

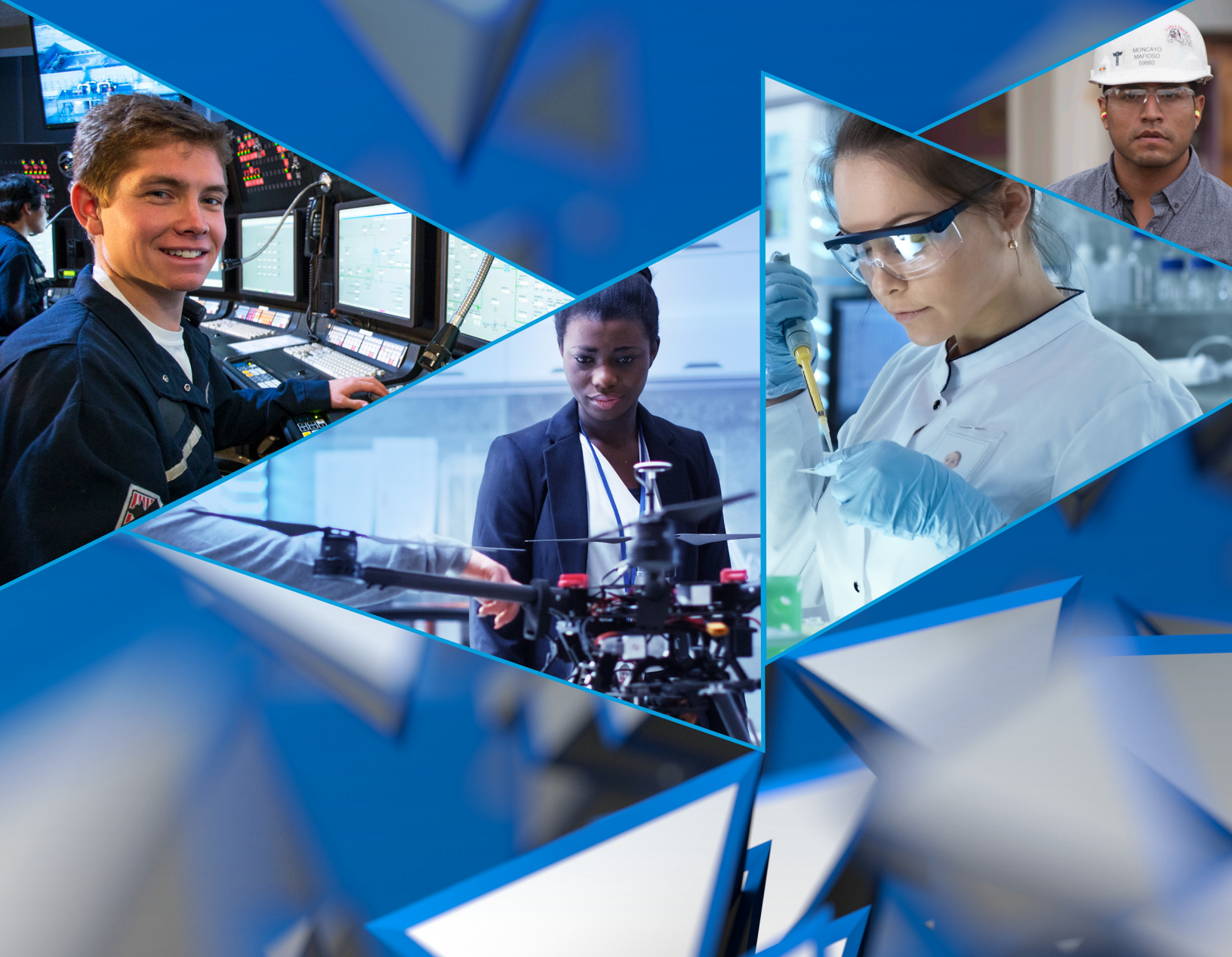


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MILLENNIALS

IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES





Millennials in the Oil & Natural Gas and Petrochemical Industries

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Executive Summary

Much of the future growth of the oil & natural gas and petrochemical industry will depend on the ability to attract younger workers – both to replace a large number of retirees and to support the industry’s expansion. This report presents an analysis of the demographic and workforce characteristics of the wave of new entrants to the workforce over the past 20 years termed the Millennial generation by demographers. We define Millennials as those born in 1981-2000 (and immigrants of corresponding ages). Thus, in 2016 Millennials in the workforce of ages 18-34 are those born in 1982-1998.

Using US Census Bureau data, we compare Millennials to Baby Boomers and Gen X-ers at the same age when they were the new entrants to the labor force. We then present estimates of the number of Millennials employed in the oil & natural gas and petrochemical industries in 2015 and projections of Millennials’ role in the industry through 2035.¹

Compared to Baby Boomers and Gen X-ers when they were age 18-34, Millennials are:

- More diverse—45% of Millennials age 18-34 in 2016 were Hispanic, African American or some other minority group. Only one-third of Gen-Xers were minority at the time they were first fully of working ages, and only 22% of Baby Boomers were minorities at the time they were first of working ages
- Better educated—About 66% of Millennials age 25-34 in 2016 have had at least some college coursework, compared with 56% of Gen-Xers at a corresponding age and 45% of Baby Boomers.
- Largely employed in service industries (e.g., personal and professional services, health care, and education)—Among Millennials age 18-34 that are working, 42% are employed in service industries, while in 1980 only 27% of Baby Boomers age 18-34 were working in service industries.

Principal findings regarding the current employment of Millennials in the oil & natural gas and petrochemical industries are:

- There were 475 thousand Millennials employed in the oil & natural gas and petrochemical industries in 2015, accounting for 34% of total industry employment. This is very close to the economy-wide 35% share of Millennials in total employment in 2015.
- Millennials employed in the oil & natural gas and petrochemical industries are a very diverse group, as they are economy-wide. About 94 thousand Millennials employed in these industries in 2015 (or 20%) were Hispanic. Approximately 27 thousand were African American.

¹ The estimates and projections of Millennial employment in the oil and natural gas industry presented here were developed to be consistent with estimates for 2015 and baseline employment projections in a March 2016 report prepared by IHS Markit for the American Petroleum Institute, *Minority and Female Employment in the Oil & Natural Gas and Petrochemical Industries, 2015-2035*.

- Millennials' shares of employment in the oil & natural gas and petrochemical industry are highest in the blue collar occupations. They accounted for 46% of all industry employment in unskilled blue collar occupations in 2015 and 42% in semi-skilled blue collar occupations – jobs that have historically been staffed disproportionately by young people.
- Among the nine regions identified in Census Bureau data, the share of Millennials in employment in the industry is highest in the West South Central and the Mountain region – two regions where Millennials account for the highest share of total employment economy-wide as well.

Our projections of Millennial employment show:

- As they complete their educations and move fully into the workforce, Millennials will account for most of the rising replacement requirements in the oil & natural gas and petrochemical industries. Their share of employment in these industries will rise to 41% in 2025 and remain near that level over the next decade.
- As the Millennial generation ages and the average educational attainment of the 20-year age cohort rises, their share of employment in managerial, business and financial occupations and in professional and related occupations will increase. The share employed in less skilled blue collar jobs will decline.

Examples of Occupations in the Oil & Natural Gas and Petrochemical Industries

Management, Business and Financial

General and Operations Managers
Construction Managers
Engineering Managers
Cost Estimators
Accountants and Auditors

Professional and Related

Architects
Surveyors
Civil Engineers
Electrical Engineers
Mechanical Engineers
Petroleum Engineers
Engineers, all other
Architectural and Civil Drafters
Civil Engineering Technicians
Surveying and Mapping Technicians
Geoscientists
Geological and Petroleum Technicians

Service

Security Guards
Catering Services

Sales & Related

Sales Representatives, Wholesale & Manuf.

Office & Administrative Support

First-Line Supervisors, Office and Admin. Support
Bookkeeping, Accounting, and Auditing Clerks
Secretaries and Administrative Assistants
Office Clerks, General

Skilled Blue Collar

First-Line Supervisors of Constr. & Extraction Workers
Carpenters
Cement Masons and Concrete Finishers
Paving, Surfacing, and Tamping Equipment Operators
Operating Engineers & Other Constr. Equipment Operators
Electricians
Plumbers, Pipefitters, and Steamfitters
Derrick, Rotary Drill and Service Unit Operators
Mobile Heavy Equipment Mechanics, Except Engines
Industrial Machinery Mechanics
Maintenance and Repair Workers, General
Petroleum Pump System Operators, Refinery Operators
Crane and Tower Operators
Pump Operators and Wellhead Pumpers

Semi-skilled Blue Collar

Roustabouts, Oil and Gas
Welders, Cutters, Solderers, and Brazers
Inspectors, Testers, Sorters, Samplers, and Weighers
Truck Drivers, Heavy and Tractor-Trailer
Excavating and Loading Machine and Dragline Operators

Unskilled Blue Collar

Construction Laborers
Fence Erectors
Freight, Stock & Material Movers, Hand
Helpers, Extraction Workers

Millennials in the US Labor Force

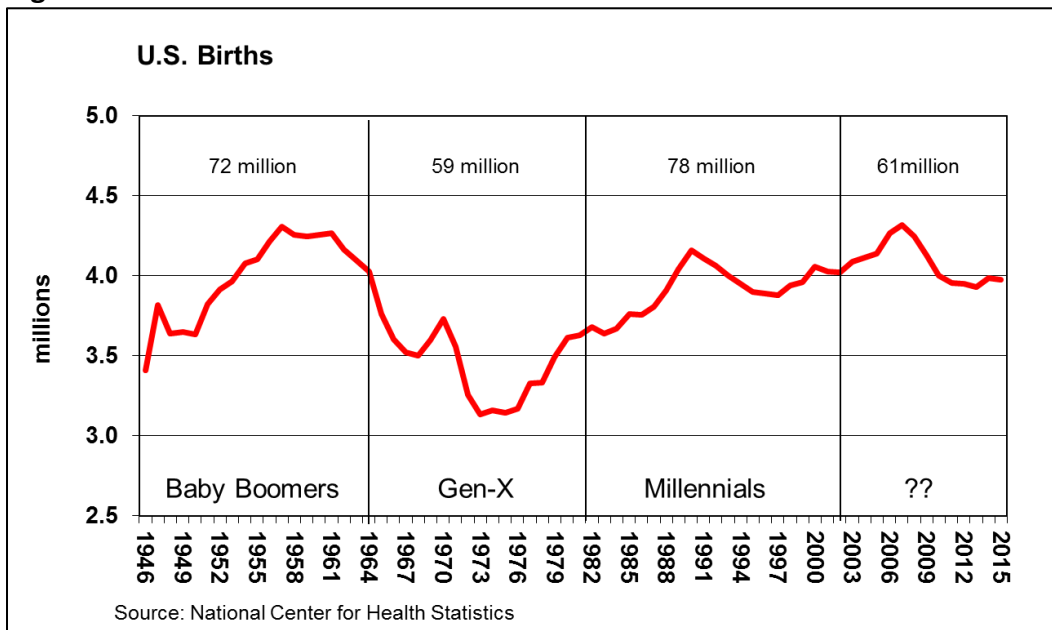
Demographics of Millennials and Previous Generations

Much of the future growth of the oil & natural gas and petrochemical industries will depend on the ability to attract younger workers – both to replace a large number of retirees and to support the industry’s expansion. This report presents an analysis of the demographic and workforce characteristics of the wave of new entrants to the workforce over the past 20 years termed the Millennial generation by demographers. Using Census Bureau data, we compare Millennials to Baby Boomers and Gen X-ers at the same age when they were the new entrants to the labor force. We then develop and present estimates and projections of the employment of Millennials in the oil & natural gas and petrochemical industries.

