers.continuum

LinkedIn: www.linkedin.com/pub/mark-bridgers/12/9b4/81

Mark Bridgers

Mark founded and leads a Utility Vertical Market team team at Continuum Capital. He works with gas/electric utilities, power generators, pipeline companies, and energy companies. As a recognized expert in capital construction and operational challenges, Mark was recently honored with membership in the Society of Gas Operators (SOGO).

Mark helps firms prepare for and successfully navigate “strategic transitions.” His passion is helping organizations achieve breakthrough innovations through collaborative or integrated relationships. He is the architect of an approach for integrated service provider management referred to as the “Extended Enterprise” among construction industry participants.

Mark is an avid educator, trainer, and writer with more than 20 years of industry expertise including financial performance analysis; development and implementation of tools to reduce construction cost, life-cycle cost, and operational friction; restructuring of processes and procedures - often times using LEAN Construction techniques; and leader development.. He is a recognized expert in capital construction and operational challenges . Mark is also author of over 150 articles and research papers published internationally in industry journals, including ENR, PE – The Magazine for Professional Engineers, Pipeline & Gas Journal, Utility Contractor (NUCA), Underground Contractor, Electric Energy (RMEL) and Electric Perspectives (EEI).

Mark holds a master’s degree in business administration from the University of Virginia’s Darden school of Business and a bachelor’s degree in financial management from Clemson University. In addition, he earned the designation of Chartered Property and Casualty Underwriter (CPCU) and Associate in Reinsurance (ARe).



Agenda

- ▶ History & Perspective
- ▶ Workforce Capacity
- ▶ Demand vs. Supply
- ▶ Appendices
 - Appendix I – Electric T&D
 - Appendix II – Telecom
 - Appendix III – Pipeline
 - Appendix IV – Water & Sewer
 - Appendix V – Power Generation

Appendix I – Electric T&D

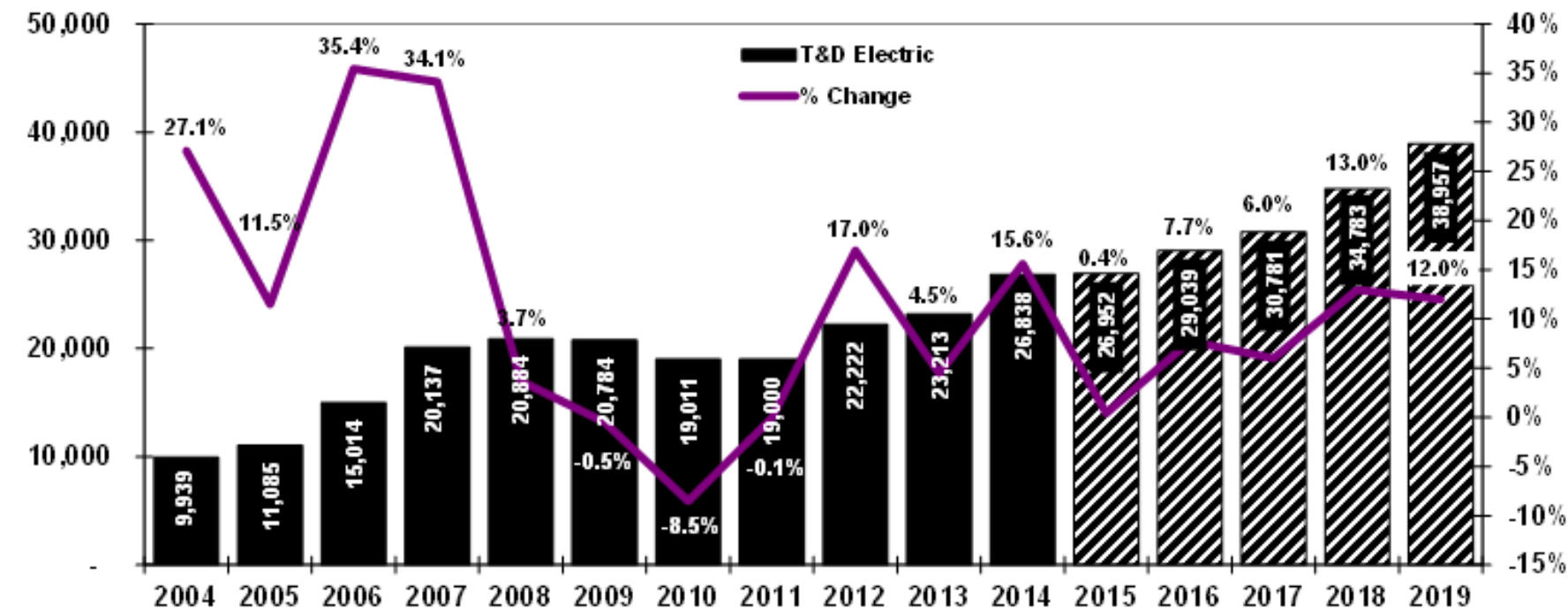
Workforce Availability Perspectives & Information

Electric Construction Market Drivers

- ▶ Replacement Funding – Driven by legislative action in New England, Mid-Atlantic and Mid-West
- ▶ New Housing – Acceleration spotty around the country but all markets improving
- ▶ Reliability Expectations – Asset replacement, hardening, reinforcement activity
- ▶ “Smart Grid” – Transformation of the grid; “real” construction activity just beginning and will accelerate in the future – today is mostly technology and meter installation
- ▶ Distributed Generation – just beginning and will accelerate in the future

U.S. Electric T&D Spending Overview

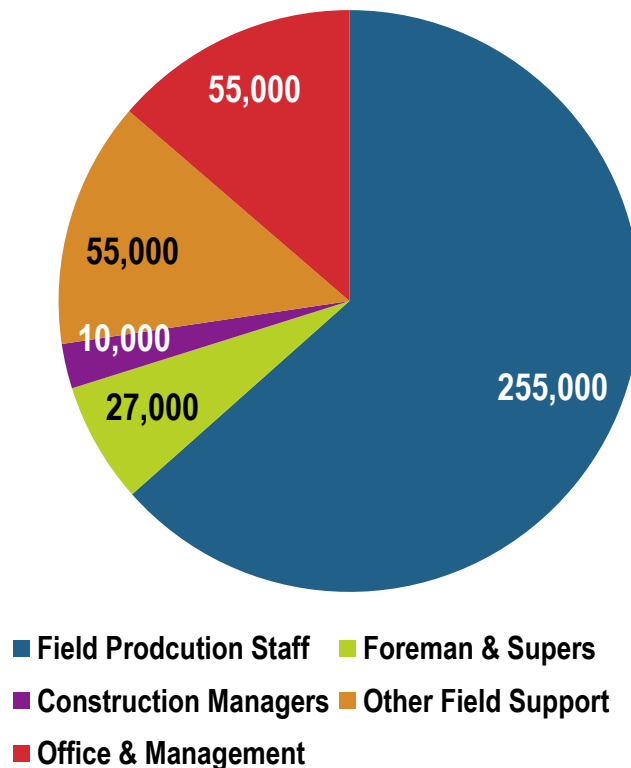
- US Electric Transmission & Distribution
 - Spending forecast through 2019



Source: Building permits, construction put in place, and trade sources. Continuum prepared forecasts for 2015-2019.

Today: Combined Electric Workforce

**Combined Workforce
Breakdown**

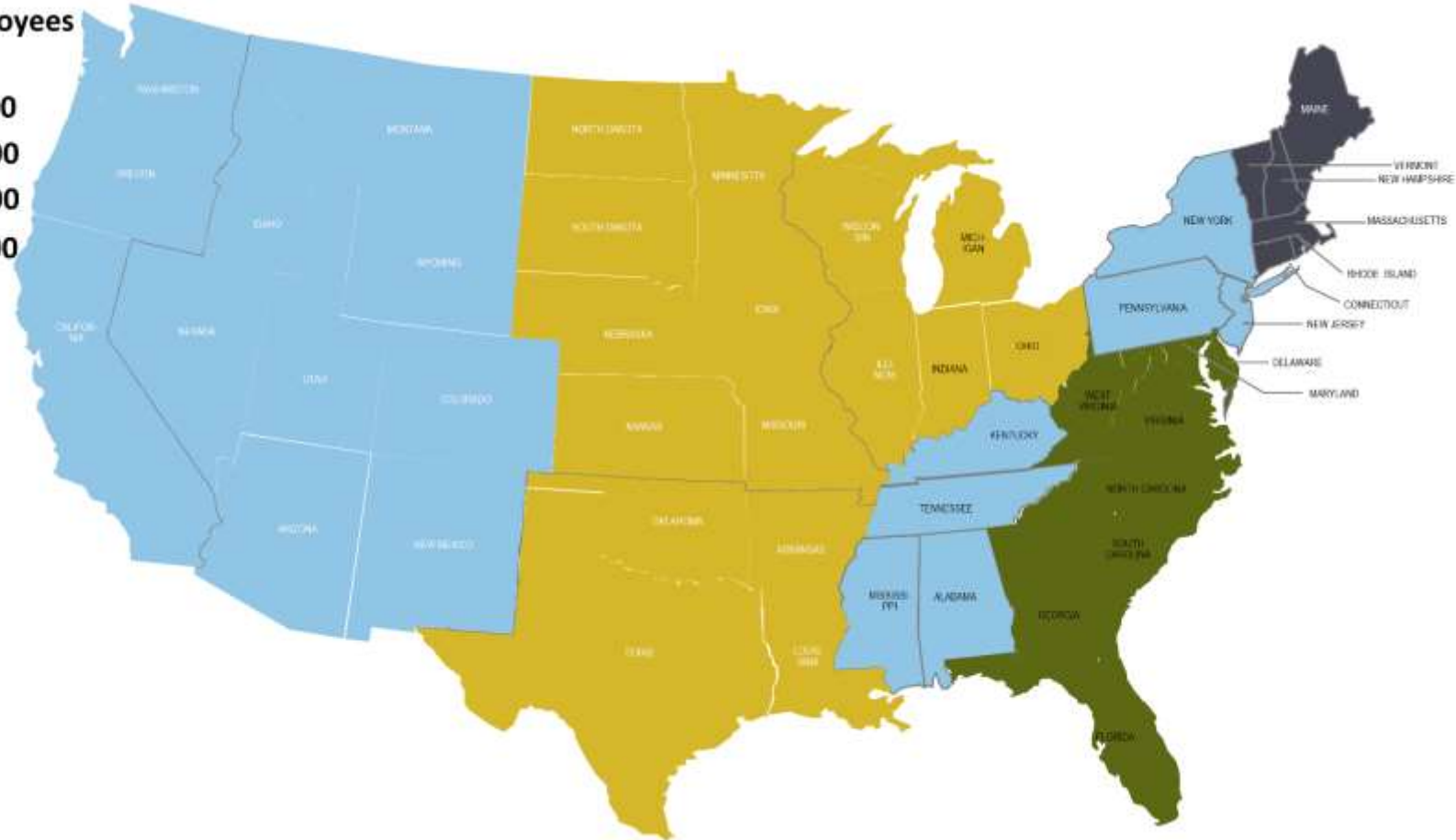


- ▶ Electric workforce is 3.5x larger than gas workforce
- ▶ Field production staff consist of the following
 - Linemen
 - Operating Engineers and Other Construction Equipment Operators
 - Helpers
- ▶ Foreman & Superintendents are classified as first-line supervisors of construction trades
- ▶ Other field support includes truck drivers, inspectors, mechanics, electricians, etc.
- ▶ Assuming 4 staff per crew on average equals 63,000 available crews

Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 22112 Electric power transmission and distribution, NAICS 23713 Power and communication system construction, NAICS 221100 Electric Power Generation, Transmission and Distribution, and Electrical Power-Line Installers and Repairers (SOC code 499051) and electric utility industry interviews, and proprietary Continuum information.

