



Center for Houston's Future

11/09/2017





Houston Introduction

Introduction

City of Houston Timeline (1/2)

1846: Texas becomes the 28th state

1853: Houston's first railroad – the Buffalo Bayou, Brazos & Colorado Railroad – begins operations

1853: Texas Legislature appropriates \$4,000 to Buffalo Bayou improvements

1870: Congress designates Houston a port: the first survey of Houston's proposed ship channel is conducted

1872: Congress makes its first appropriation (\$10,000) for ship channel improvements

1882: Houston Electric Light Co. is organized, making Houston and NYC the first cities to build electric power plants

1887: Houston's first general hospital opens

1900: Category 4 storm hits Galveston, claiming more than 6,000 lives and causing property damage of \$30million (\$846 million in 2012 dollars)

1901: Oil discovered at Spindletop. Later discoveries in Humble in 1905 and Goose Creek in 1906 put Houston in the center of new oil and oilfield equipment development

1902: Congress appropriates \$1m for work on the Houston Ship Channel

1910: Congress accepts a novel plan to split ship channel development costs between Houston and the federal government

1914: The 25 foot deep Houston Ship Channel is completed and formally dedicated

1920-1940: Oil refineries proliferate along the Ship Channel, taking advantage of inexpensive waterborne shipping

1926: Natural gas is first piped into Houston

1927: Houston Junior College is established (Now TX Southern and U of H)

1928: Municipal airport opened – air service to Houston begins

1934: Intracoastal canal links Houston to Mississippi river navigation system

1935: First scheduled air passenger service to Houston

1940s: Petrochemical complex develops, taking feedstocks from nearby refineries

1941: New master plan for Houston roads emphasizes a loop system

1943: Texas Medical Center is founded

1947: Texas Southern University acquired by Texas Legislature

Introduction

City of Houston Timeline (2/2)

1947: Engineering begins on the Gulf Freeway, Texas' first freeway

1948: Annexation expands Houston's area from 74 to 216 square miles

1948: Houston port ranks second nationally in total tonnage

1955: Houston metro area population reaches 1 million

1969: Houston Intercontinental Airport begins operations

1971: Shell Oil Company relocates corporate headquarters to Houston. More than 200 major firms move HQs, subsidiaries, and divisions to Houston during the 1970s

1973: Arab oil embargo quadruples oil prices in 90 days, fueling Houston's 1973–1981 economic boom

1978: Voters approve and fund Metropolitan Transit Authority

1982: Employment peaks at 1,583,400 in March before the onset of the recession

1983: Voters approve creation of Harris County toll road authority

1987: Trough of recession in January – total job loss during the recession totaled 221,900

1989: Houston Chamber of Commerce, Houston Economic Development Council, and Houston World Trade Association combine to form the Greater Houston Partnership

1990: Houston economic recovery is complete – April job count is above the March 1982 level

2000: Census finds Houston MSA has no racial or ethnic majority

2001: Tropical Storm Allison inundates Houston in June, inflicting \$4.9 billion in property damage

2004: Houston's first light rail line begins operations

2008: Hurricane Ike makes landfall in September, causing \$27 billion in property damage across the Texas Gulf Coast

2011: By November, Houston returns to 2008 pre-recession employment levels, and is the first major metro to do so

2013: A \$60 billion boom in chemical plant construction begins along the Gulf Coast. This helps to offset job losses in the energy industry over the next two years