Our analysis is based on definitions of the three generations at the time they were ages 18-34. There is no single definition of the start and end years that demarcates the three generations; various previous studies of each of the generations have used slightly different start and end points. We employ a definition of Millennials that includes all those born in 1981-2000 (and immigrants of corresponding ages). Thus, in 2016 Millennials in the workforce of ages 18-34 are those born in 1982-1998. Gen-Xers were ages 18-34 18 years earlier, in 1998 (i.e., those born in 1964-1980). Baby Boomers are those born from 1946 through 1963, and Baby Boomers born in 1946-1962 were ages 18-34 in 1980.

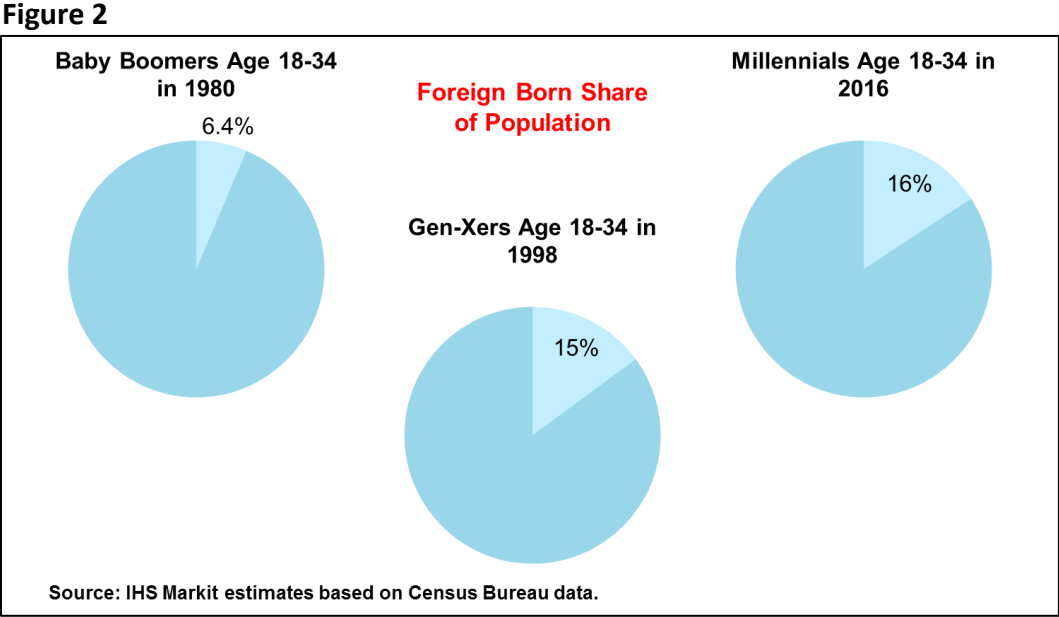
Trends in US births over the past 70 years are depicted in Figure 1. Note that while there were 78 million births over the 20-year period defined as the Millennial generation, the focus of our comparative generational analysis below is on the 66 million born in 1982-1998 who were ages 18-34 in 2016.

Figure 1



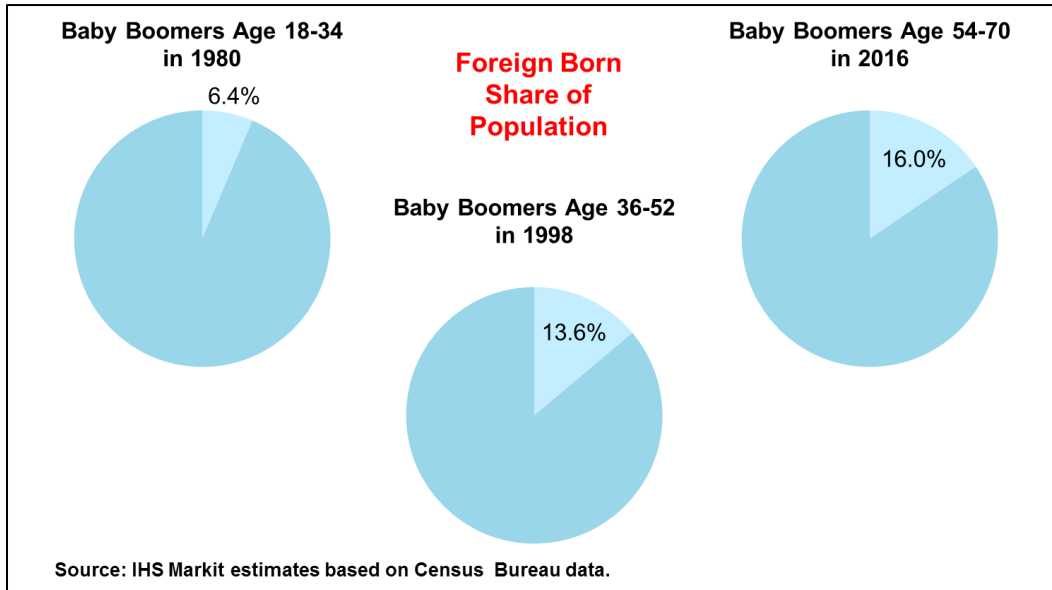
Our analysis of the three generations at the time each generation was age 18-34 is based on tabulations of microdata files from various US Census Bureau databases. Analysis of the demographic characteristics of Baby Boomers in 1980 is based on data from the 1980 Census of Population. Demographic characteristics of Gen-Xers in 1998 were tabulated from the Current Population Survey for that year, and data for Millennials in 2016 are based on the Current Population Survey for 2016.

Millennials in the workforce today are not just those born in the US. There were 66 million people born between 1982 and 1998. But the number of Millennials age 18-34 is now much larger – over 75 million. Immigration contributes a growing share of this cohort; 16% of the population age 18-34 in 2016 was foreign born. When Gen Xers were age 18-34 in 1998, 15% of them were foreign born, and when Baby Boomers were age 18-34 in 1980, only 6.4% of them were foreign born (see Figure 2).



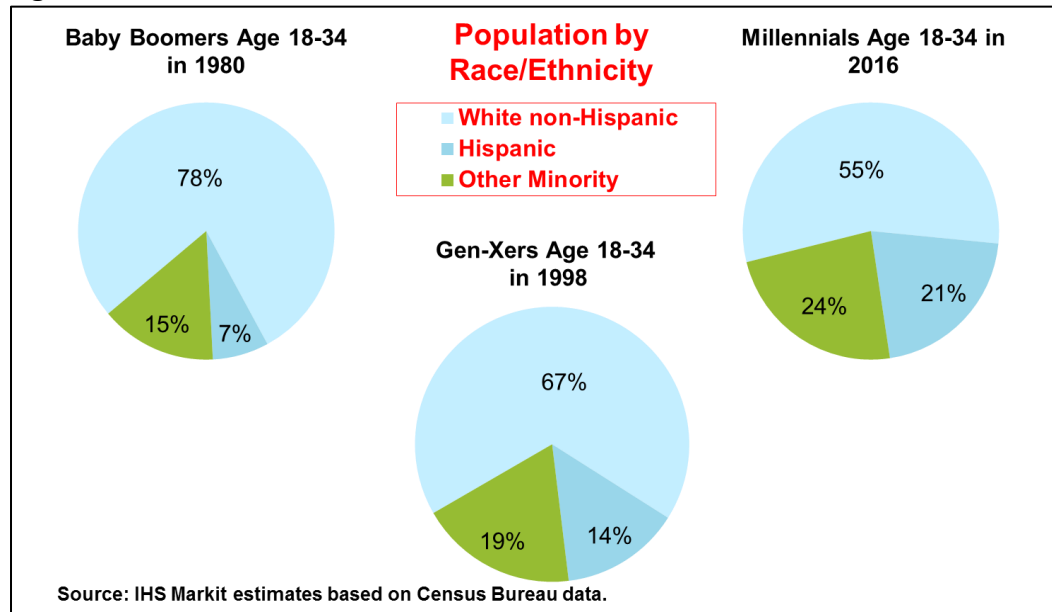
The foreign-born share of each generation rises over time as new immigrants continue to join the cohort originally born in the US. Figure 3 shows how the foreign-born share of Baby Boomers has increased from 1980 to 2016.

Figure 3



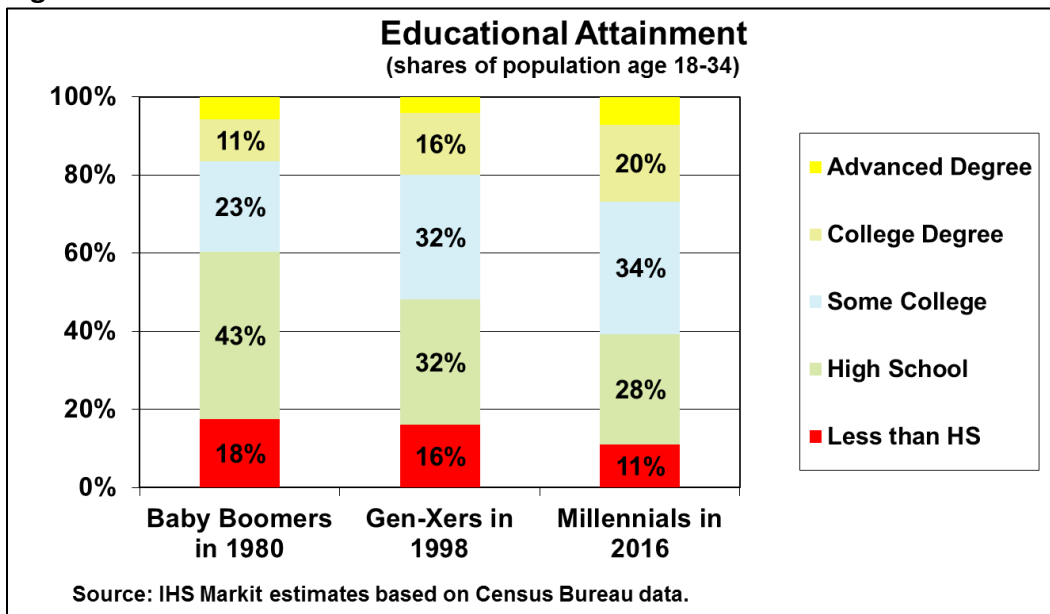
Millennials are a more diverse group than the previous two generations when they entered the workforce due both to a higher share of foreign-born and to a higher share of young Hispanics among those born in the US. Fully 45% of Millennials age 18-34 in 2016 were Hispanic, African American or some other minority group. Only one-third on Gen-Xers were minority at the time they were first fully of working ages, and only 22% of Baby Boomers were minorities at the time they were first of working ages (see Figure 4).