Today: Electric T&D Workforce

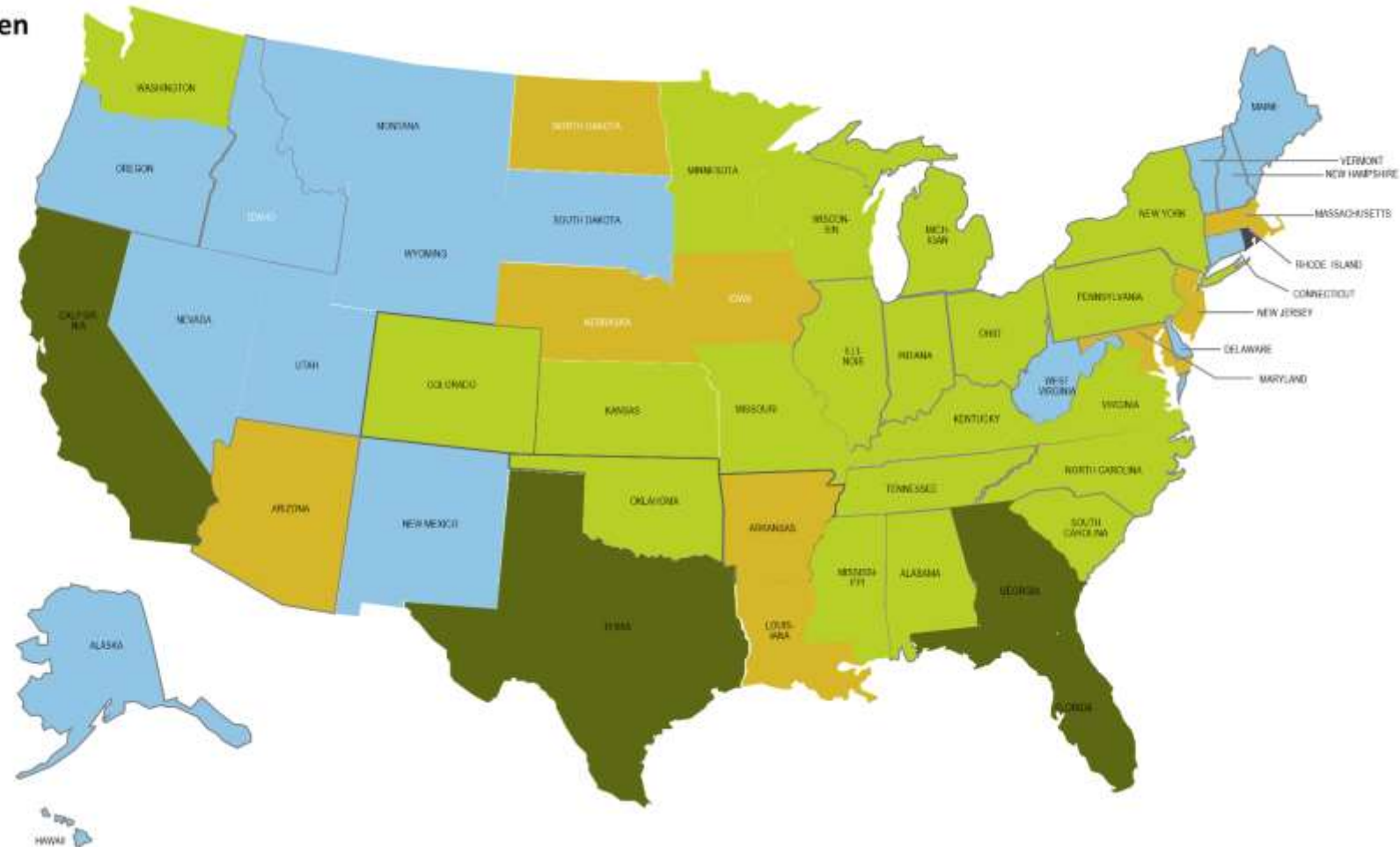
Electric T&D Employees



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 22112 Electric power transmission and distribution, NAICS 23713 Power and communication system construction, NAICS 221100 Electric Power Generation, Transmission and Distribution, and Electrical Power-Line Installers and Repairers (SOC code 499051) and electric utility industry interviews, and proprietary Continuum information.

Today: Electric Linemen

Number of Linemen

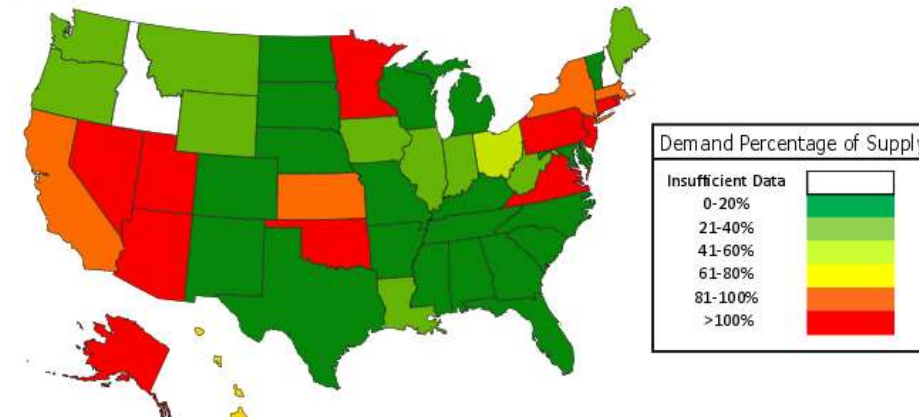


Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 22112 Electric power transmission and distribution, NAICS 23713 Power and communication system construction, NAICS 221100 Electric Power Generation, Transmission and Distribution, and Electrical Power-Line Installers and Repairers (SOC code 499051) and electric utility industry interviews, and proprietary Continuum information.

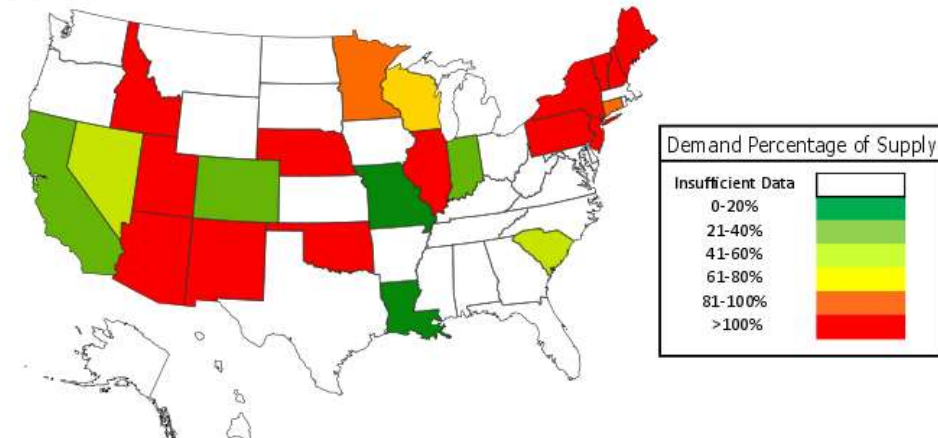
Electric Transmission & Distribution

- Today vs. 2018
- Long-term, this market may need 50,000 new field and supervisory entrants.

Supply / Demand Imbalance: Electric Power Transmission 2014



Supply / Demand Imbalance: Electric Power Transmission 2018



Source: Continuum and CLMA analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data, CLMA proprietary data, industry interviews, and proprietary Continuum information and forecasts.

Appendix II – Telecom

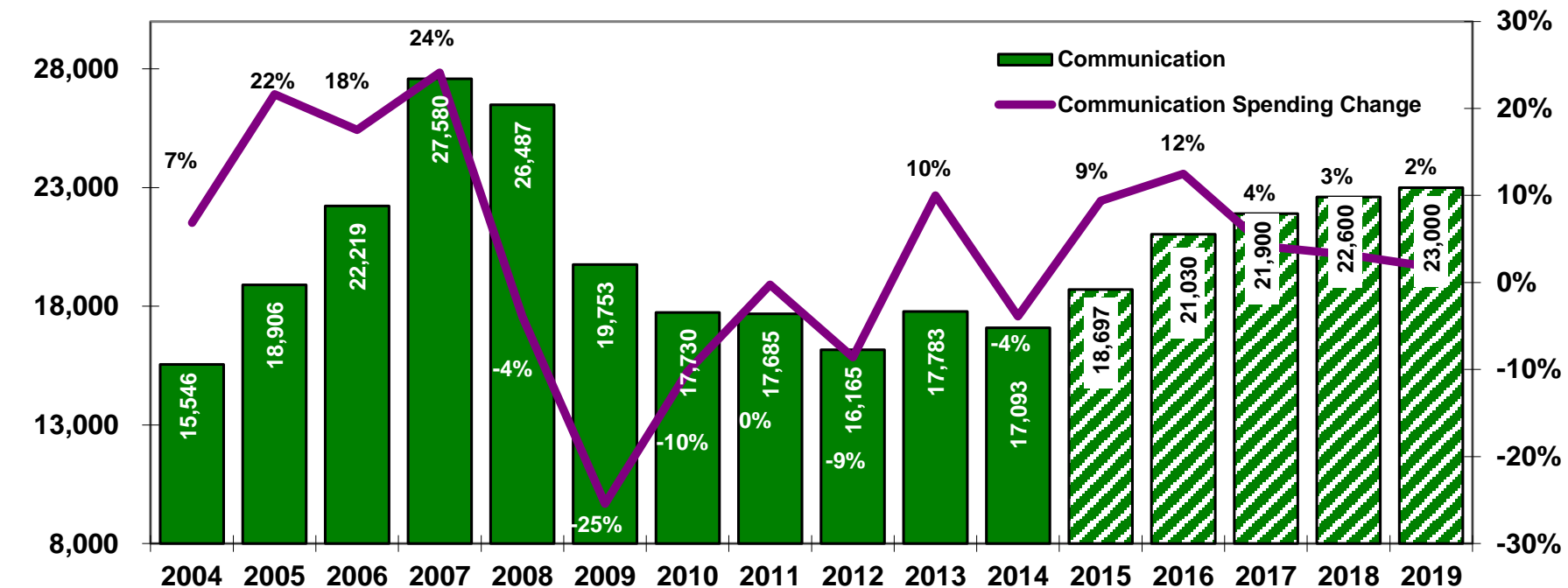
Workforce Availability Perspectives & Information

Telecom Construction Market Drivers

- ▶ Competition - Google, AT&T, Verizon, and CenturyLink among others to bring fiber and high speed service to major cities in the U.S.
- ▶ Federal Funding – Increasing availability of federal funding (Connect America Fund (CAF), etc.)
- ▶ Data Management – Continued expansion of data bandwidth need
- ▶ Wireless Infrastructure – Increasing need for fiber backhaul to support wireless infrastructure
- ▶ New Housing – Acceleration spotty around the country but all markets improving

U.S. Telecom Spending Overview

► US Telecom Construction Market



Source: Building permits, construction put in place, and trade sources. Continuum prepared forecasts for 2015-2019.