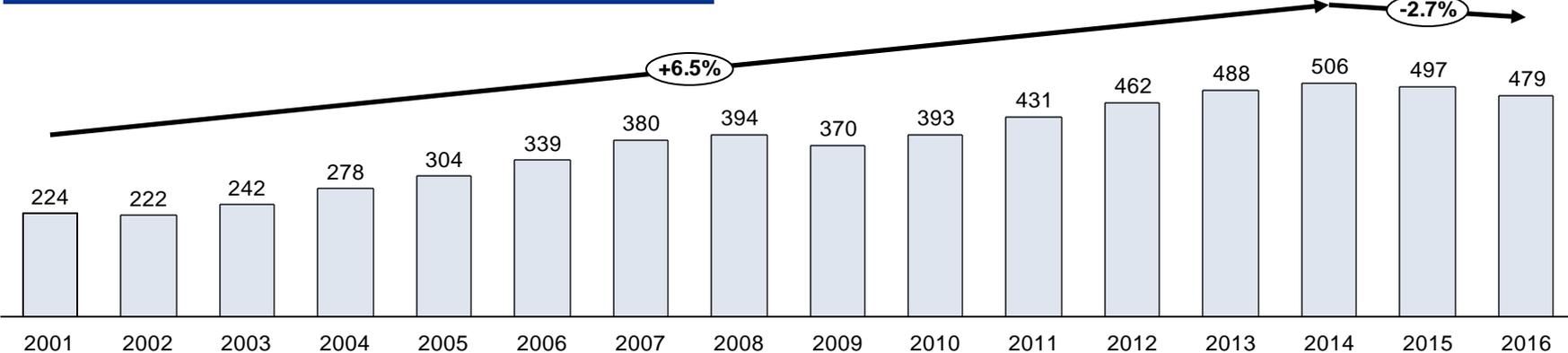
2014: Oil prices peak at \$108 per barrel in June before plunging 75% over the next 18 months. Nearly 80,000 energy related jobs are lost

2016: The energy downturn bottoms out and a slow recovery begins

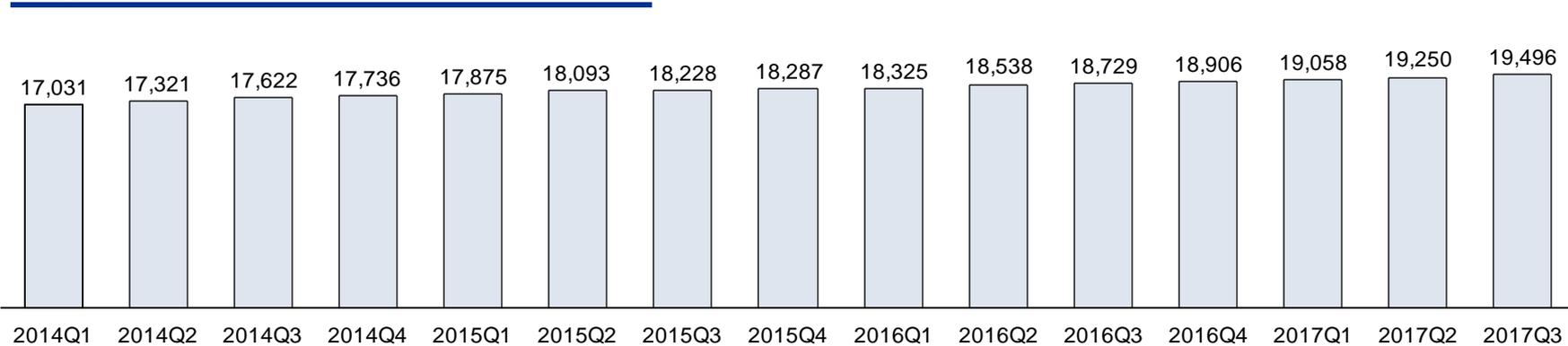
Introduction

Houston's GDP showed strong growth until 2014, but recent challenges in the oil and gas industry have resulted in decline versus US GDP

Houston gross domestic product (\$b, 2001-2016)



US gross domestic product (\$b, 2014Q1-17Q3)