Figure 4



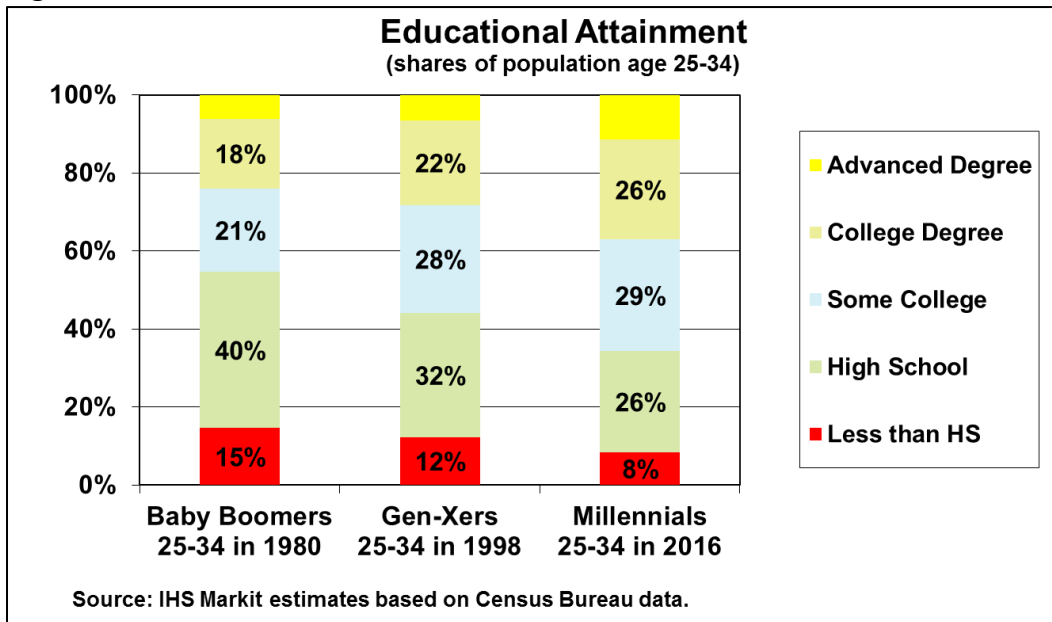
Millennials are better educated than Baby Boomers or Gen-Xers at the same age as they were ready to enter the workforce. Figure 5 shows the distribution of the population by level of education for the three generations for all persons age 18-34. Only 11% of Millennials age 18-34 were not high school graduates – lower than the corresponding shares for Gen-Xers and Baby Boomers when they were 18-34 (16% and 18%, respectively).

Figure 5



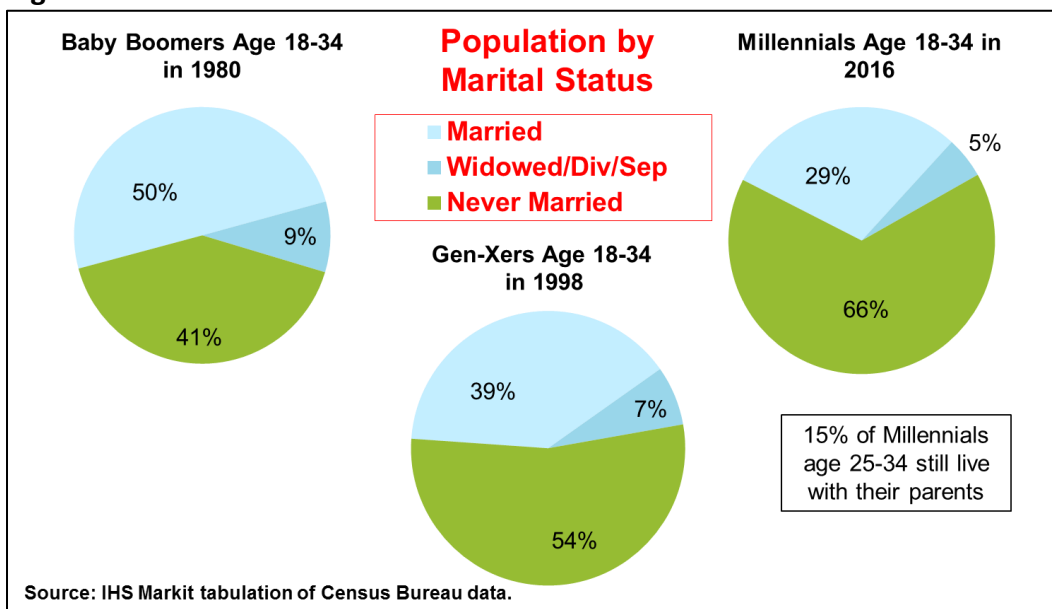
Obviously not everyone age 18-34 has had sufficient time to get a college degree or more advanced education. The conventional approach to evaluating educational attainment is to focus on the population age 25 and over. Figure 6 shows the distribution of the population age 25-34 by level of education for the three generations in our target years of 1980, 1998 and 2016. Millennials have a higher share of advanced degrees than either Gen-Xers or Baby Boomers at a corresponding age. They also have a higher share of college graduates and a higher share of population with “some college” than the two previous generations. About 66% of Millennials have had at least some college course work, compared with 56% of Gen-Xers at a corresponding age and 45% of Baby Boomers.

Figure 6



Millennials have been slower to get married than the previous two generations. Much of the youngest generation has been coming of working age during the most severe recession in the post-war period and an economic recovery that took several years before employment growth began to accelerate. This contributed to the higher incidence of Millennials staying in school longer resulting in the higher educational attainment noted above and to a delay in marriage and a slowdown in the rate of household formation. Nearly two-thirds of Millennials age 18-34 in 2016 were never married compared with 54% of Gen-Xers and 41% of Baby Boomers at a comparable point in their lives (Figure 7).

Figure 7



Labor Force Characteristics of Millennials and Previous Generations

Millennials in the age bracket that encompasses persons who could still be in school or could have already entered the labor force – those age 18-24 – have a lower labor force participation rate than Gen-Xers or Baby Boomers at a comparable age (see Table 1). This is especially true of men. Male Millennials age 18-24 have a labor force participation rate of 67%, while a much higher fraction of comparable Gen-Xers and Baby Boomers were in the labor force (77% and 82%, respectively). It appears there is a higher share of discouraged workers among young male Millennials, since the fraction of those not in the labor force who are instead attending school – 70% – is the same as it was for Gen-Xers and Baby Boomers despite the lower labor force participation of Millennials.

Young female Millennials also have a lower labor force participation rate than comparable Gen-Xers and Baby Boomers. But among female Millennials age 18-24 there is a much higher propensity for those not in the labor force to be in school (64% compared to 52% for Gen-Xers and 35% for Baby Boomers). For female Millennials delayed marriage has meant staying in school. For Millennials age 25-34, labor force participation among men is lower than it was for comparable Baby Boomers, but higher for women (see Table 2).

Table 1
Labor Force Data for the Age 18-24 Cohort of Three Generations

	Baby Boomers Age 18-24 in 1980	Gen-Xers Age 18-24 in 1998	Millennials Age 18-24 in 2016
Labor Force Participation Rate	74%	73%	65%
Men	82%	77%	67%
Women	67%	70%	63%
Students as % of “not in Labor Force”	47%	60%	67%
Men	70%	70%	70%
Women	35%	52%	64%
Unemployment Rate	13.0%	9.2%	10.7%
Economy-wide Unemployment Rate	7.2%	4.5%	4.9%

Source: IHS Markit estimates based on Census Bureau data.

Table 2
Labor Force Data for the Age 25-34 Cohort of Three Generations

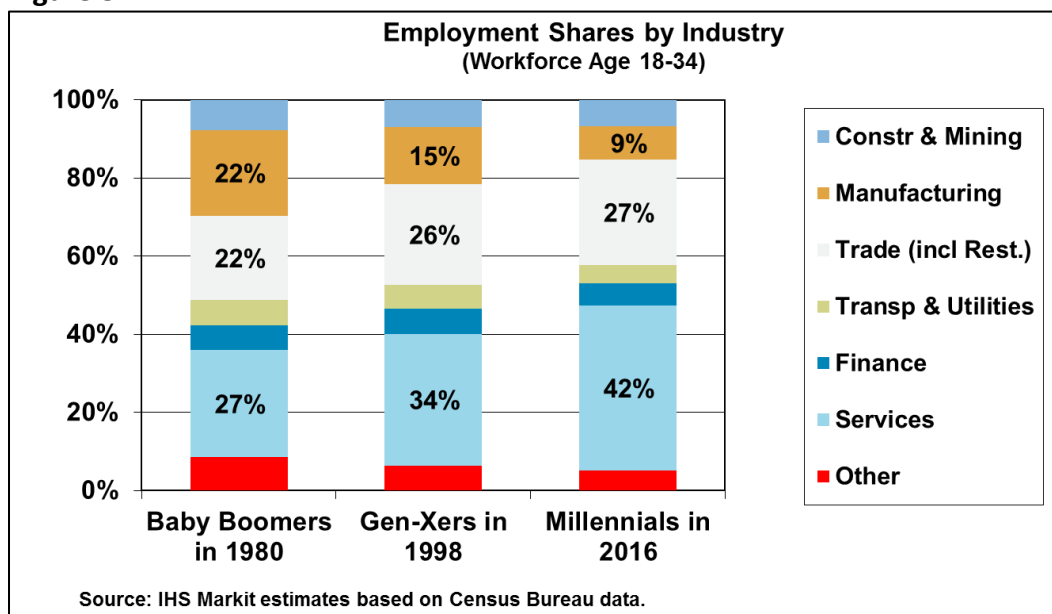
	Baby Boomers Age 25-34 in 1980	Gen-Xers Age 25-34 in 1998	Millennials Age 25-34 in 2016
Labor Force Participation Rate	80%	85%	82%
Men	95%	93%	89%
Women	66%	76%	75%
Unemployment Rate	7.0%	4.2%	5.2%
Economy-wide Unemployment Rate	7.2%	4.5%	4.9%

Source: IHS Markit estimates based on Census Bureau data.

Millennials' Employment by Industry and Occupation

Millennials' employment by industry, when compared to the employment shares of Baby Boomers and Gen-Xers at the same age, mirrors the economy-wide shift over time toward services (see Figure 8, which shows the distribution of total employment into seven broad industry categories). Service industries include a wide range of activities from professional services (e.g., legal, engineering) to health care, education, the arts and personal services. Among Millennials age 18-34 that are working, 42% are employed in service industries, while in 1980 only 27% of Baby Boomers age 18-34 were working in service industries. Only 9% of Millennials age 18-34 are employed in manufacturing industries – down from 22% for Baby Boomers of the same ages in 1980.