Telecom Workforce

Forecast Change by Occupation Through 2022 – Communications Workers	Utility	Contractor
Telecommunications equipment installers and repairers, except line installers	-4%	10%
Telecommunications line installers and repairers	-10%	42%

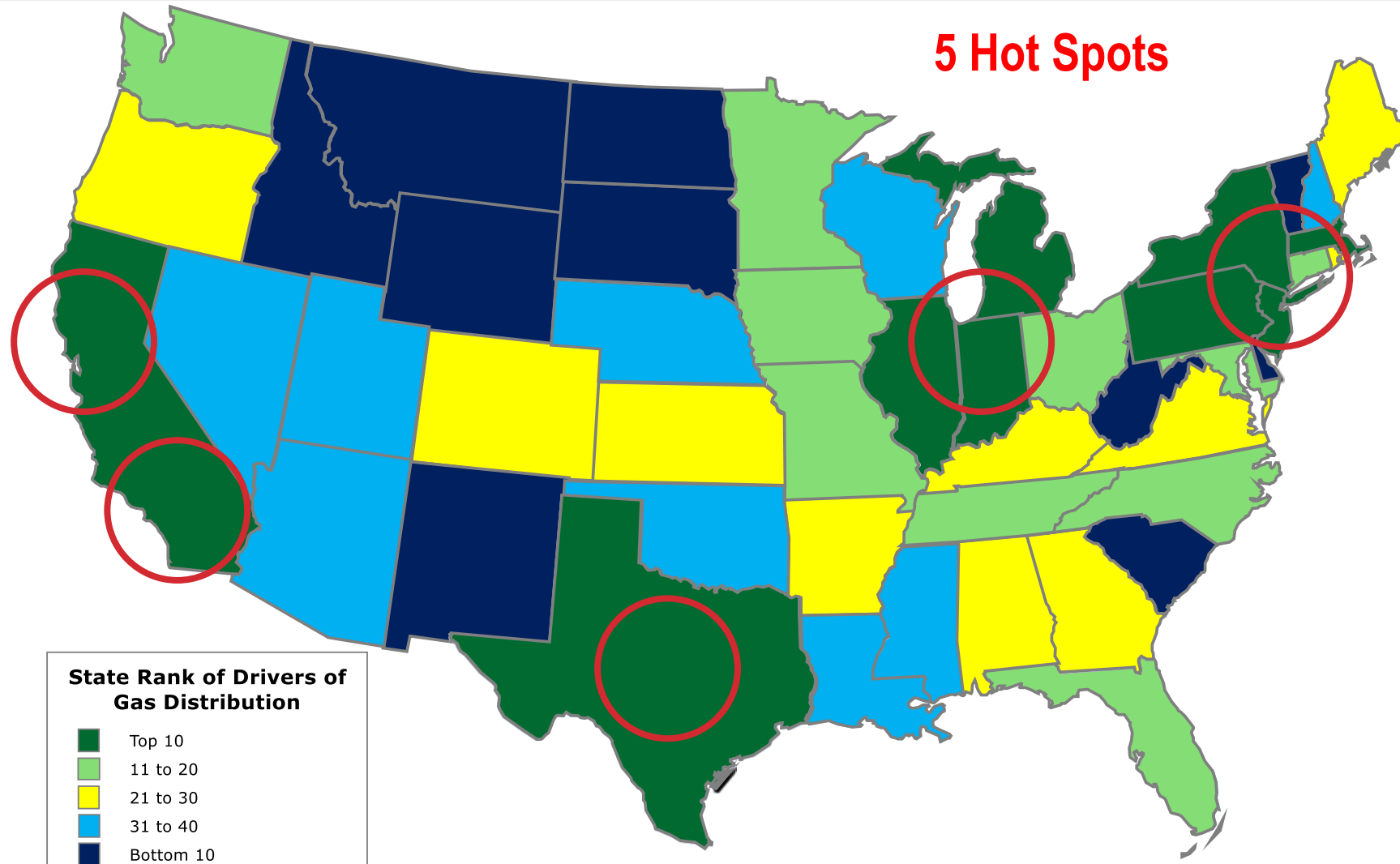
- ▶ The traditional telecommunication line installer workforce internal to the telecommunication firms is forecast to decline by 10% through 2022.
- ▶ In raw numbers this workforce will decline from 76,300 in 2012 to 68,300 in 2022.
- ▶ The contractor line installer workforce is expected to increase from 15,800 to 22,500.
- ▶ The communication industry is moving gradually towards more of an outsourced construction workforce model.
 - In 2012 17% of the line installers were external. By 2022 25% of this workforce will be external.

Source: Continuum analysis of U.S. Bureau of Labor & Statistics information.

Appendix III – Pipeline

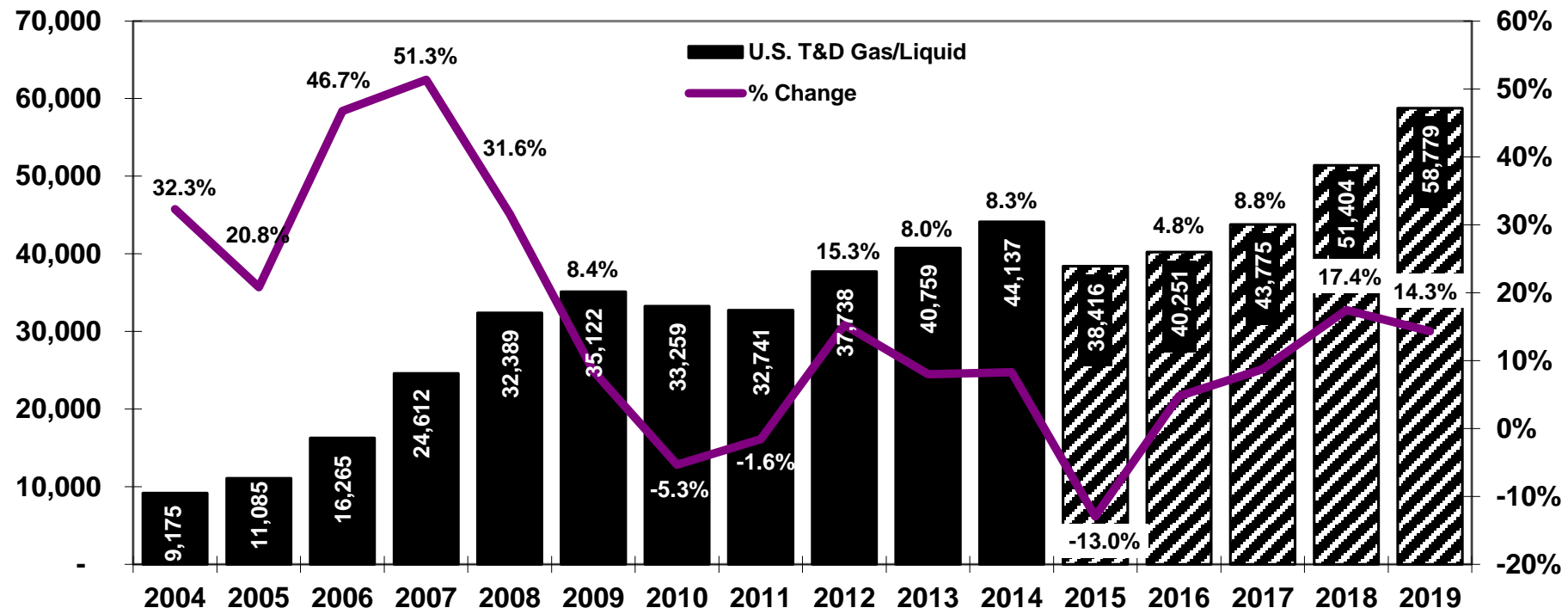
Workforce Availability Perspectives & Information

State Specific Drivers of Pipeline Spending



US Pipeline Spending Overview

► US Gas & Liquid, Transmission & Distribution



Source: Building permits, construction put in place, and trade sources. Continuum prepared forecasts for 2015-2018.

US Gas & Oil Pipeline Wave Drivers

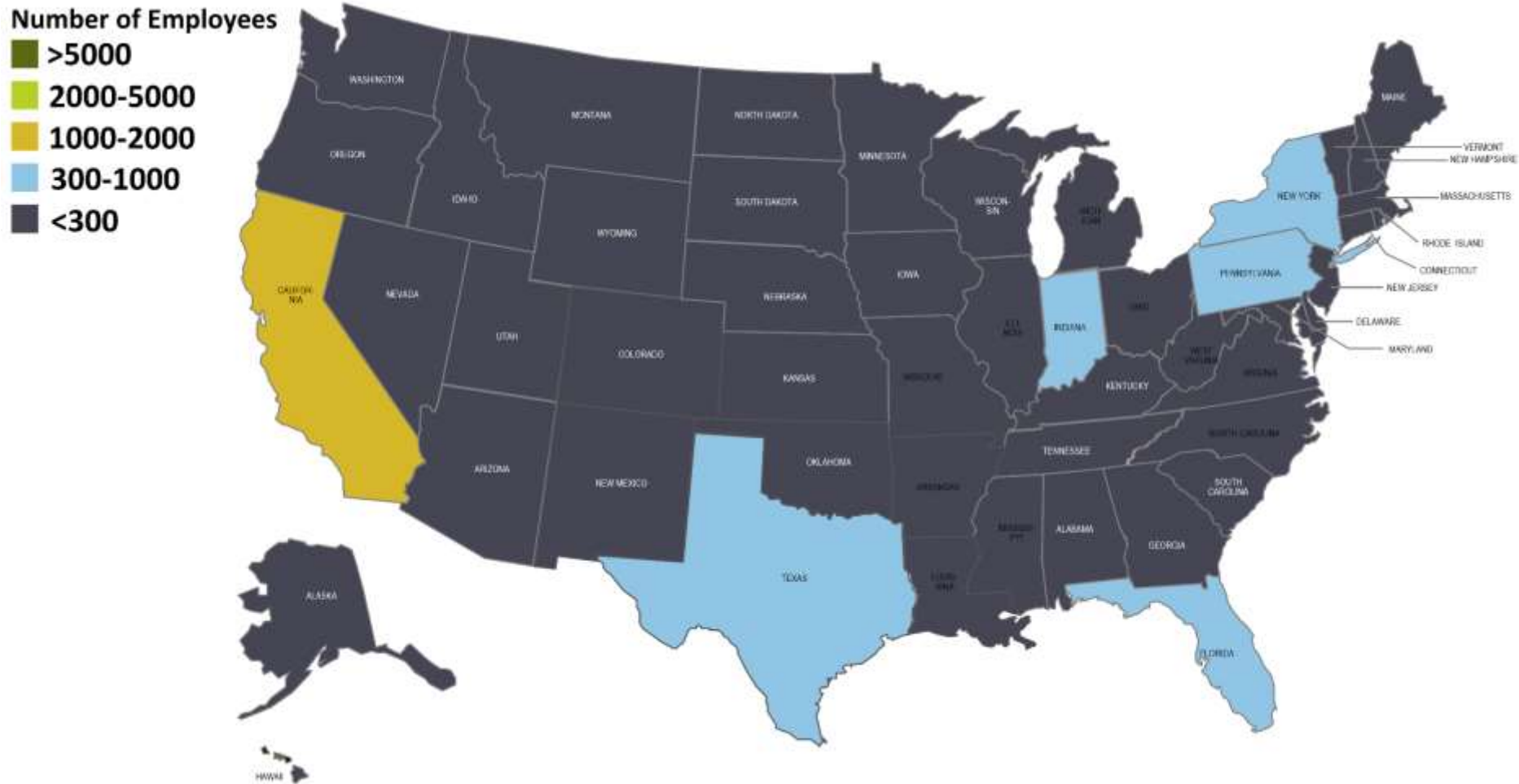
Wave 1 2008-2013	Wave 2 2016-2021	Wave 3 2025-2030	Wave 4 Beyond 2031
Trans. Integrity & Dist. Replacement	Industrial & Power Gen Renaissance	Trans. Replacement & Dist. Integrity	The Cliff
<ul style="list-style-type: none"> • \$32 to \$43 billion (+34%) 	<ul style="list-style-type: none"> • \$43 to \$65 billion (+49%) 	<ul style="list-style-type: none"> • \$65 to \$80 billion (+23%) 	<ul style="list-style-type: none"> • \$80 to \$45 billion (-44%)
<ul style="list-style-type: none"> • Shale gas and oil exploration expansion • Interstate transmission network expansion • TIMP acceleration of activity • Distribution replacement programs start • DIMP plan preparation 	<ul style="list-style-type: none"> • Transmission and high pressure distribution lateral construction • NGL and shale oil transmission system build out – Replacement for rail transport • Distribution replacement programs accelerating • Housing starts accelerating 	<ul style="list-style-type: none"> • Interstate transmission replacement programs accelerating • DIMP acceleration of activity • Early distribution plastics replaced • Rising natural gas prices increase domestic gas production 	<ul style="list-style-type: none"> • Transmission replacement activity slows • 100 years of distribution infrastructure replaced in 20 years • Industrial/Power/Export infrastructure complete – modest to no growth • Housing starts tempered by low population growth