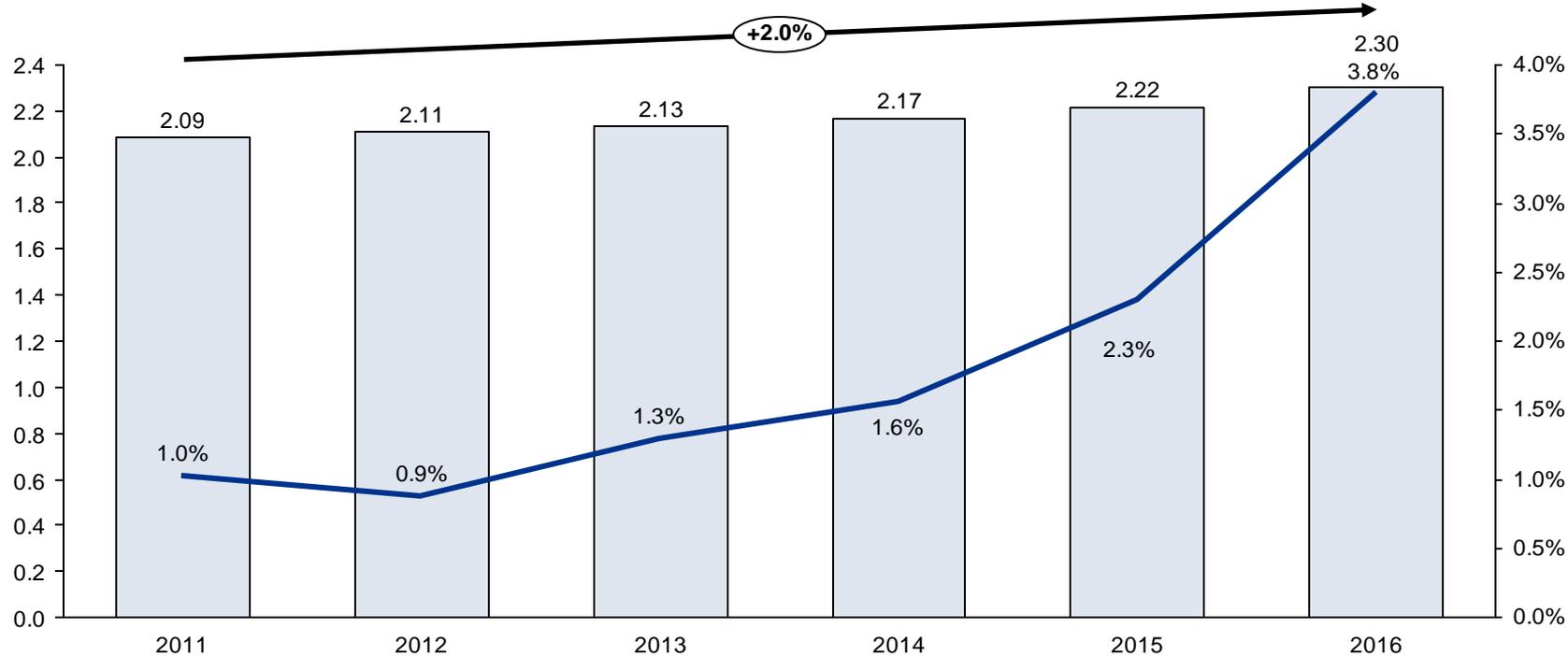
Note(s): (a)
Source(s): (1) US Bureau of Economic Analysis



Introduction

The City of Houston’s population has grown at an increasing rate over the past few years...

Total population and population growth – Houston City (millions,%, 2011-16)



Note(s): (a)
Source(s): (1) U.S. Census Bureau, American Community Survey



Introduction

...and the Greater Houston MSA population increased by over 850,000 over the past 5 years, with a significant portion coming from migration

Components of population change - Houston MSA and County (2016)						
Geography	Population (July 1 2016)	Net domestic migration	Net international migration	Births	Deaths	Total population change ('10-'16)
Houston MSA	6,772,470	283,239	193,618	599,542	226,559	851,971
Austin County	29,758	701	206	2,153	1,675	1,347
Brazoria County	354,195	21,414	2,915	29,538	13,403	41,068
Chambers County	39,899	3,303	100	2,982	1,629	4,800
Fort Bend County	741,237	92,739	23,750	54,353	17,019	156,534
Galveston County	329,431	23,720	3,784	25,163	15,382	38,128
Harris County	4,589,928	65,282	153,824	432,780	150,560	496,686
Liberty County	81,704	3,602	299	6,689	4,628	6,063
Montgomery County	556,203	67,824	8,641	42,104	20,484	100,453
Waller County	50,115	4,654	99	3,780	1,779	6,892