Figure 8

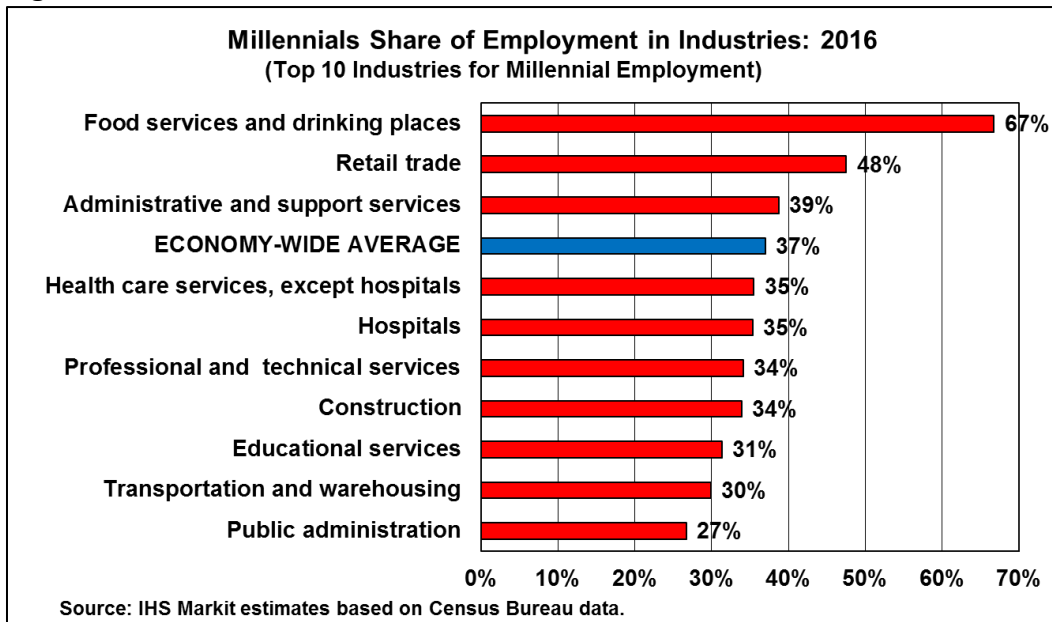


Economy-wide, Millennials account for 37% of all employment in 2016, even though many are still in school. (This includes part-time as well as full-time employees.) Gen-Xers account for 36% of 2016 employment, Baby Boomers for 25%, and those born before the Baby Boomer era 2%.

Looking at where Millennial employment is concentrated in more narrowly defined industry categories, we find that Millennials account for two-thirds of employment in the restaurant industry and nearly half in retail trade. Millennials also have high shares of employment in administrative and support services and health care. Figure 9 shows the employment shares of Millennials in the 10 industries that employ the greatest number of Millennials (based on a classification that divides the entire economy into 51 industries).

Millennials share of employment in the mining industry matches their 37% share of employment economy-wide. However, less than 1% of Millennials were employed in mining in 2016.

Figure 9



The employment of Millennials by occupation, when compared to the previous two generations at the same ages, also mirrors long-term shifts in the occupational mix of the economy. Figure 10 presents data on the distribution of employment of the three generations in seven broad categories that encompass all employment. Note that jobs in any given occupation may be found in many different industries. Millennials have a higher share of employment in professional and technical occupations than previous generations – 26% of total employment compared with 17% for Gen-Xers and Baby Boomers when they were age 18-34. Millennials have a correspondingly lower share of employment in blue collar occupations – 20% compared to 34% for Baby Boomers in 1980.

Figure 10

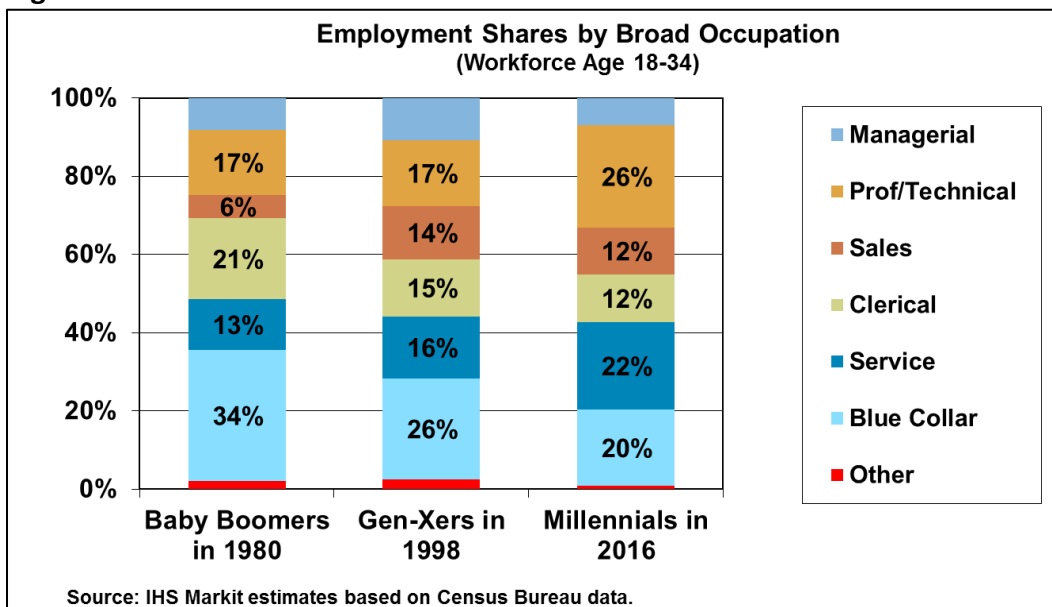
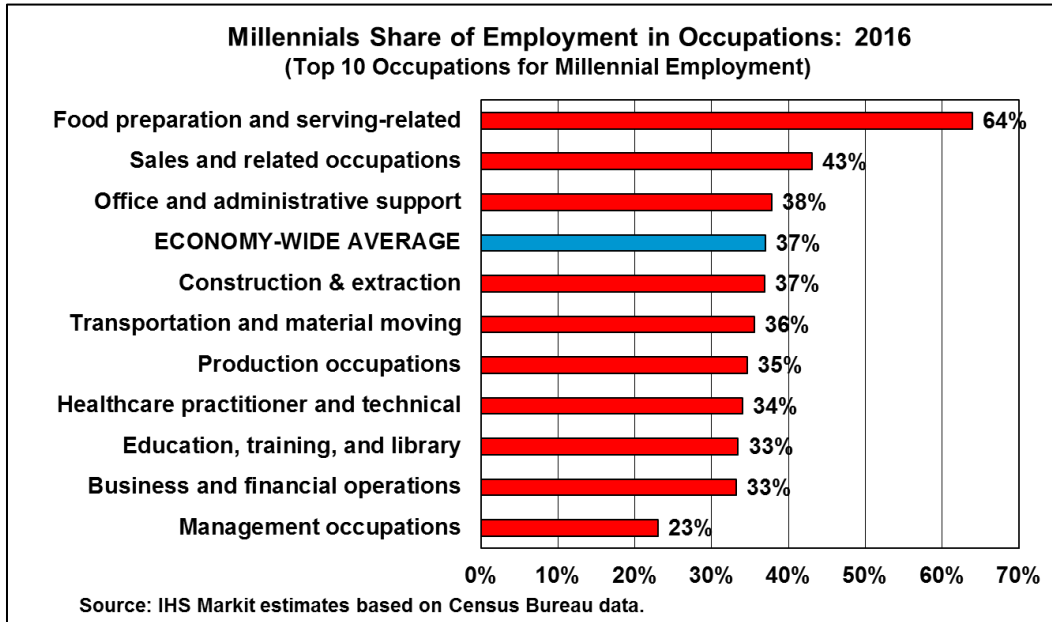


Figure 11 presents data on the Millennials' share of total US employment by occupation based on a more detailed occupational classification, which divides employment economy-wide into 22 categories. Millennial shares of employment are shown here for the 10 categories with the largest number of Millennials employed. Millennials account for 64% of employment in the food preparation and serving occupation – an occupational category traditionally dominated by young workers. They also have above average shares of employment in sales and office and administrative support occupations.

Figure 11



Millennials in the Oil & Natural Gas and Petrochemical Industries

Millennial Employment in 2015

To estimate the employment of Millennials in the oil & natural gas and petrochemical industries, we used public-use micro-data files from recent years of the American Community Survey to tabulate employment by age in detailed occupations within all segments of the oil & natural gas and petrochemical industries, including industries responsible for investment. These estimates and projections of Millennial employment were developed to be consistent with estimates for 2015 and baseline employment projections presented in a March 2016 report prepared by IHS Markit for the American Petroleum Institute.²

We estimate that 475 thousand Millennials were employed in the oil & natural gas and petrochemical industries in 2015, accounting for 34% of total employment of 1.4 million (see Table 3). This is very close to the economy-wide 35% share of Millennials in total employment in 2015. For the oil & natural gas industry alone, excluding petrochemicals, Millennials' share of employment matches their economy-wide share.

Table 3
Employment in the Oil & Natural Gas and Petrochemical Industries
by Generation: 2015

	Oil & Natural Gas Industry	Petrochemical Industry	Total
Total	1,188,279	202,135	1,390,414
Millennials	421,829	53,461	475,290
Generation X	448,390	82,218	530,608
Baby Boomers	300,168	63,559	363,727
Silent Generation (age 69+)	17,892	2,897	20,789
	Shares		
Total	100.0%	100.0%	100.0%
Millennials	35.5%	26.4%	34.2%
Generation X	37.7%	40.7%	38.2%
Baby Boomers	25.3%	31.4%	26.2%
Silent Generation (age 69+)	1.5%	1.4%	1.5%

² *Minority and Female Employment in the Oil & Natural Gas and Petrochemical Industries, 2015-2035*, March 2016. See pages 12-14 of that report for the specific industries included in these estimates.

The shares of Millennials in oil & natural gas and petrochemical employment are highest in the blue collar occupations (see Table 4). Millennials account for 46% of all industry employment in unskilled blue collar occupations and 42% in semi-skilled blue collar jobs. Even though the share of blue collar jobs in total US employment has declined substantially over time, many of these jobs continue to be staffed disproportionately by young people.

Table 4
Employment in the Oil & Natural Gas and Petrochemical Industries
Millennials and All Other by Broad Occupation: 2015

	Total	Millennials	All Other	Millennials Share
Total	1,390,414	475,290	915,124	34.2%
Management, Business and Financial	246,184	58,033	188,151	23.6%
Professional and Related	209,141	70,138	139,003	33.5%
Service	16,549	5,040	11,509	30.5%
Sales and Related	29,269	7,529	21,740	25.7%
Office & Administrative Support	119,524	36,571	82,953	30.6%
Skilled Blue Collar	403,487	143,036	260,451	35.4%
Semi-skilled Blue Collar	296,226	123,021	173,205	41.5%
Unskilled Blue Collar	70,034	31,922	38,112	45.6%
	Shares			
Total	100.0%	100.0%	100.0%	
Management, Business and Financial	17.7%	12.2%	20.6%	
Professional and Related	15.0%	14.8%	15.2%	
Service	1.2%	1.1%	1.3%	
Sales and Related	2.1%	1.6%	2.4%	
Office & Administrative Support	8.6%	7.7%	9.1%	
Skilled Blue Collar	29.0%	30.1%	28.5%	
Semi-skilled Blue Collar	21.3%	25.9%	18.9%	
Unskilled Blue Collar	5.0%	6.7%	4.2%	

In the West South Central region, which accounts for well over half of employment in the industry, and in the Mountain region, the Millennial share of employment (at 36%) is above the national average for the industry (see Table 5). These are the two regions where Millennials account for the highest share of employment economy-wide within a region. The share of Millennials in the oil & natural gas industry is below the share of Millennials in total employment in other regions where the industry has a smaller presence – especially New England, East North Central and East South Central.