Today: Contractor Oil & Gas Pipeline Workforce



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, industry interviews, and proprietary Continuum information.

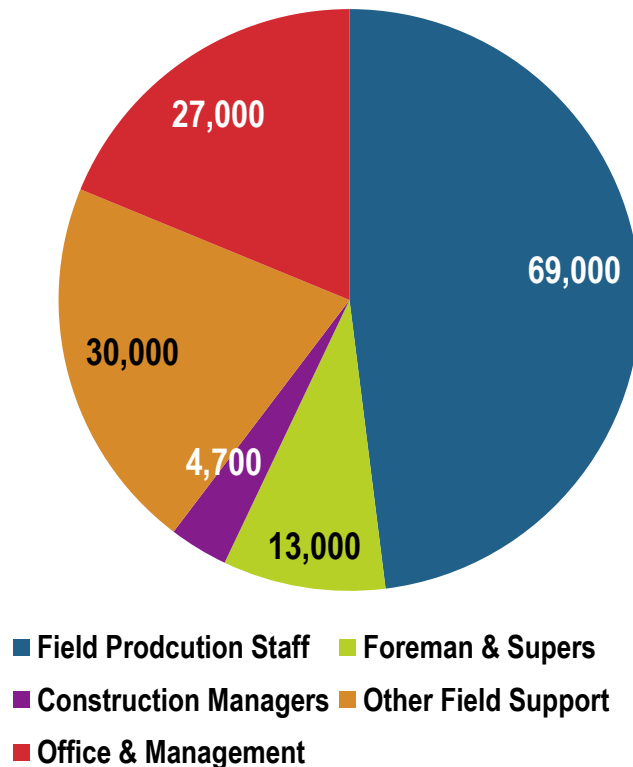
Today: Gas Utility Construction Workforce



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution, distribution utility and industry interviews, and proprietary Continuum information.

Today: Combined Underground Workforce – 17,000 Crews

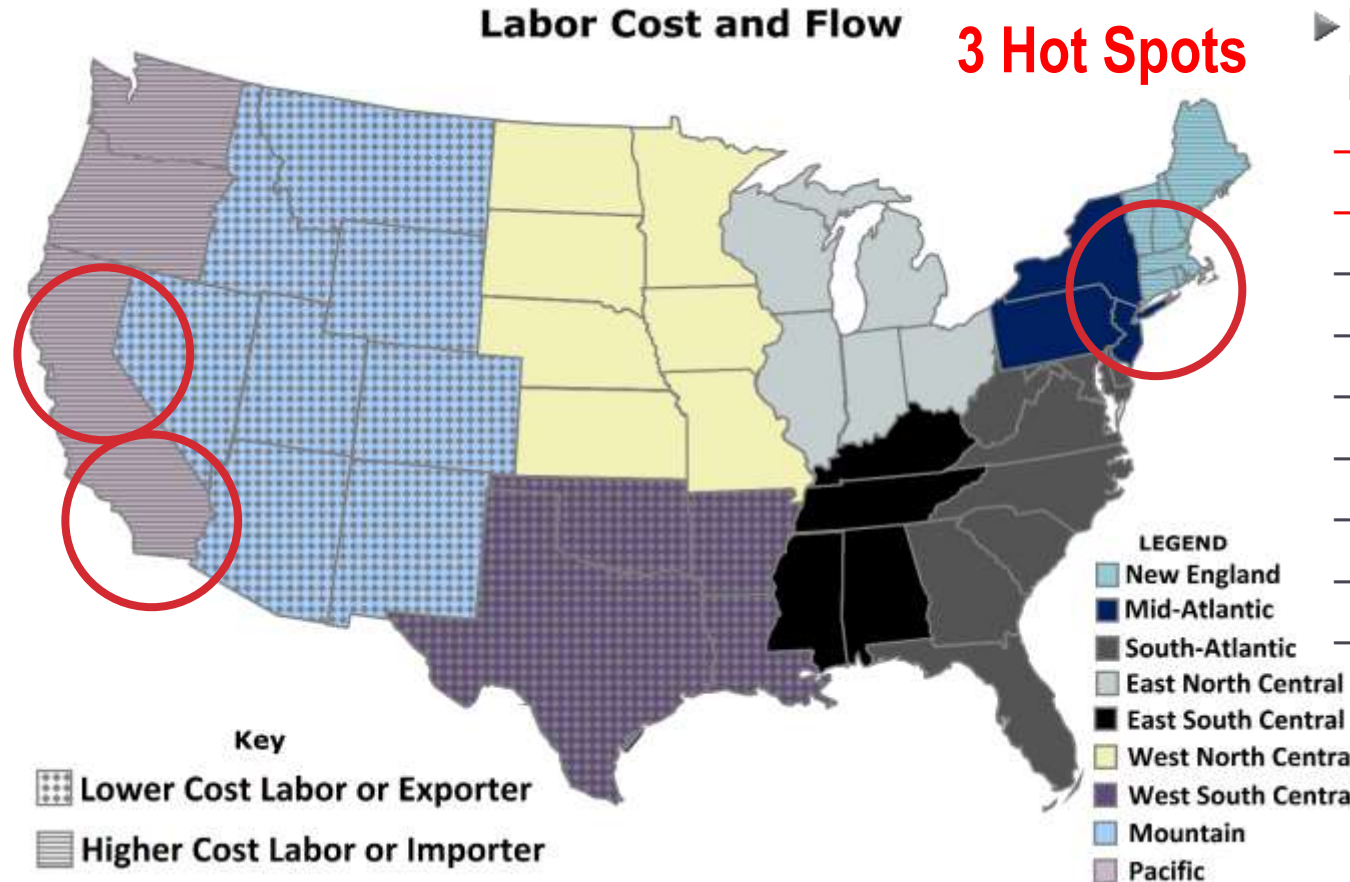
Combined Workforce Breakdown



- Field production staff consist of the following
 - Construction Laborers
 - Operating Engineers and Other Construction Equipment Operators
 - Plumbers Pipefitters and Steamfitters
 - Helpers--Pipelayers Plumbers Pipefitters and Steamfitters
 - Welders Cutters Solderers and Brazers
- Foreman & Superintendents are classified as first-line supervisors of construction trades
- Other field support includes truck drivers, inspectors, mechanics, pavers, landscapers, etc.
- Assuming 4 staff per crew on average equals 17,000 available crews

Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution and gas distribution contractor, utility, and industry interviews, and proprietary Continuum information.

Today: Pipeline Supply vs. Demand

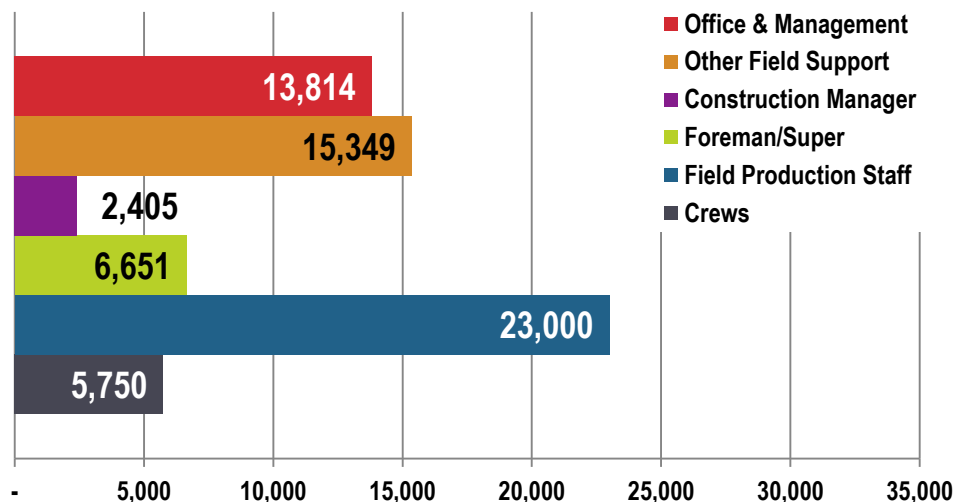


- Labor supply versus today's regional spending:
- **New England – Critical**
 - **Pacific – Critical**
 - Middle Atlantic – Challenging
 - East North Central – Challenging
 - South Atlantic – Challenging
 - West North Central – Challenging
 - East South Central – Challenging
 - Mountain – Manageable
 - West South Central – Manageable

Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution and gas distribution contractor, utility, and industry interviews, and proprietary Continuum information.