Table 5
Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries by Industry Segment, 2015

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Total Employment										
Oil & Gas and Petrochemical Industries	1,390,414	7,829	87,145	80,651	93,927	60,537	33,826	804,154	133,020	89,325
Oil & Gas Industry	1,188,279	2,950	73,288	51,444	75,469	36,266	21,522	716,520	129,109	81,711
Petrochemical Industry	202,135	4,879	13,857	29,207	18,458	24,271	12,304	87,634	3,911	7,614
Employment of Millennials										
Oil & Gas and Petrochemical Industries	475,290	1,806	26,264	21,322	30,200	15,477	9,447	293,430	47,983	29,361
Oil & Gas Industry	421,829	806	23,270	14,440	25,097	10,093	6,227	267,927	46,970	26,999
Petrochemical Industry	53,461	1,000	2,994	6,882	5,103	5,384	3,220	25,503	1,013	2,362
Share of Millennials in each Industry Segment and Division										
Oil & Gas and Petrochemical Industries	34%	23%	30%	26%	32%	26%	28%	36%	36%	33%
Oil & Gas Industry	35%	27%	32%	28%	33%	28%	29%	37%	36%	33%
Petrochemical Industry	26%	20%	22%	24%	28%	22%	26%	29%	26%	31%

Differences among regions in Millennials' share of employment arise from both differences in industry mix by region and differences in the age profile of the workforce by region (see Table 6). Tables in the format of Table 6 for employment in industry operations and employment stimulated by investment, separately for the oil & natural gas and petrochemical industries, are provided in Appendix A.

Estimates of the employment of Millennials in the top detailed occupations in the oil & natural gas and petrochemical industries are presented in Table 7. These data include employment in both operations and investment in all segments of the oil & natural gas and petrochemical industries. Millennials' shares within each occupation in each of the nine Census regions are shown in Table 8. Millennials account for more than half of employment in the key oil & natural gas industry occupations of derrick, rotary drill and service unit operators and roustabouts. The Millennial share is also high in three less skilled blue collar occupations:

- helpers, extraction workers (56%),
- laborers and freight, stock, and material movers, hand (47%) and
- construction laborers (43%),

as well as in the more skilled blue collar occupations:

- pipelayers, plumbers, pipefitters and steamfitters (45%) and
- welding, soldering and brazing workers (44%).

Table 6
Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries by Major Occupation, 2015

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Employment of Millennials										
Total	475,290	1,806	26,264	21,322	30,200	15,477	9,447	293,430	47,983	29,361
Management, Business and Financial	58,033	215	3,847	2,200	3,371	1,650	485	37,880	5,105	3,280
Professional and Related	70,138	355	4,215	2,259	3,476	1,996	844	45,853	7,272	3,868
Service	5,040	69	260	498	138	339	112	2,989	266	369
Sales and Related	7,529	41	291	323	268	229	231	5,119	707	320
Office & Administrative Support	36,571	159	1,682	1,658	1,570	1,051	604	24,603	2,531	2,713
Skilled Blue-collar	143,036	344	7,725	5,407	9,745	4,156	2,691	85,007	18,555	9,406
Semi-skilled Blue Collar	123,021	479	5,663	6,099	8,829	4,332	3,528	75,299	11,681	7,111
Unskilled Blue Collar	31,922	144	2,581	2,878	2,803	1,724	952	16,680	1,866	2,294
Share of Millennials within Each Occupation by Division										
Total	34%	23%	30%	26%	32%	26%	28%	36%	36%	33%
Management, Business and Financial	24%	15%	27%	18%	24%	15%	12%	25%	22%	21%
Professional and Related	34%	34%	38%	26%	31%	25%	24%	34%	40%	30%
Service	30%	40%	23%	33%	15%	32%	15%	34%	35%	24%
Sales and Related	26%	16%	19%	17%	15%	15%	46%	29%	25%	23%
Office & Administrative Support	31%	22%	24%	25%	23%	21%	25%	33%	26%	40%
Skilled Blue-collar	35%	20%	28%	24%	31%	26%	26%	39%	40%	34%
Semi-skilled Blue Collar	42%	23%	31%	31%	40%	31%	37%	46%	43%	40%
Unskilled Blue Collar	46%	37%	36%	41%	48%	44%	39%	50%	41%	42%

Table 7
Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries, 2015:
Top Detailed Occupations

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Derrick, Rotary Drill, and Service Unit Operators	61,784	0	1,972	1,131	2,965	887	653	40,960	9,366	3,850
Roustabouts, Oil & Gas	33,611	0	1,112	660	1,600	503	361	22,220	5,048	2,107
Construction Laborers	19,403	104	1,888	1,227	1,955	740	333	10,292	1,420	1,444
Petroleum Engineers	11,914	6	822	173	216	278	0	7,901	1,913	605
First-Line Supervisors of Construction Trades and Extraction Workers	11,350	22	571	325	732	140	100	7,350	1,343	767
Pumping Station Operators	11,078	0	251	417	943	37	305	6,942	1,277	906
Driver/Sales Workers and Truck Drivers	11,001	41	470	509	786	258	303	6,703	1,403	528
Welding, Soldering, and Brazing Workers	10,712	31	475	318	449	270	101	7,363	1,220	485
Industrial Machinery Installation, Repair, and Maintenance Workers	10,112	16	258	360	620	291	310	6,047	1,177	1,033
Operating Engineers and Other Construction Equipment Operators	8,779	21	862	509	1,037	200	93	4,971	638	448
Laborers and Freight, Stock, and Material Movers, Hand	8,755	18	404	514	637	532	199	4,963	942	546
Secretaries and Administrative Assistants	8,006	6	505	341	404	145	55	5,412	774	364
Office Clerks, General	7,773	12	251	226	279	190	188	5,409	972	246
Pipelayers, Plumbers, Pipefitters, and Steamfitters	7,723	45	652	407	439	313	70	4,670	671	456
General and Operations Managers	6,281	5	380	213	319	89	34	4,050	643	548
Production Workers, Helpers and All Other	5,862	35	321	357	324	223	163	3,737	396	306
Accountants and Auditors	5,815	13	348	233	135	125	56	4,006	429	470
Maintenance and Repair Workers, General	4,976	1	112	507	252	79	150	3,137	428	310
Environmental Scientists and Geoscientists	4,188	1	166	78	129	12	5	3,375	338	84
Bookkeeping, Accounting, and Auditing Clerks	4,175	3	118	152	60	75	26	2,980	192	569
Civil Engineers	3,954	8	211	138	244	85	93	2,803	157	215
Geological and Petroleum Technicians	3,606	4	91	38	146	9	2	2,523	608	185
Helpers and Other Extraction Workers	3,508	0	79	66	267	33	56	2,289	463	255
Electricians	3,401	13	248	143	245	122	107	1,985	358	180
Sales Representatives, Wholesale and Manufacturing Managers, All Other	3,178	10	103	141	121	110	120	2,281	196	96
	888	2	62	41	43	26	10	549	91	64

Table 8
Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries, 2015:
Millennial Share of Top Detailed Occupations in Each Region

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Derrick, Rotary Drill, and Service Unit Operators	52%	0%	40%	43%	36%	42%	40%	53%	61%	56%
Roustabouts, Oil & Gas	52%	0%	40%	44%	36%	43%	40%	53%	61%	56%
Construction Laborers	43%	41%	38%	38%	49%	37%	38%	44%	39%	47%
Petroleum Engineers	39%	55%	70%	20%	18%	50%	0%	39%	53%	27%
First-Line Supervisors of Construction Trades and Extraction Workers	27%	22%	20%	18%	23%	12%	15%	29%	29%	29%
Pumping Station Operators	37%	0%	17%	41%	51%	5%	56%	37%	34%	46%
Driver/Sales Workers and Truck Drivers	27%	29%	19%	25%	24%	17%	34%	28%	31%	20%
Welding, Soldering, and Brazing Workers	44%	44%	33%	37%	35%	33%	31%	46%	52%	39%
Industrial Machinery Installation, Repair, and Maintenance Workers	34%	6%	15%	16%	32%	18%	29%	37%	47%	48%
Operating Engineers and Other Construction Equipment Operators	31%	16%	32%	29%	43%	18%	18%	33%	25%	24%
Laborers and Freight, Stock, and Material Movers, Hand	47%	16%	33%	42%	51%	54%	40%	48%	51%	48%
Secretaries and Administrative Assistants	24%	5%	27%	22%	20%	12%	8%	27%	24%	17%
Office Clerks, General	36%	12%	18%	19%	19%	21%	40%	43%	46%	18%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	45%	42%	35%	31%	29%	39%	18%	54%	52%	38%
General and Operations Managers	21%	3%	21%	14%	16%	7%	5%	22%	22%	29%
Production Workers, Helpers and All Other	37%	26%	36%	33%	35%	28%	34%	42%	31%	28%
Accountants and Auditors	34%	21%	40%	29%	15%	22%	15%	37%	24%	39%
Maintenance and Repair Workers, General	30%	0%	10%	34%	21%	7%	24%	36%	33%	29%
Environmental Scientists and Geoscientists	27%	11%	27%	19%	22%	4%	2%	32%	19%	8%
Bookkeeping, Accounting, and Auditing Clerks	24%	5%	12%	19%	6%	12%	8%	28%	11%	52%
Civil Engineers	36%	20%	31%	30%	35%	23%	60%	39%	20%	44%
Geological and Petroleum Technicians	36%	50%	22%	12%	25%	5%	1%	39%	51%	25%
Helpers and Other Extraction Workers	56%	0%	30%	46%	58%	29%	64%	57%	56%	71%
Electricians	31%	17%	29%	18%	28%	22%	36%	34%	37%	25%
Sales Representatives, Wholesale and Manufacturing	24%	10%	14%	16%	15%	14%	32%	30%	18%	12%
Managers, All Other	20%	11%	24%	15%	16%	16%	8%	21%	21%	18%

Female Millennials

About one-quarter of all women employed in the oil & natural gas and petrochemical industries in 2015 were Millennials (see Table 9). Largely because Millennial employment in the oil & natural gas industry is very high in male-dominated blue collar occupations, the share of females among Millennials employed in the industry is low. We estimate that 13% of Millennials employed in the oil & natural gas and petrochemical industries in 2015 were women (see Table 10). This is below the industry-wide share of female employment of 17%. Note also that in the traditionally female-dominated office and administrative support (OAS) occupational category the female share of all OAS workers among Millennials (57%) is below the industry-wide average of 67%. (Among the older generations, 70% of employment in office and administrative support occupations in the oil & natural gas and petrochemical industries is female.)

Table 9
Female Employment in the Oil & Natural Gas and Petrochemical Industries
Millennials and All Other by Broad Occupation: 2015

	Total	Millennial	All Other	Millennial
	Female	Female	Female	Share
Total	237,231	61,897	175,334	26.1%
Management, Business and Financial	71,102	16,353	54,749	23.0%
Professional and Related	43,301	11,812	31,489	27.3%
Service	3,853	643	3,210	16.7%
Sales and Related	5,289	1,444	3,845	27.3%
Office & Administrative Support	79,768	20,952	58,816	26.3%
Skilled Blue Collar	10,516	4,270	6,246	40.6%
Semi-skilled Blue Collar	18,944	5,112	13,832	27.0%
Unskilled Blue Collar	4,458	1,311	3,147	29.4%
				Shares
Total	100.0%	100.0%	100.0%	
Management, Business and Financial	30.0%	26.4%	31.2%	
Professional and Related	18.3%	19.1%	18.0%	
Service	1.6%	1.0%	1.8%	
Sales and Related	2.2%	2.3%	2.2%	
Office & Administrative Support	33.6%	33.8%	33.5%	
Skilled Blue Collar	4.4%	6.9%	3.6%	
Semi-skilled Blue Collar	8.0%	8.3%	7.9%	
Unskilled Blue Collar	1.9%	2.1%	1.8%	

Table 10
Employment of Female Millennials in the Oil & Natural Gas and Petrochemical Industries, 2015

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Employment of Millennials										
Total	61,897	303	3,398	2,980	3,311	2,108	965	40,617	4,828	3,387
Management, Business and Financial	16,353	74	898	722	953	461	138	11,145	1,125	837
Professional and Related	11,812	45	736	378	576	390	131	7,897	962	697
Service	643	5	31	60	20	21	9	400	54	43
Sales and Related	1,444	6	55	62	61	61	9	953	161	76
Office & Administrative Support	20,952	55	1,034	844	849	534	278	14,746	1,507	1,105
Skilled Blue-collar	4,270	15	325	202	360	118	100	2,230	638	282
Semi-skilled Blue Collar	5,112	86	246	526	351	401	238	2,651	325	288
Unskilled Blue Collar	1,311	17	73	186	141	122	62	595	56	59
Female Share of Millennial Employment within Each Occupation by Division										
Total	13%	17%	13%	14%	11%	14%	10%	14%	10%	12%
Management, Business and Financial	28%	34%	23%	33%	28%	28%	28%	29%	22%	26%
Professional and Related	17%	13%	17%	17%	17%	20%	16%	17%	13%	18%
Service	13%	7%	12%	12%	14%	6%	8%	13%	20%	12%
Sales and Related	19%	15%	19%	19%	23%	27%	4%	19%	23%	24%
Office & Administrative Support	57%	35%	61%	51%	54%	51%	46%	60%	60%	41%
Skilled Blue-collar	3%	4%	4%	4%	4%	3%	4%	3%	3%	3%
Semi-skilled Blue Collar	4%	18%	4%	9%	4%	9%	7%	4%	3%	4%
Unskilled Blue Collar	4%	12%	3%	6%	5%	7%	7%	4%	3%	3%

Minority Millennials

We estimate that about 94 thousand of the 475 thousand Millennials employed in the oil & natural gas and petrochemical industries in 2015 (or 20%) were Hispanic. Approximately 27 thousand of the 475 thousand (or 6%) were African American. In both instances, these shares are slightly below the overall shares of the minority groups in these industries (see Table 11). The two minority groups have above average shares of employment in the blue collar jobs compared to all Millennials in these industries.

Table 11
Employment of Minority Millennials in the Oil & Natural Gas and Petrochemical
by Broad Occupation: 2015

	Total Millennials	African American	Hispanic	All Other
Total	475,290	27,267	93,507	354,516
Management, Business and Financial	58,033	2,960	6,737	48,336
Professional and Related	70,138	3,300	6,748	60,090
Service	5,040	449	866	3,725
Sales and Related	7,529	240	759	6,530
Office & Administrative Support	36,571	2,032	6,918	27,621
Skilled Blue Collar	143,036	7,665	29,523	105,848
Semi-skilled Blue Collar	123,021	8,108	32,125	82,788
Unskilled Blue Collar	31,922	2,513	9,831	19,578
Shares within Occupations				
Total	100.0%	5.7%	19.7%	74.6%
Management, Business and Financial	100.0%	5.1%	11.6%	83.3%
Professional and Related	100.0%	4.7%	9.6%	85.7%
Service	100.0%	8.9%	17.2%	73.9%
Sales and Related	100.0%	3.2%	10.1%	86.7%
Office & Administrative Support	100.0%	5.6%	18.9%	75.5%
Skilled Blue Collar	100.0%	5.4%	20.6%	74.0%
Semi-skilled Blue Collar	100.0%	6.6%	26.1%	67.3%
Unskilled Blue Collar	100.0%	7.9%	30.8%	61.3%
Shares within Demographic Groups				
Total	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	12.2%	10.9%	7.2%	13.6%
Professional and Related	14.8%	12.1%	7.2%	16.9%
Service	1.1%	1.6%	0.9%	1.1%
Sales and Related	1.6%	0.9%	0.8%	1.8%
Office & Administrative Support	7.7%	7.5%	7.4%	7.8%
Skilled Blue Collar	30.1%	28.1%	31.6%	29.9%
Semi-skilled Blue Collar	25.9%	29.7%	34.4%	23.4%
Unskilled Blue Collar	6.7%	9.2%	10.5%	5.5%

Hispanic Millennials employed in the oil & natural gas and petrochemical industries have slightly higher shares of employment in semi-skilled and unskilled blue collar jobs compared to older Hispanics employed in the industries, and the Millennial shares of managerial and professional jobs are slightly lower (Table 12). These results are not surprising since Millennials have had less time to gain job experience and advanced education.

A similar pattern is seen in comparing African American Millennials with older African Americans employed in the oil & natural gas and petrochemical industries (Table 13).

Table 12
Hispanic Employment in the Oil & Natural Gas and Petrochemical Industries
Millennials and All Other by Broad Occupation: 2015

	Total Hispanic	Millennial Hispanic	All Other Hispanic	Millennial Share
Total	283,470	93,507	189,963	33.0%
Management, Business and Financial	22,601	6,737	15,864	29.8%
Professional and Related	22,547	6,748	15,799	29.9%
Service	3,023	866	2,157	28.6%
Sales and Related	3,253	759	2,494	23.3%
Office & Administrative Support	17,167	6,918	10,249	40.3%
Skilled Blue Collar	93,800	29,523	64,277	31.5%
Semi-skilled Blue Collar	92,918	32,125	60,793	34.6%
Unskilled Blue Collar	28,161	9,831	18,330	34.9%
	Shares			
Total	100.0%	100.0%	100.0%	
Management, Business and Financial	8.0%	7.2%	8.4%	
Professional and Related	8.0%	7.2%	8.3%	
Service	1.1%	0.9%	1.1%	
Sales and Related	1.1%	0.8%	1.3%	
Office & Administrative Support	6.1%	7.4%	5.4%	
Skilled Blue Collar	33.1%	31.6%	33.8%	
Semi-skilled Blue Collar	32.8%	34.4%	32.0%	
Unskilled Blue Collar	9.9%	10.5%	9.6%	

Table 13
African American Employment in the Oil & Natural Gas and Petrochemical Industries
Millennials and All Other by Broad Occupation: 2015

	Total African American	Millennial African American	All Other African American	Millennial Share
Total	93,602	27,267	66,335	29.1%
Management, Business and Financial	12,495	2,960	9,535	23.7%
Professional and Related	12,463	3,300	9,163	26.5%
Service	3,344	449	2,895	13.4%
Sales and Related	557	240	317	43.1%
Office & Administrative Support	8,545	2,032	6,513	23.8%
Skilled Blue Collar	23,923	7,665	16,258	32.0%
Semi-skilled Blue Collar	25,981	8,108	17,873	31.2%
Unskilled Blue Collar	6,294	2,513	3,781	39.9%
	Shares			
Total	100.0%	100.0%	100.0%	
Management, Business and Financial	13.3%	10.9%	14.4%	
Professional and Related	13.3%	12.1%	13.8%	
Service	3.6%	1.6%	4.4%	
Sales and Related	0.6%	0.9%	0.5%	
Office & Administrative Support	9.1%	7.5%	9.8%	
Skilled Blue Collar	25.6%	28.1%	24.5%	
Semi-skilled Blue Collar	27.8%	29.7%	26.9%	
Unskilled Blue Collar	6.7%	9.2%	5.7%	

The Millennial Generation’s Future Role in the Oil & Natural Gas Industry

Given our definition of Millennials as those born in 1981-2000 (including immigrants of corresponding ages), in 2015 Millennials were those of ages 15-34. We tabulate employment only for persons age 16 and over, and a large share of these Millennials was still pursuing their education in 2015. In future years, the share of the Millennial generation in the workforce – and in the oil & natural gas industry – will obviously grow as they move fully into the labor force. We projected Millennial employment in the oil & natural gas and petrochemical industries at two future ten-year intervals – 2025 and 2035. Millennials will be age 25-44 in 2025 and age 35-54 in 2035.

As noted earlier, the projections of Millennial employment presented here were developed to be consistent with projections produced in a March 2016 report that IHS Markit prepared for API. That report included projections under two scenarios of overall industry growth – a Regulatory Constraints scenario that reflected growth under the prevailing policy and regulatory environment and a Pro-Development scenario that projected additional jobs that would be

created under a scenario of relaxation of certain regulatory constraints on the oil and natural gas industry. Millennial employment projections in this report are linked to the first scenario, which was characterized as the Baseline scenario in that earlier report.

In order to project the employment of Millennials, we developed additional detail in our demographic model to include the age structure of immigration, age-specific employment rates, and assumptions about the propensity of persons at different ages to be employed in the oil & natural gas industry. We analyzed trends in age-specific employment rates to project age-specific employment in future years. We also project the employment of Millennials in broad occupational categories in nine regions of the country, but we do not separately project employment of minority groups within the Millennial cohort in the oil & natural gas industry. Future shifts in the occupational distribution of Millennials in the different minority groups may not follow the patterns of previous generations.

Millennials will continue to account for much of the replacement of Baby Boomers in the oil & natural gas and petrochemical industries who will be retiring over the next 20 years as well as contributing to net employment growth in the industry. The first Baby Boomers crossed the threshold of the traditional retirement age of 65 five years ago, but Baby Boomers still account for about one-fourth of employment in the industry. We estimate that the share of the Millennial generation employed in the oil & natural gas and petrochemical industries will rise from 34% in 2015 to 41% in 2025 as the size of this 20-year age cohort increases with additional immigration of young adults and as they move fully into the labor force (see Table 14). In the West South Central region that leads the industry, the Millennial share of employment will rise to 45%.

Over the following 10 years, the employment of Millennials will grow more slowly than total employment because the post-Millennial generation will get the bigger boost from immigration and from the transition from education into the workforce economy-wide. Therefore, in 2035, when Millennials are age 35-54, we project that they will account for a slightly lower share (40%) of employment in the oil & natural gas and petrochemical industries.

While this report has focused on the similarities and contrasts of Millennials to previous generations from the standpoint of basic demographic indicators such as racial diversity, nativity, and educational attainment, as well as labor market indicators such as labor participation and unemployment rates, an ever growing number of studies have looked at the question “what makes Millennials different?” from the standpoint of their behavior in the labor market – their desires and ambitions. Given the importance of attracting and retaining Millennials for the future of the oil & natural gas industry, it is important for industry firms to be attuned to these differences. Among the characteristics of Millennials commonly cited is their familiarity and expertise with digital technology, an expectation for opportunities to learn and rapid advancement, and a desire for feedback, recognition and encouragement.