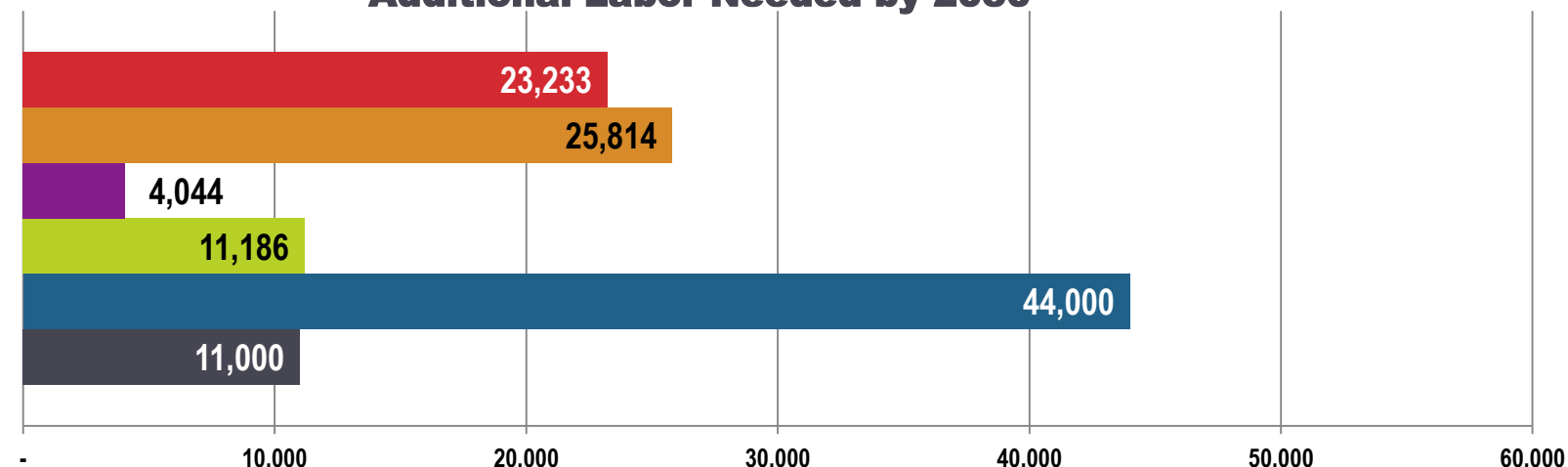
Future Pipeline Labor & Management Need?

Additional Labor Needed by 2020



From Today:
2020 = 5,750 Additional Crews
2030 = 11,000 Additional Crews

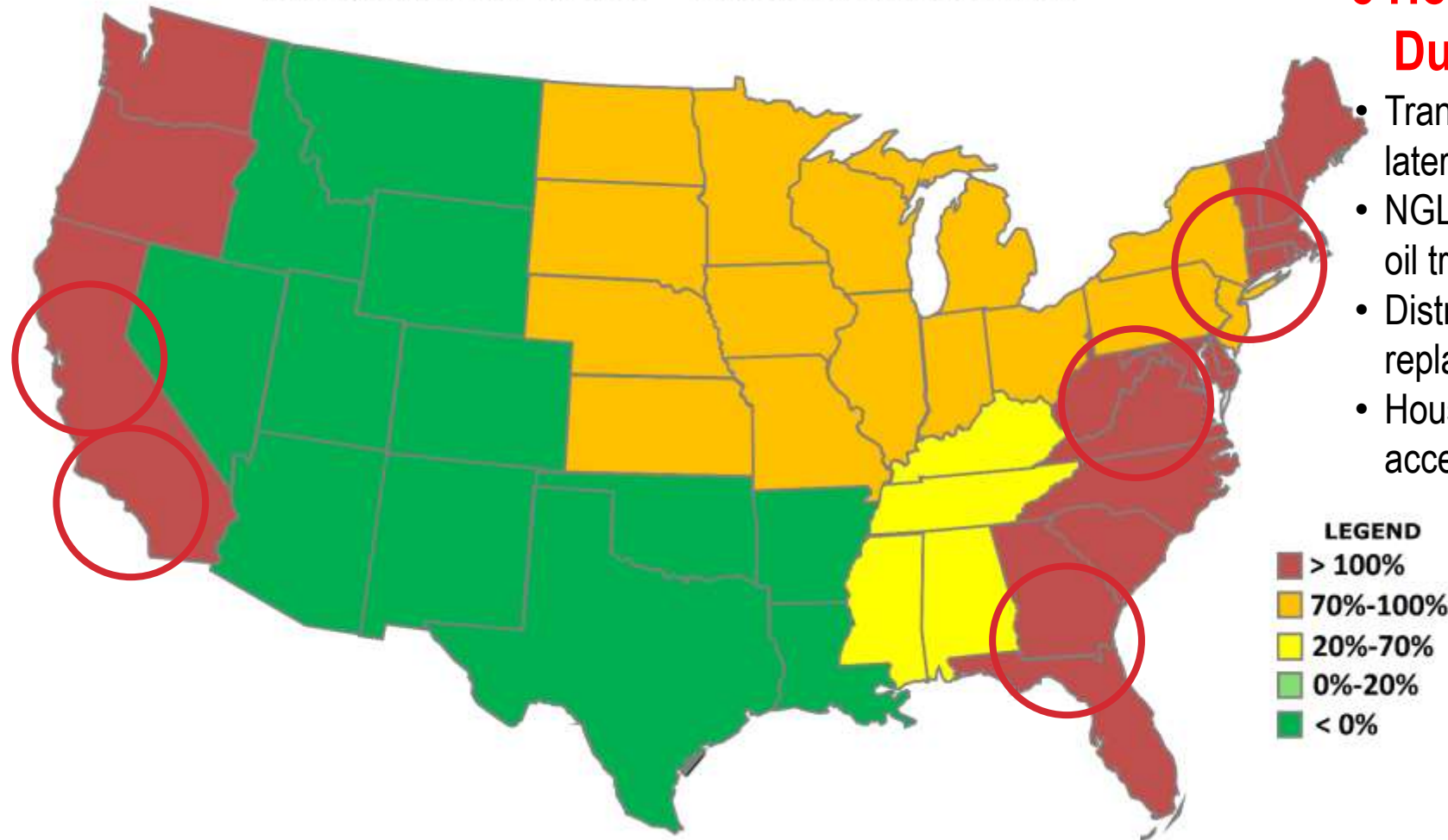
Additional Labor Needed by 2030



Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for NAICS 23712 Oil and Gas Pipeline Construction, NAICS 486000 Pipeline Transportation, NAICS 221210 Natural Gas Distribution and gas distribution contractor, utility, and industry interviews, and proprietary Continuum information.

2020: Pipeline Supply vs. Demand

2020 Labor Need - Balanced Market



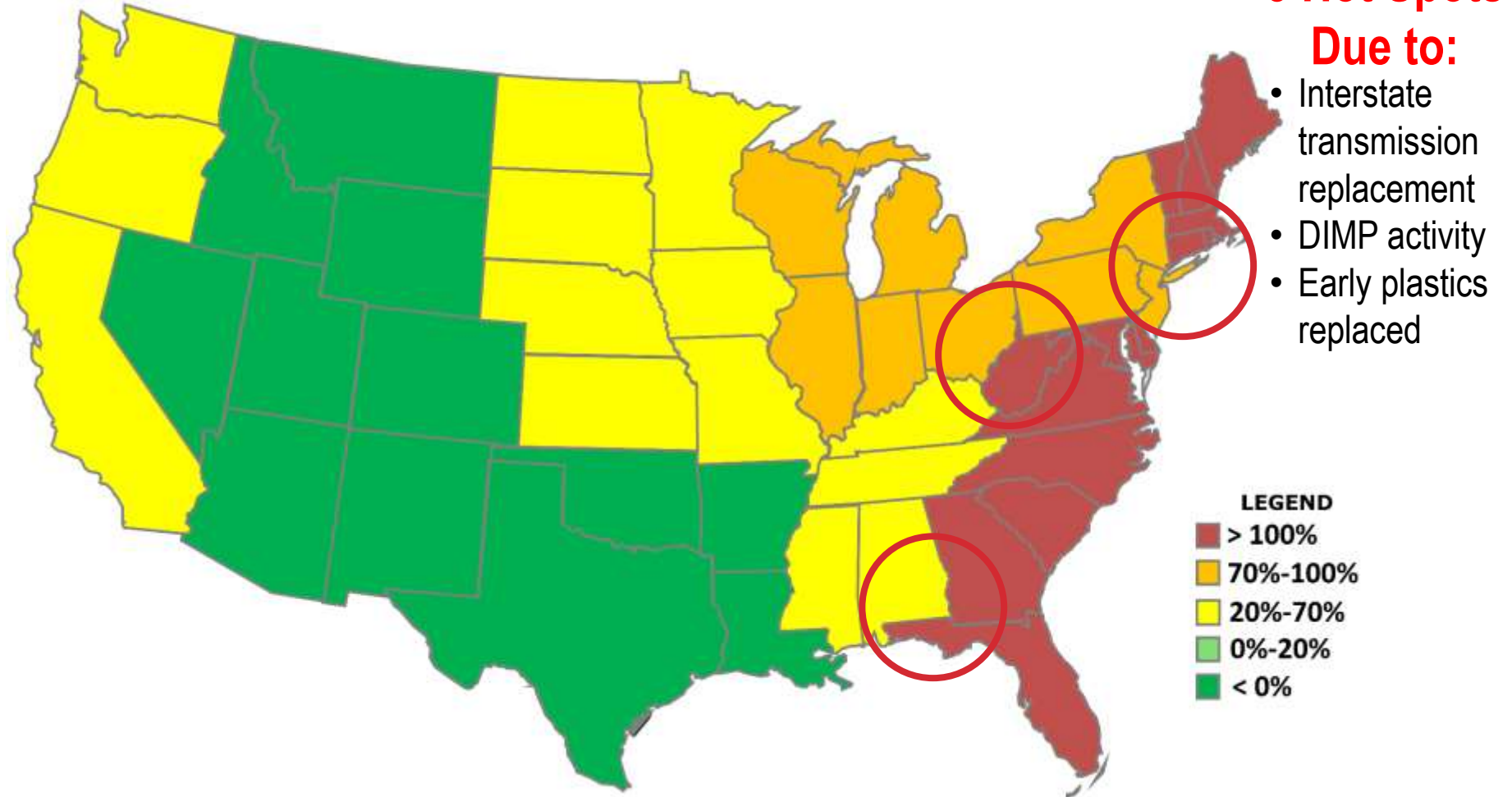
5 Hot Spots Due To:

- Transmission lateral
- NGL and shale oil transmission
- Distribution replacement
- Housing starts accelerating