Some of these characteristics are reflected in our projections of future change in the occupational mix of Millennials in the oil & natural gas industry. As the Millennial generation ages and the average educational attainment of the 20-year age cohort rises, their share of employment in

managerial, business and financial and in professional and related occupations will increase. We project that the share of Millennials employed in managerial, business and financial occupations in the oil & natural gas and petrochemical industries will rise from 24% in 2015 to 35% in 2025. The Millennial share of professional and related occupations in the industry will rise from 34% to 43%. The share employed in skilled blue collar occupations will also rise slightly, while the share employed in less skilled blue collar jobs will decline. These trends will occur across all regions as projected in Tables 15 through 17. (Tables in the format of Table 15 for each segment of the oil & natural gas and petrochemical industries are provided in Appendix B.)

Table 14
Projected Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries
by Industry Segment: 2025 and 2035

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
2025										
Employment of Millennials										
Oil & Gas and Petrochemical Industries	793,221	2,480	70,188	49,359	54,861	21,921	16,180	481,128	45,866	51,238
Oil and Gas Industry	724,821	1,244	66,235	39,308	49,872	15,721	12,246	447,262	44,608	48,325
Petrochemical Industry	68,400	1,236	3,953	10,051	4,989	6,200	3,934	33,866	1,258	2,913
Share of Millennials in each Industry Segment and Division										
Oil & Gas and Petrochemical Industries	41%	29%	38%	34%	39%	30%	36%	45%	45%	39%
Oil and Gas Industry	43%	34%	39%	35%	40%	32%	36%	46%	45%	39%
Petrochemical Industry	32%	25%	26%	31%	32%	26%	33%	34%	32%	36%
2035										
Employment of Millennials										
Oil & Gas and Petrochemical Industries	748,197	2,360	59,014	45,894	56,905	18,346	16,519	458,786	50,227	40,146
Oil and Gas Industry	686,539	1,178	55,114	37,022	51,554	12,467	12,738	429,907	49,057	37,502
Petrochemical Industry	61,658	1,182	3,900	8,872	5,351	5,879	3,781	28,879	1,170	2,644
Share of Millennials in each Industry Segment and Division										
Oil & Gas and Petrochemical Industries	40%	28%	38%	34%	38%	28%	34%	42%	42%	35%
Oil and Gas Industry	41%	32%	39%	35%	39%	30%	35%	44%	42%	35%
Petrochemical Industry	30%	24%	26%	30%	32%	24%	32%	31%	30%	33%

Table 15
Projected Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries by Occupation

	2015	2025	2035
Millennials Employment			
Total	475,290	793,221	748,197
Management, Business and Financial	58,033	117,033	120,516
Professional and Related	70,138	126,661	124,299
Service	5,040	7,866	9,243
Sales and Related	7,529	12,447	13,829
Office & Administrative Support	36,571	62,327	57,587
Skilled Blue Collar	143,036	256,096	240,333
Semi-skilled Blue Collar	123,021	174,341	152,533
Unskilled Blue Collar	31,922	36,450	29,857
Millennials Employment - Share of Millennial Total			
Total	100.0%	100.0%	100.0%
Management, Business and Financial	12.2%	14.8%	16.1%
Professional and Related	14.8%	16.0%	16.6%
Service	1.1%	1.0%	1.2%
Sales and Related	1.6%	1.6%	1.8%
Office & Administrative Support	7.7%	7.9%	7.7%
Skilled Blue Collar	30.1%	32.3%	32.1%
Semi-skilled Blue Collar	25.9%	22.0%	20.4%
Unskilled Blue Collar	6.7%	4.6%	4.0%
Millennials Employment as Share of Industry Total by Occupation			
Total	34%	41%	40%
Management, Business and Financial	24%	35%	36%
Professional and Related	34%	43%	43%
Service	30%	35%	40%
Sales and Related	26%	33%	37%
Office & Administrative Support	31%	39%	37%
Skilled Blue Collar	35%	44%	42%
Semi-skilled Blue Collar	42%	44%	40%
Unskilled Blue Collar	46%	41%	35%

Table 16

**Projected Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries
by Occupation and Division, 2025**

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Total	793,221	2,480	70,188	49,359	54,861	21,921	16,180	481,128	45,866	51,238
Management, Business and Financial	117,033	390	12,445	5,954	7,361	2,980	1,082	74,653	5,572	6,596
Professional and Related	126,661	522	12,321	5,305	6,451	2,970	1,634	82,691	7,499	7,268
Service	7,866	82	607	1,022	196	423	175	4,554	228	579
Sales and Related	12,447	68	672	761	443	348	480	8,386	697	592
Office & Administrative Support	62,327	202	4,349	4,072	2,809	1,438	1,038	41,306	2,442	4,671
Skilled Blue Collar	256,096	558	23,239	15,688	19,982	7,092	5,611	147,398	18,665	17,863
Semi-skilled Blue Collar	174,341	516	12,394	12,111	14,322	5,096	5,053	104,676	9,541	10,632
Unskilled Blue Collar	36,450	142	4,161	4,446	3,297	1,574	1,107	17,464	1,222	3,037
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	14.8%	15.7%	17.7%	12.1%	13.4%	13.6%	6.7%	15.5%	12.1%	12.9%
Professional and Related	16.0%	21.0%	17.6%	10.7%	11.8%	13.5%	10.1%	17.2%	16.3%	14.2%
Service	1.0%	3.3%	0.9%	2.1%	0.4%	1.9%	1.1%	0.9%	0.5%	1.1%
Sales and Related	1.6%	2.7%	1.0%	1.5%	0.8%	1.6%	3.0%	1.7%	1.5%	1.2%
Office & Administrative Support	7.9%	8.1%	6.2%	8.2%	5.1%	6.6%	6.4%	8.6%	5.3%	9.1%
Skilled Blue Collar	32.3%	22.5%	33.1%	31.8%	36.4%	32.4%	34.7%	30.6%	40.7%	34.9%
Semi-skilled Blue Collar	22.0%	20.8%	17.7%	24.5%	26.1%	23.2%	31.2%	21.8%	20.8%	20.8%
Unskilled Blue Collar	4.6%	5.7%	5.9%	9.0%	6.0%	7.2%	6.8%	3.6%	2.7%	5.9%

Table 17
Projected Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries
by Occupation and Division, 2035

		New	Middle	East	West		East	West		
	Total	England	Atlantic	North	North	South	South	South	Mountain	Pacific
				Central	Central	Atlantic	Central	Central		
Total	748,197	2,360	59,014	45,894	56,905	18,346	16,519	458,786	50,227	40,146
Management, Business and Financial	120,516	412	11,576	6,208	8,324	2,806	1,246	77,567	6,635	5,742
Professional and Related	124,299	512	10,805	5,152	7,117	2,628	1,775	81,699	8,548	6,063
Service	9,243	96	649	1,219	258	438	225	5,464	314	580
Sales and Related	13,829	74	658	808	526	348	564	9,394	900	557
Office & Administrative Support	57,587	186	3,607	3,734	2,878	1,183	1,048	38,679	2,597	3,675
Skilled Blue Collar	240,333	537	19,135	14,703	20,924	5,917	5,912	139,050	20,279	13,876
Semi-skilled Blue Collar	152,533	427	9,620	10,329	13,688	3,883	4,711	92,444	9,733	7,698
Unskilled Blue Collar	29,857	116	2,964	3,741	3,190	1,143	1,038	14,489	1,221	1,955
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	16.1%	17.5%	19.6%	13.5%	14.6%	15.3%	7.5%	16.9%	13.2%	14.3%
Professional and Related	16.6%	21.7%	18.3%	11.2%	12.5%	14.3%	10.7%	17.8%	17.0%	15.1%
Service	1.2%	4.1%	1.1%	2.7%	0.5%	2.4%	1.4%	1.2%	0.6%	1.4%
Sales and Related	1.8%	3.1%	1.1%	1.8%	0.9%	1.9%	3.4%	2.0%	1.8%	1.4%
Office & Administrative Support	7.7%	7.9%	6.1%	8.1%	5.1%	6.4%	6.3%	8.4%	5.2%	9.2%
Skilled Blue Collar	32.1%	22.8%	32.4%	32.0%	36.8%	32.3%	35.8%	30.3%	40.4%	34.6%
Semi-skilled Blue Collar	20.4%	18.1%	16.3%	22.5%	24.1%	21.2%	28.5%	20.1%	19.4%	19.2%
Unskilled Blue Collar	4.0%	4.9%	5.0%	8.2%	5.6%	6.2%	6.3%	3.2%	2.4%	4.9%

Appendix A. Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries: 2015

Employment of Millennials in Oil & Natural Gas Industry Operations by Major Occupation, 2015

		New	Middle	East	West	South	East	West		
	Total	England	Atlantic	North	North	Atlantic	South	South	Central	Pacific
				Central	Central		Central	Central	Mountain	
Employment of Millennials										
Total	192,155	174	12,578	7,488	15,876	4,305	4,002	104,851	26,805	16,076
Management, Business and Financial	29,186	8	2,292	582	1,853	456	213	18,508	3,167	2,107
Professional and Related	29,831	41	2,041	495	1,235	395	339	18,576	4,494	2,215
Service	2,045	24	127	191	33	86	55	1,167	122	240
Sales and Related	2,557	0	65	75	3	22	192	1,844	311	45
Office & Administrative Support	15,437	17	804	686	747	228	240	9,573	1,454	1,688
Skilled Blue Collar	60,645	72	4,142	2,420	5,466	1,745	1,508	29,147	10,485	5,660
Semi-skilled Blue Collar	43,818	5	2,501	2,115	5,477	1,014	1,129	21,875	6,347	3,355
Unskilled Blue Collar	8,636	7	606	924	1,062	359	326	4,161	425	766
Share of Millennials within Each Occupation by Division										
Total	34%	24%	34%	27%	32%	27%	27%	35%	36%	32%
Management, Business and Financial	26%	14%	41%	16%	28%	19%	14%	27%	23%	22%
Professional and Related	33%	35%	48%	20%	27%	27%	21%	33%	42%	28%
Service	30%	63%	22%	34%	7%	37%	16%	37%	30%	22%
Sales and Related	30%	0%	13%	30%	0%	8%	83%	35%	29%	18%
Office & Administrative Support	30%	21%	27%	28%	21%	18%	26%	31%	24%	46%
Skilled Blue Collar	34%	25%	30%	24%	29%	27%	26%	36%	38%	33%
Semi-skilled Blue Collar	42%	8%	32%	35%	41%	32%	35%	46%	43%	37%
Unskilled Blue Collar	50%	21%	40%	47%	59%	51%	31%	58%	31%	49%

Employment of Millennials in Oil & Natural Gas Industry Investment by Major Occupation, 2015