2030: Pipeline Supply vs. Demand

2030 Labor Need - Balanced Market



Appendix IV – Water & Sewer

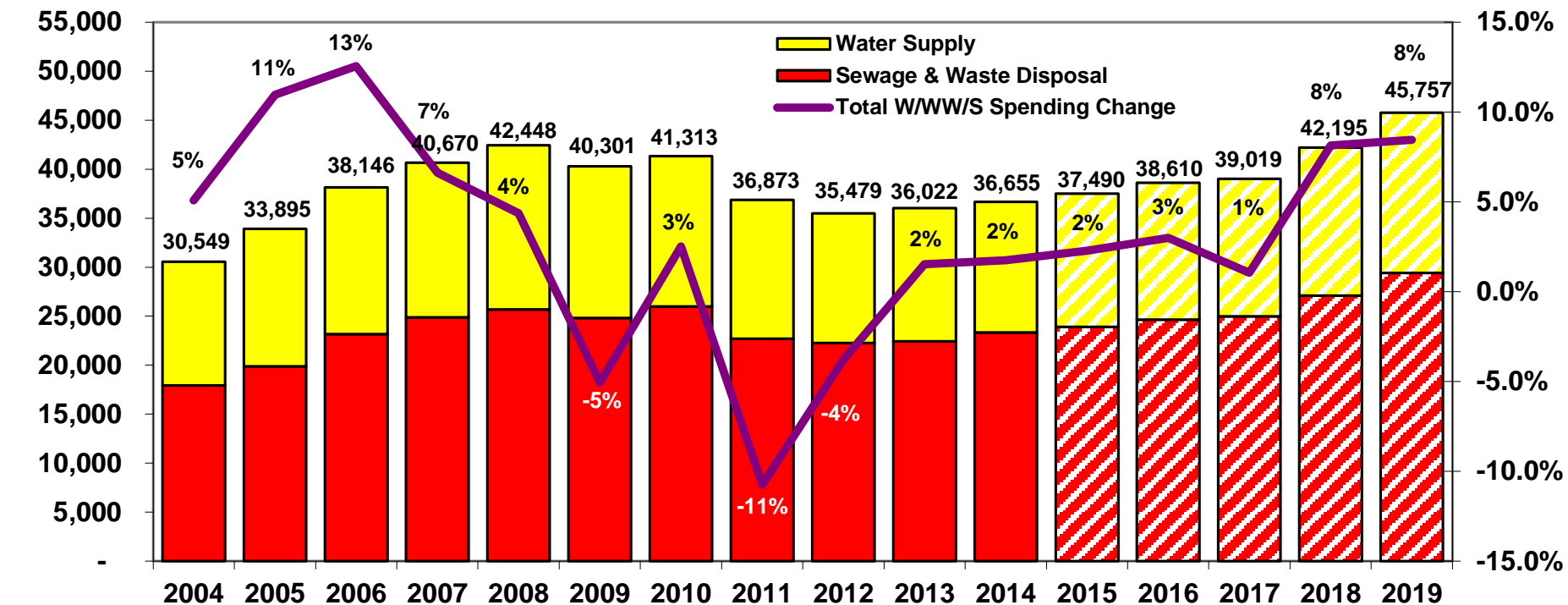
Workforce Availability Perspectives & Information

Water & Sewer Market Drivers

- ▶ Aging Infrastructure – Water and sewer infrastructure beyond it anticipated design life
- ▶ Water Demand – Increasing demand for residential, commercial, and industrial usage exceeding supply
- ▶ Unaccounted For Water – Percentage of unaccounted for or non-metered water loss is being solved too slowly
- ▶ Low Water & Sewer Rates – Municipal rates and available funding mechanism in many markets are simply too low to afford a combination of system maintenance and capital spend
- ▶ Leadership Gaps – Agencies without farsighted leadership and courage to pursue funding increase for hiring, training, and capital asset improvement

Water & Sewer Spending Overview

► US Combined Water & Sewer Spending



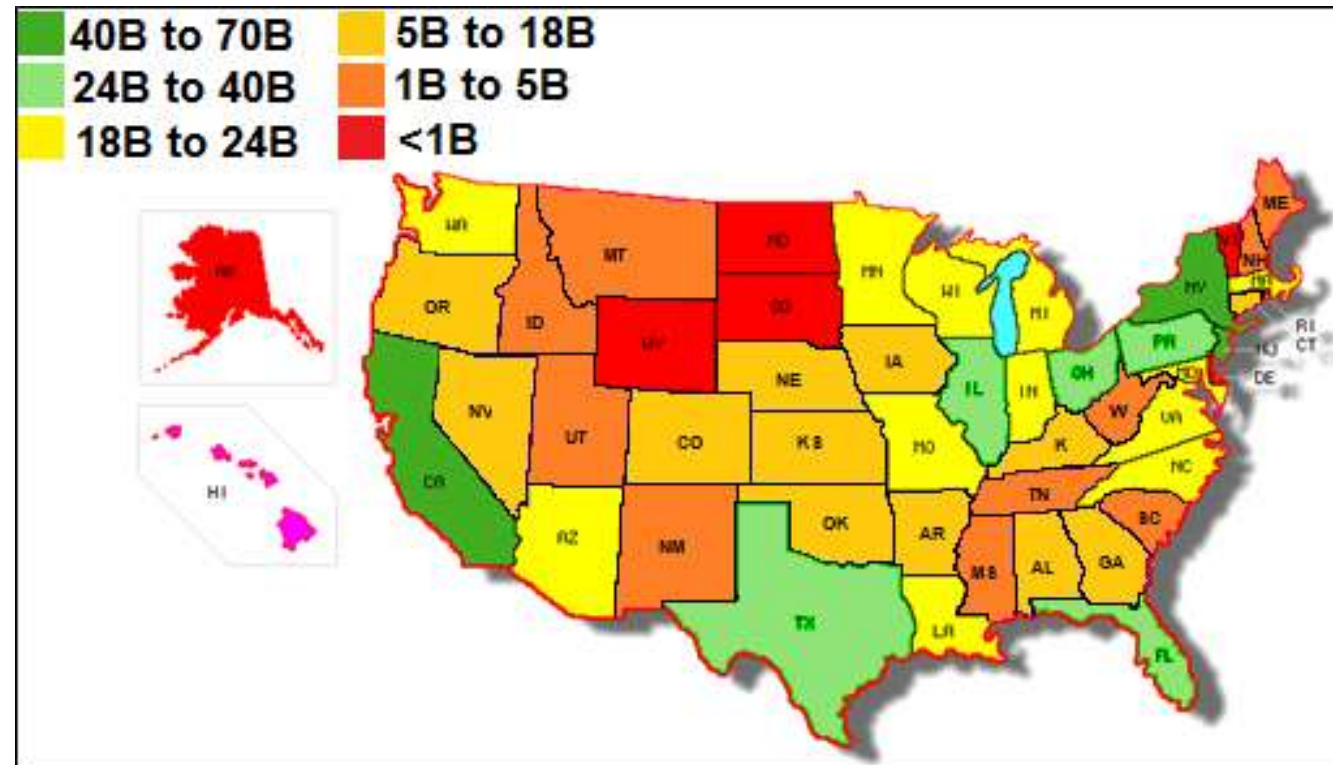
Source: Building permits, construction put in place, and trade sources. Continuum prepared forecasts for 2015-2019.

Water & Sewer Wave Drivers

Wave 1 2016-2019	Wave 2 2020-2025	Wave 3 2025-2035	Wave 4 Beyond 2035
Replacement/Limited New Infrastructure	Systems Approach Integration	Necessity versus Innovation	?
Total Additional Expenditure \$20-\$80 billion	Total Additional Expenditure \$50-\$65 billion	Total Additional Expenditure \$45 - \$100 billion	
<ul style="list-style-type: none"> Limited financing will continue to plague the industry Some small spurts of financing will follow lead concerns Greatest opportunity in medium to large system operators Preparing for P3 opportunities 	<ul style="list-style-type: none"> Expansion of P3 US Market Increased systems thinking across jurisdictions to watershed approach Integration of wastewater, potable, non-potable systems Technical assistance provider to medium to small systems 	<ul style="list-style-type: none"> Deteriorating systems will begin to fail in higher numbers based on asset life expectancy State and federal participation may increase through revolving loan arrangements Integrated system applications will become the norm 	

Geography of Needed Capital Spend

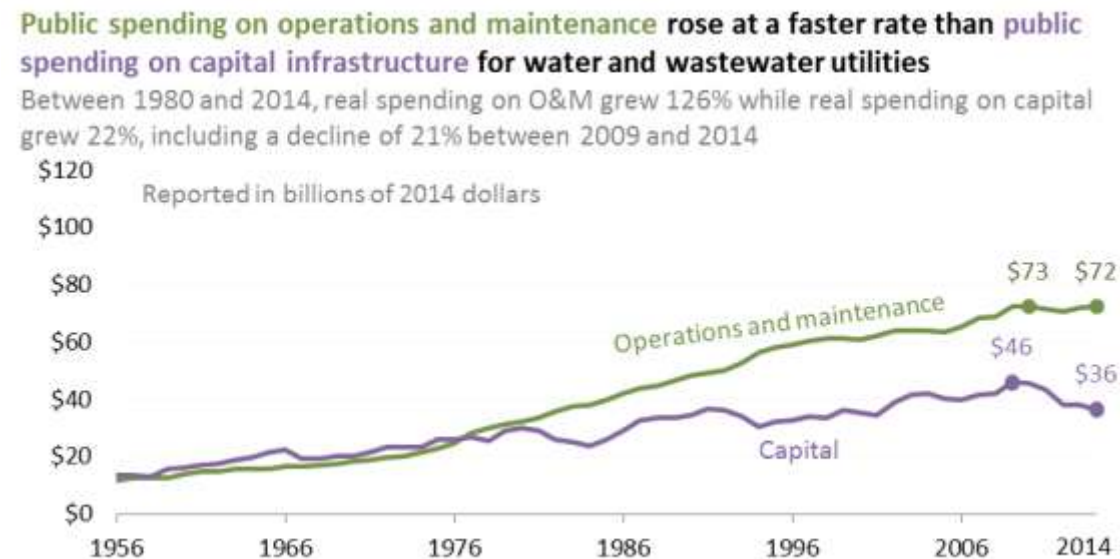
► 20 Year Water/Wastewater Investment Needed by State



Source: Continuum analysis of data from American Society of Civil Engineers assessment of state water/wastewater infrastructure investment needed.

Funding Restrictions Cripple Capital Spend

- ▶ O&M is growing at twice the rate of capital spending restricting funds
- ▶ Low water and sewer rates are restricting funds
- ▶ Project delivery systems of design/bid/build are by definition the slowest and are restricting the ability to accelerate spending



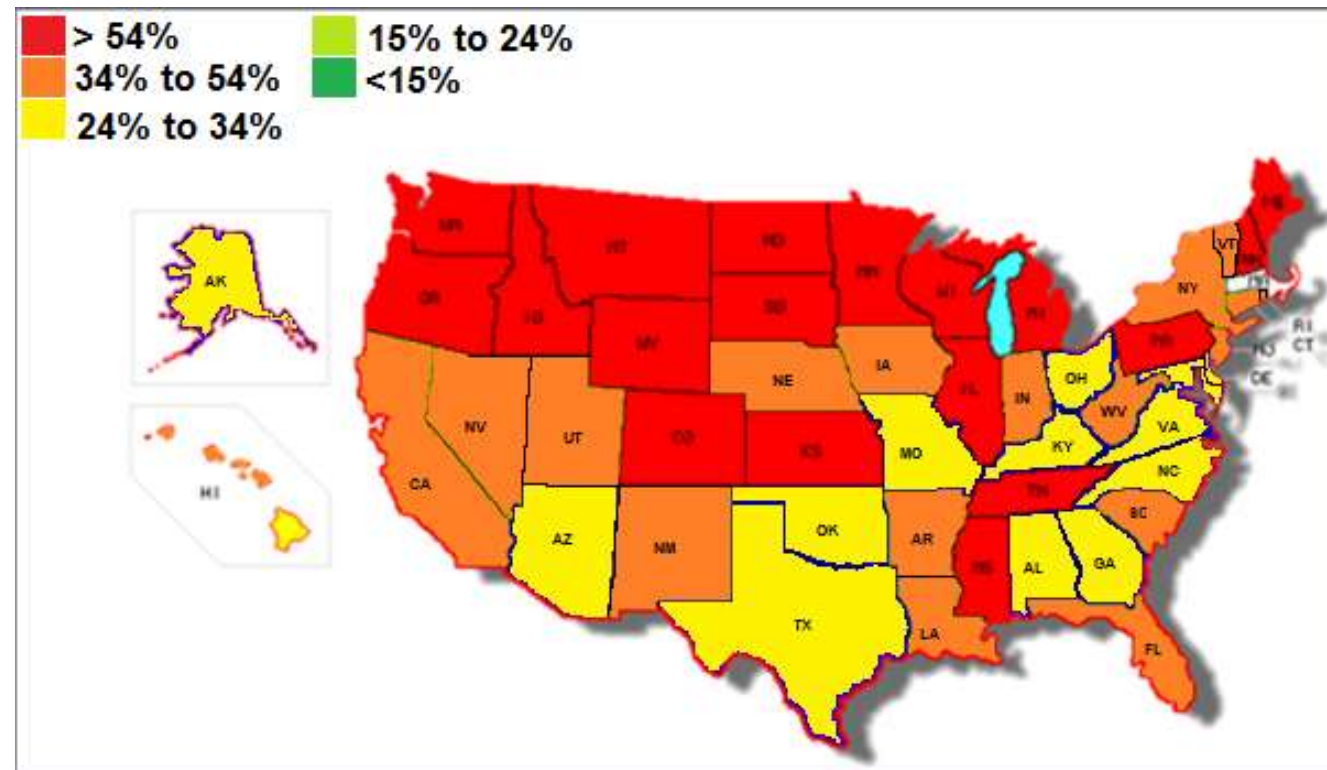
Water/Wastewater Aging Workforce

- ▶ In 2008, the water/wastewater industry has the oldest workforces in the utility industry with nearly 30% of this workforce eligible to retire within five years.
- ▶ The aging workforce was the third ranked item behind only aging infrastructure and regulatory compliance
- ▶ Years of underinvestment have not only created a need to increase spending to replace aging infrastructure but have left the utilities without the time and resources to train and develop new staff.
- ▶ Today, unlike the other major utility segments water/wastewater utilities are not forecast to shrink their workforce in coming years with the overall workforce expected to increase from 47,000 in 2012 to 55,000 in 2022 to meet expanding spending.

Source: Workforce Planning for Water Utilities - Successful Recruiting, Training and Retaining Operators and Engineers to Meet Future Challenges, American Water Works Association (AWWA) Research Foundation. 2015 Water Industry Outlook, Mazars Group, 2015, pg. 2.

Water/Wastewater Aging Workforce

- ▶ Percent of Water/Wastewater Workforce over 55 by State
 - Overall 23.4% of the Water/Waste Water workforce is over 55



Source: Continuum analysis of data from data from Bureau of Labor Statistics 2012 employment survey.

Appendix V – Power Generation

Workforce Availability Perspectives & Information

Power Generation Market Drivers

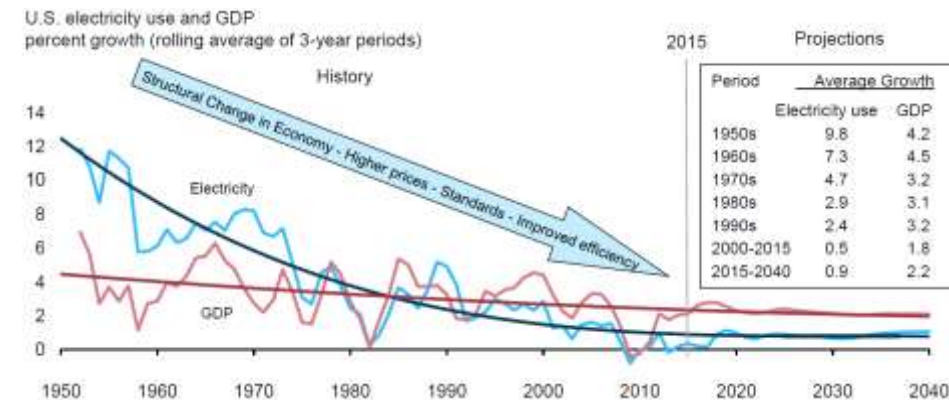
- Drivers of Spending
 - Shale Oil & Gas
 - Renewable Energy Requirements
 - Power Demand Destruction



Source: PacWest Consulting Partners (www.pacwest.com).



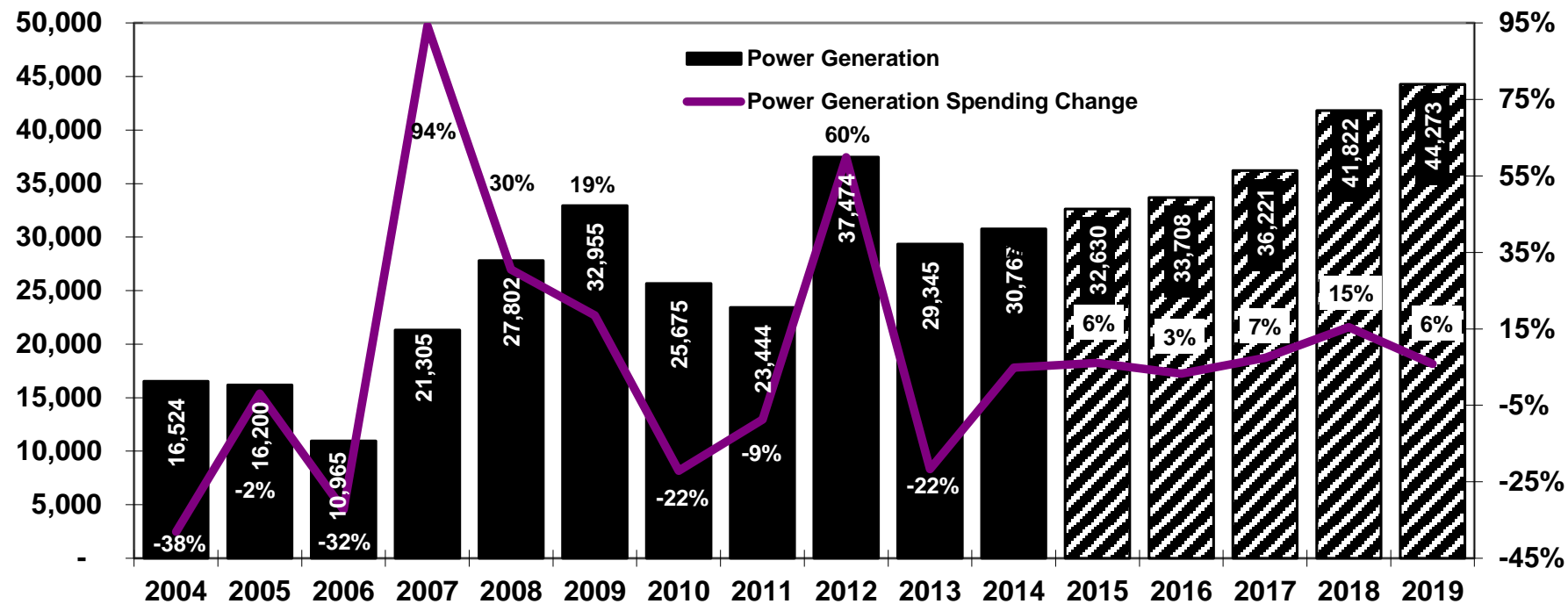
Source: Proprietary Continuum analysis state renewable power generation requirements and guidelines.



Source: Annual Energy Outlook 2016, US Energy Information Administration, Figure xx-xx. U.S. electricity demand growth in the Reference case, 1950-2040, pg. xx-xx.

Power Generation Spending Overview

► US Power Generation Spending



Source: Building permits, construction put in place, and trade sources. Continuum prepared forecasts for 2015-2019.

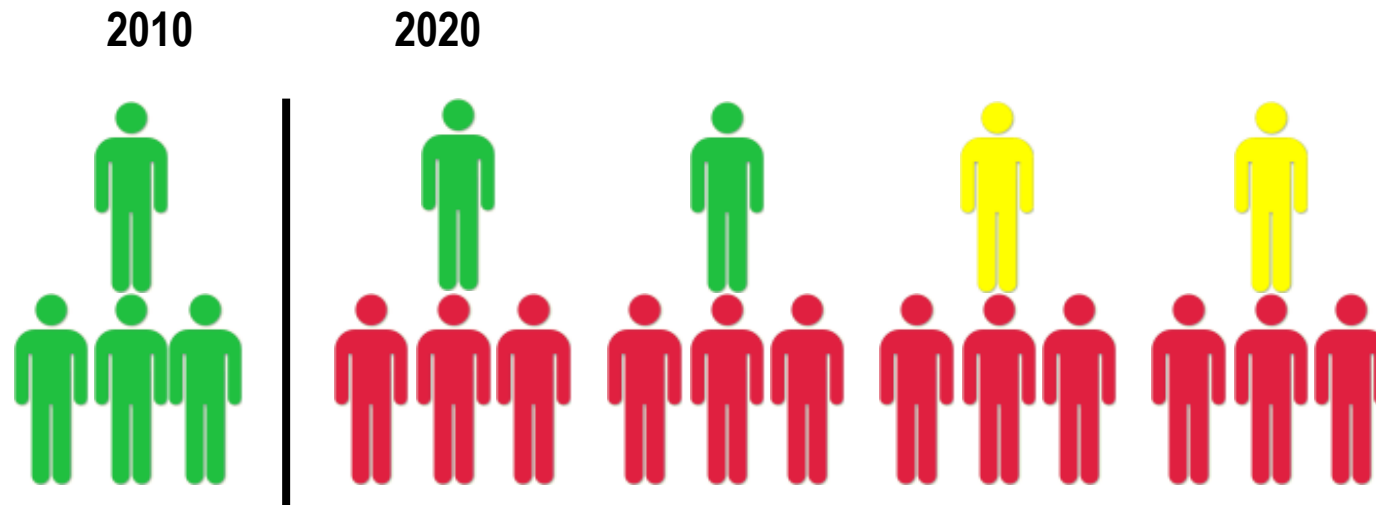
Power Generation Wave Drivers

Wave 1 2002-2012	Wave 2 2015-2030	Wave 3 2030-2045	Wave 4 Beyond 2036
Peaking Gas & Wind Power Driven	Coal Retirements & Gas/Renewable Driven	Distributed Generation & Storage Driven	The place of traditional power gen utility?
<ul style="list-style-type: none"> • \$20 to \$37 billion (+85%) 	<ul style="list-style-type: none"> • \$33 to \$50 billion (+52%) 	<ul style="list-style-type: none"> • \$50 to \$35 billion (-30%) 	<ul style="list-style-type: none"> • Shrinking Spending
<ul style="list-style-type: none"> • Production/investment tax credit fuels wind power construction • Low natural gas prices and energy demand fuel merchant and utility gas fired power generation construction 	<ul style="list-style-type: none"> • Coal retirements from age and regulation accelerate • Replacement of coal is four faceted: <ol style="list-style-type: none"> 1) stand alone natural gas; 2) renewable augmented by natural gas; 3) energy efficiency; 4) distributed generation 	<ul style="list-style-type: none"> • Nuclear licensing not renewed • Coal retirements continue • Wide spread distributed generation is a reality • Utility scale storage invented and widespread augmenting both renewables and distributed generation • Spending has peaked early in this cycle 	<ul style="list-style-type: none"> • Power generation spending fragmented at residential, commercial, and industrial sites in addition to traditional merchant or utility sites • Traditional power generators punished and atrophying • Utility industry transitions to “<u>Insurance</u>” model and focuses on grid management