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Employment of Millennials										
Total	229,674	632	10,692	6,952	9,221	5,788	2,225	163,076	20,165	10,923
Management, Business and Financial	23,563	56	973	716	814	550	139	17,456	1,853	1,006
Professional and Related	32,279	100	1,682	897	1,246	670	187	23,586	2,672	1,239
Service	1,897	7	93	89	49	110	14	1,280	130	125
Sales and Related	3,715	5	155	56	73	65	16	2,887	353	105
Office & Administrative Support	16,428	27	522	340	433	367	95	12,942	912	790
Skilled Blue Collar	74,052	220	3,336	2,284	3,336	1,795	854	50,791	7,901	3,535
Semi-skilled Blue Collar	59,469	129	2,084	1,398	2,056	1,405	624	44,124	4,977	2,672
Unskilled Blue Collar	18,271	88	1,847	1,172	1,214	826	296	10,010	1,367	1,451
Share of Millennials within Each Occupation by Division										
Total	37%	28%	30%	29%	36%	29%	33%	39%	38%	35%
Management, Business and Financial	24%	17%	18%	20%	22%	16%	15%	25%	23%	20%
Professional and Related	36%	36%	37%	35%	38%	28%	30%	36%	37%	33%
Service	35%	44%	30%	48%	32%	47%	26%	33%	48%	39%
Sales and Related	26%	20%	29%	15%	19%	21%	18%	28%	22%	18%
Office & Administrative Support	33%	18%	22%	22%	26%	25%	23%	36%	27%	35%
Skilled Blue Collar	40%	29%	28%	27%	36%	29%	32%	43%	43%	35%
Semi-skilled Blue Collar	45%	29%	34%	32%	43%	33%	43%	47%	43%	42%
Unskilled Blue Collar	46%	42%	36%	43%	45%	43%	46%	49%	47%	42%

Employment of Millennials in Petrochemical Industry Operations by Major Occupation, 2015

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Employment of Millennials										
Total	40,011	1,000	2,994	6,882	3,763	5,384	3,107	13,590	1,013	2,278
Management, Business and Financial	4,203	151	582	902	606	644	125	948	85	160
Professional and Related	5,978	214	492	867	737	931	303	1,927	106	401
Service	986	38	40	218	44	143	42	443	14	4
Sales and Related	982	36	71	192	175	142	22	133	43	168
Office & Administrative Support	3,828	115	356	632	322	456	263	1,291	165	228
Skilled Blue Collar	4,843	52	247	703	584	616	293	1,990	169	189
Semi-skilled Blue Collar	15,918	345	1,078	2,586	949	1,913	1,745	5,883	357	1,062
Unskilled Blue Collar	3,273	49	128	782	346	539	314	975	74	66
Share of Millennials within Each Occupation by Division										
Total	25%	20%	22%	24%	27%	22%	26%	26%	26%	31%
Management, Business and Financial	14%	15%	18%	17%	20%	13%	7%	12%	10%	15%
Professional and Related	25%	33%	23%	25%	29%	22%	23%	23%	29%	38%
Service	25%	32%	17%	28%	14%	24%	13%	33%	16%	3%
Sales and Related	18%	18%	14%	16%	27%	15%	13%	12%	26%	31%
Office & Administrative Support	25%	23%	24%	23%	23%	21%	25%	29%	30%	29%
Skilled Blue Collar	18%	7%	14%	17%	27%	18%	15%	18%	27%	20%
Semi-skilled Blue Collar	33%	22%	27%	28%	30%	29%	37%	38%	33%	44%
Unskilled Blue Collar	38%	34%	22%	34%	41%	42%	43%	42%	40%	18%

Employment of Millennials in Petrochemical Industry Investment by Major Occupation, 2015

	Total	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Employment of Millennials										
Total	13,450	0	0	0	1,340	0	113	11,913	0	84
Management, Business and Financial	1,081	0	0	0	98	0	8	968	0	7
Professional and Related	2,050	0	0	0	258	0	15	1,764	0	13
Service	112	0	0	0	12	0	1	99	0	0
Sales and Related	275	0	0	0	17	0	1	255	0	2
Office & Administrative Support	878	0	0	0	68	0	6	797	0	7
Skilled Blue Collar	3,496	0	0	0	359	0	36	3,079	0	22
Semi-skilled Blue Collar	3,816	0	0	0	347	0	30	3,417	0	22
Unskilled Blue Collar	1,742	0	0	0	181	0	16	1,534	0	11
Share of Millennials within Each Occupation by Division										
Total	33%	0%	0%	0%	31%	0%	28%	33%	0%	29%
Management, Business and Financial	18%	0%	0%	0%	15%	0%	14%	18%	0%	15%
Professional and Related	35%	0%	0%	0%	38%	0%	29%	35%	0%	31%
Service	30%	0%	0%	0%	35%	0%	25%	30%	0%	0%
Sales and Related	29%	0%	0%	0%	25%	0%	17%	29%	0%	29%
Office & Administrative Support	28%	0%	0%	0%	22%	0%	22%	29%	0%	32%
Skilled Blue Collar	33%	0%	0%	0%	30%	0%	30%	33%	0%	30%
Semi-skilled Blue Collar	40%	0%	0%	0%	37%	0%	31%	40%	0%	33%
Unskilled Blue Collar	45%	0%	0%	0%	43%	0%	46%	45%	0%	39%

Appendix B. Projected Employment of Millennials in the Oil & Natural Gas and Petrochemical Industries: 2015-2035

Projected Employment of Millennials in Oil & Natural Gas Industry Operations by Major Occupation: 2015-2035

	2015	2025	2035
Millennials Employment			
Total	192,155	372,390	355,794
Management, Business and Financial	29,186	63,325	65,167
Professional and Related	29,831	61,707	62,339
Service	2,045	3,622	4,493
Sales and Related	2,557	4,922	5,428
Office & Administrative Support	15,437	29,905	27,794
Skilled Blue Collar	60,645	123,895	115,870
Semi-skilled Blue Collar	43,818	73,609	64,932
Unskilled Blue Collar	8,636	11,405	9,771
Millennials Employment - Share of Millennial Total			
Total	100.0%	100.0%	100.0%
Management, Business and Financial	15.2%	17.0%	18.3%
Professional and Related	15.5%	16.6%	17.5%
Service	1.1%	1.0%	1.3%
Sales and Related	1.3%	1.3%	1.5%
Office & Administrative Support	8.0%	8.0%	7.8%
Skilled Blue Collar	31.6%	33.3%	32.6%
Semi-skilled Blue Collar	22.8%	19.8%	18.2%
Unskilled Blue Collar	4.5%	3.1%	2.7%
Millennials Employment as Share of Industry Total by Occupation			
Total	34%	41%	39%
Management, Business and Financial	26%	37%	38%
Professional and Related	33%	42%	42%
Service	30%	34%	41%
Sales and Related	30%	36%	40%
Office & Administrative Support	30%	37%	36%
Skilled Blue Collar	34%	42%	39%
Semi-skilled Blue Collar	42%	44%	39%
Unskilled Blue Collar	50%	44%	38%

**Projected Employment of Millennials in Investment in the
Oil & Natural Gas Industry by Major Occupation: 2015-2035**

	2015	2025	2035
Millennials Employment			
Total	229,674	352,431	330,745
Management, Business and Financial	23,563	43,781	45,128
Professional and Related	32,279	53,735	51,467
Service	1,897	2,802	3,120
Sales and Related	3,715	5,488	6,415
Office & Administrative Support	16,428	26,317	24,326
Skilled Blue Collar	74,052	120,535	112,911
Semi-skilled Blue Collar	59,469	78,629	70,137
Unskilled Blue Collar	18,271	21,144	17,241
Millennials Employment - Share of Millennial Total			
Total	100.0%	100.0%	100.0%
Management, Business and Financial	10.3%	12.4%	13.6%
Professional and Related	14.1%	15.2%	15.6%
Service	0.8%	0.8%	0.9%
Sales and Related	1.6%	1.6%	1.9%
Office & Administrative Support	7.2%	7.5%	7.4%
Skilled Blue Collar	32.2%	34.2%	34.1%
Semi-skilled Blue Collar	25.9%	22.3%	21.2%
Unskilled Blue Collar	8.0%	6.0%	5.2%
Millennials Employment as Share of Industry Total by Occupation			
Total	37%	45%	43%
Management, Business and Financial	24%	35%	37%
Professional and Related	36%	47%	47%
Service	35%	41%	48%
Sales and Related	26%	33%	38%
Office & Administrative Support	33%	43%	41%
Skilled Blue Collar	40%	50%	48%
Semi-skilled Blue Collar	45%	48%	44%
Unskilled Blue Collar	46%	42%	36%

**Projected Employment of Millennials in Petrochemical Industry
Operations by Major Occupation: 2015-2035**

	2015	2025	2035
Millennials Employment			
Total	40,011	60,214	60,862
Management, Business and Financial	4,203	8,970	10,121
Professional and Related	5,978	9,904	10,361
Service	986	1,380	1,624
Sales and Related	982	1,832	1,969
Office & Administrative Support	3,828	5,567	5,420
Skilled Blue Collar	4,843	9,262	11,277
Semi-skilled Blue Collar	15,918	20,118	17,305
Unskilled Blue Collar	3,273	3,181	2,785
Millennials Employment - Share of Millennial Total			
Total	100.0%	100.0%	100.0%
Management, Business and Financial	10.5%	14.9%	16.6%
Professional and Related	14.9%	16.4%	17.0%
Service	2.5%	2.3%	2.7%
Sales and Related	2.5%	3.0%	3.2%
Office & Administrative Support	9.6%	9.2%	8.9%
Skilled Blue Collar	12.1%	15.4%	18.5%
Semi-skilled Blue Collar	39.8%	33.4%	28.4%
Unskilled Blue Collar	8.2%	5.3%	4.6%
Millennials Employment as Share of Industry Total by Occupation			
Total	25%	31%	29%
Management, Business and Financial	14%	26%	28%
Professional and Related	25%	33%	32%
Service	25%	28%	31%
Sales and Related	18%	28%	28%
Office & Administrative Support	25%	31%	30%
Skilled Blue Collar	18%	27%	30%
Semi-skilled Blue Collar	33%	35%	29%
Unskilled Blue Collar	38%	31%	26%

**Projected Employment of Millennials in Investment in the
Petrochemical Industry by Major Occupation: 2015-2035**

	2015	2025	2035
Millennials Employment			
Total	13,450	8,186	796
Management, Business and Financial	1,081	957	100
Professional and Related	2,050	1,315	132
Service	112	62	6
Sales and Related	275	205	17
Office & Administrative Support	878	538	47
Skilled Blue Collar	3,496	2,404	275
Semi-skilled Blue Collar	3,816	1,985	159
Unskilled Blue Collar	1,742	720	60
Millennials Employment - Share of Millennial Total			
Total	100.0%	100.0%	100.0%
Management, Business and Financial	8.0%	11.7%	12.6%
Professional and Related	15.2%	16.1%	16.6%
Service	0.8%	0.8%	0.8%
Sales and Related	2.0%	2.5%	2.1%
Office & Administrative Support	6.5%	6.6%	5.9%
Skilled Blue Collar	26.0%	29.4%	34.5%
Semi-skilled Blue Collar	28.4%	24.2%	20.0%
Unskilled Blue Collar	13.0%	8.8%	7.5%
Millennials Employment as Share of Industry Total by Occupation			
Total	33%	41%	38%
Management, Business and Financial	18%	32%	32%
Professional and Related	35%	46%	42%
Service	30%	34%	33%
Sales and Related	29%	43%	40%
Office & Administrative Support	28%	35%	31%
Skilled Blue Collar	33%	45%	47%
Semi-skilled Blue Collar	40%	43%	33%
Unskilled Blue Collar	45%	39%	30%



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