Thesis

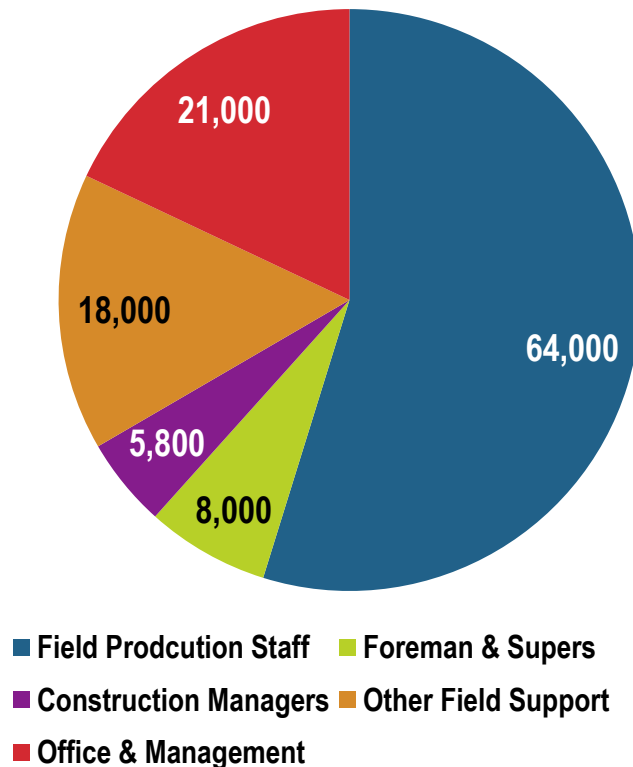
► Who Will Do The Work?

- Thesis: That growth in spending on new or renewable power generation and perhaps more importantly, the retrofit or decommissioning of existing facilities will stretch resources in a way that makes expansion problematic for contractors and the merchant or utility power generators they serve.



Today: Combined Power Generation Construction Workforce – 20,000 Crews

Combined Workforce Breakdown



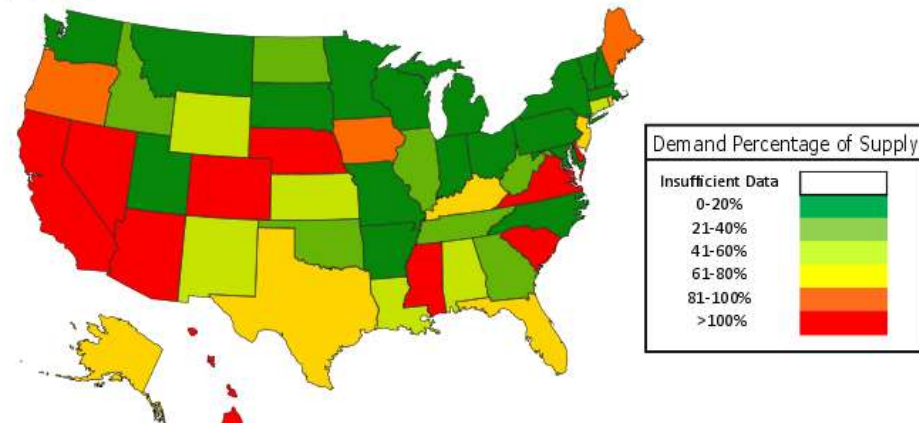
- Field production staff consist of the following:
 - Boliermakers
 - Electricians
 - Ironworkers
 - Laborers
 - Pipelayers Plumbers Pipefitters and Steamfitters
 - Welders, Cutters, Solderers, and Brazers
- Foreman & Superintendents are classified as first-line supervisors of construction trades
- Other field support includes truck drivers, inspectors, mechanics, carpenters, etc.
- Approximately 18% of the workforce works directly for the power producers.
- Assuming 4 staff per crew on average equals 18,000 available crews

Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for 22111 Electric Power Generation; 22111 Electric Power Generation, 237130 Power and Communication System Construction, 238212 Non-residential electrical contractors, 238222 non residential plumbing and HVAC contractors, 238292 Other Non-residential equipment contractors and proprietary Continuum information.

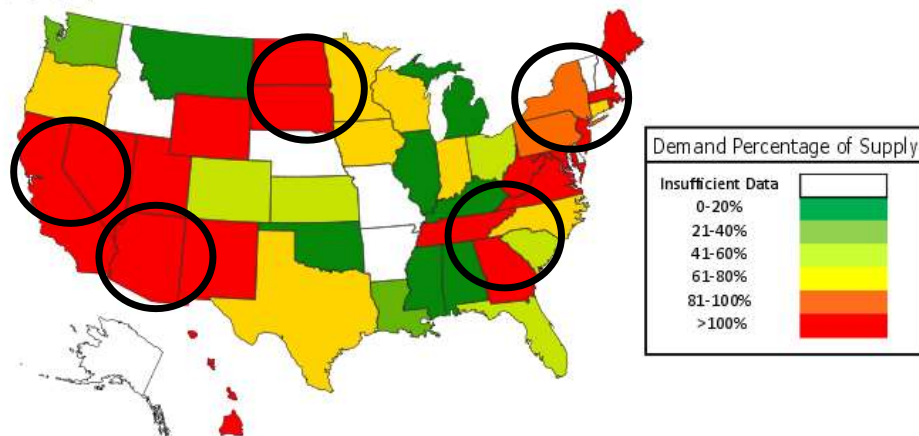
Power Generation Workforce

- Today vs. 2018
- Threatened and transforming in a way that reduces the need for traditional trades (boilermakers, millwrights, ironworkers, etc.) in favor of less specialized electrical and mechanical trades

Supply / Demand Imbalance: Electric Power Generation 2014

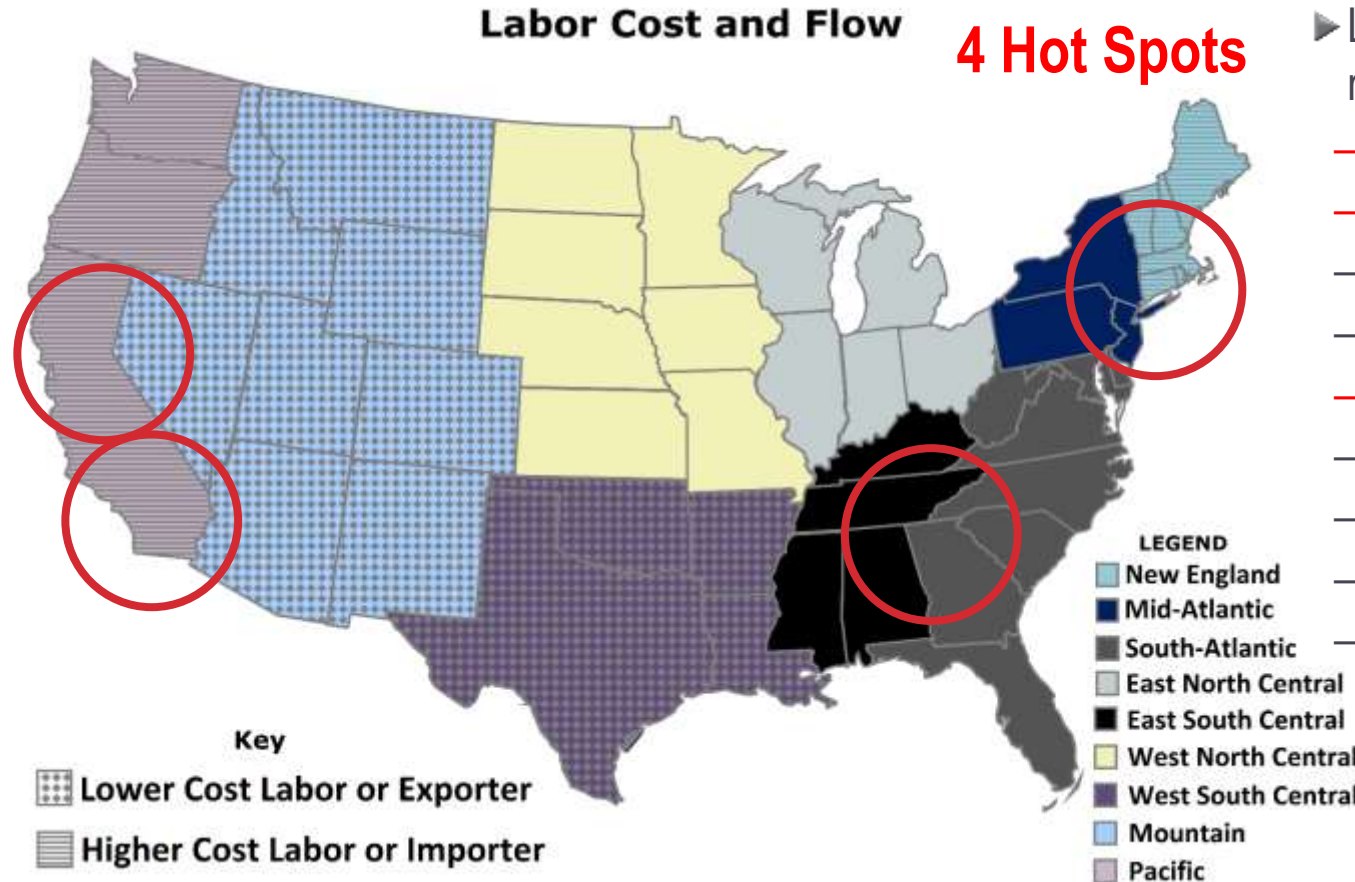


Supply / Demand Imbalance: Electric Power Generation 2018



Source: Continuum and CLMA analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data, CLMA proprietary data, industry interviews, and proprietary Continuum information and forecasts.

Future: Power Generation Workforce by Region



- Labor supply versus today's regional spending:
- **New England – Critical**
 - **Pacific – Critical**
 - Middle Atlantic – Challenging
 - East North Central – Challenging
 - **South Atlantic – Critical**
 - West North Central - Challenging
 - East South Central – Challenging
 - Mountain – Manageable
 - West South Central – Manageable

Source: Continuum analysis of 2013 U.S. Bureau of Labor Statistics (www.bls.gov) data for 22111 Electric Power Generation; 22111 Electric Power Generation, 237130 Power and Communication System Construction, 238212 Non-residential electrical contractors, 238222 non residential plumbing and HVAC contractors, 238292 Other Non-residential equipment contractors and proprietary Continuum information.