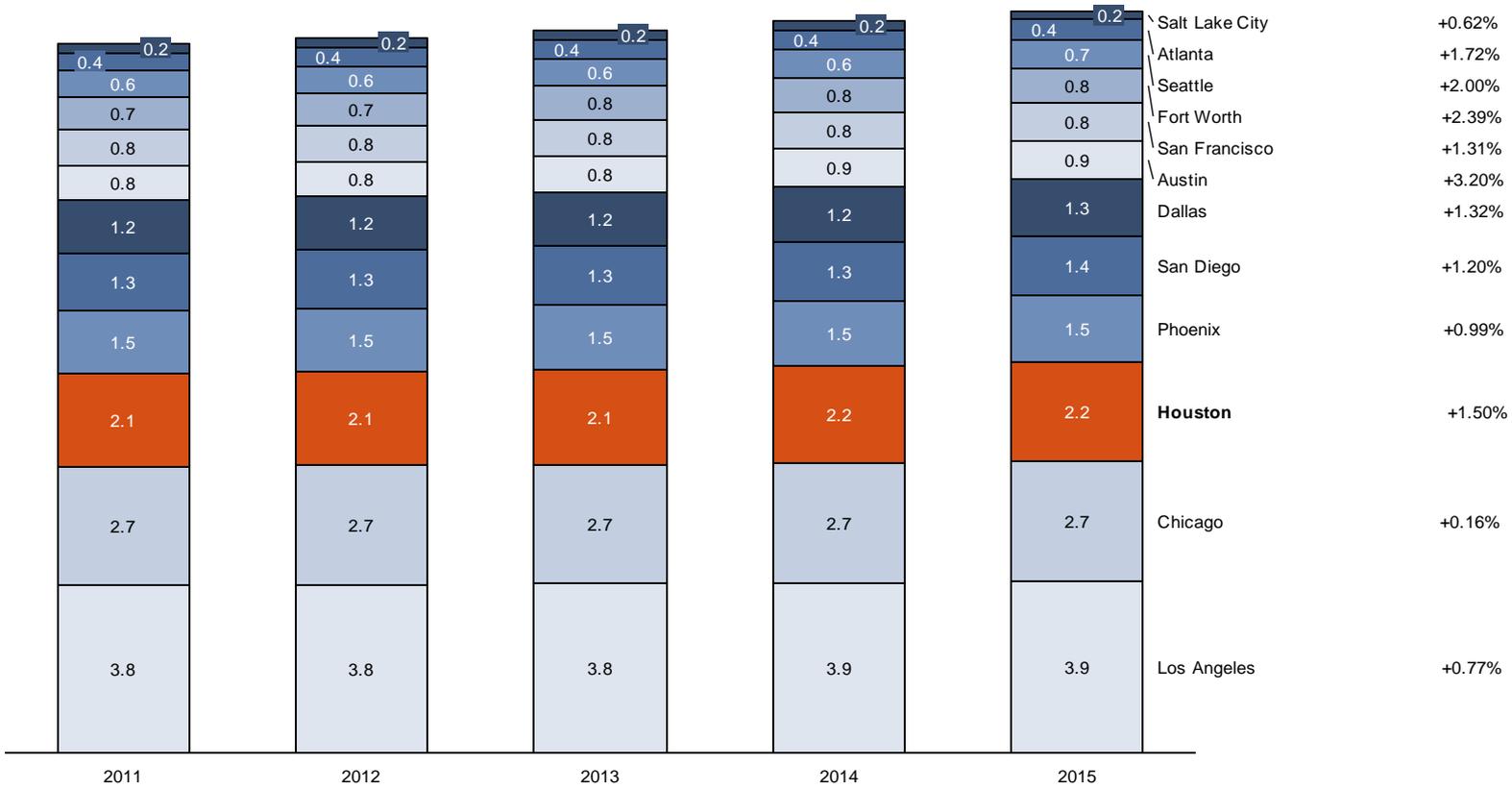
Note(s): (a)
Source(s): (1) U.S. Census Bureau, 2016 population estimates

Introduction

Houston is currently one of the largest US cities, with a 2015 estimated population of 2.2 million

Total population (millions, 2011-15)

CAGR (2011-15)



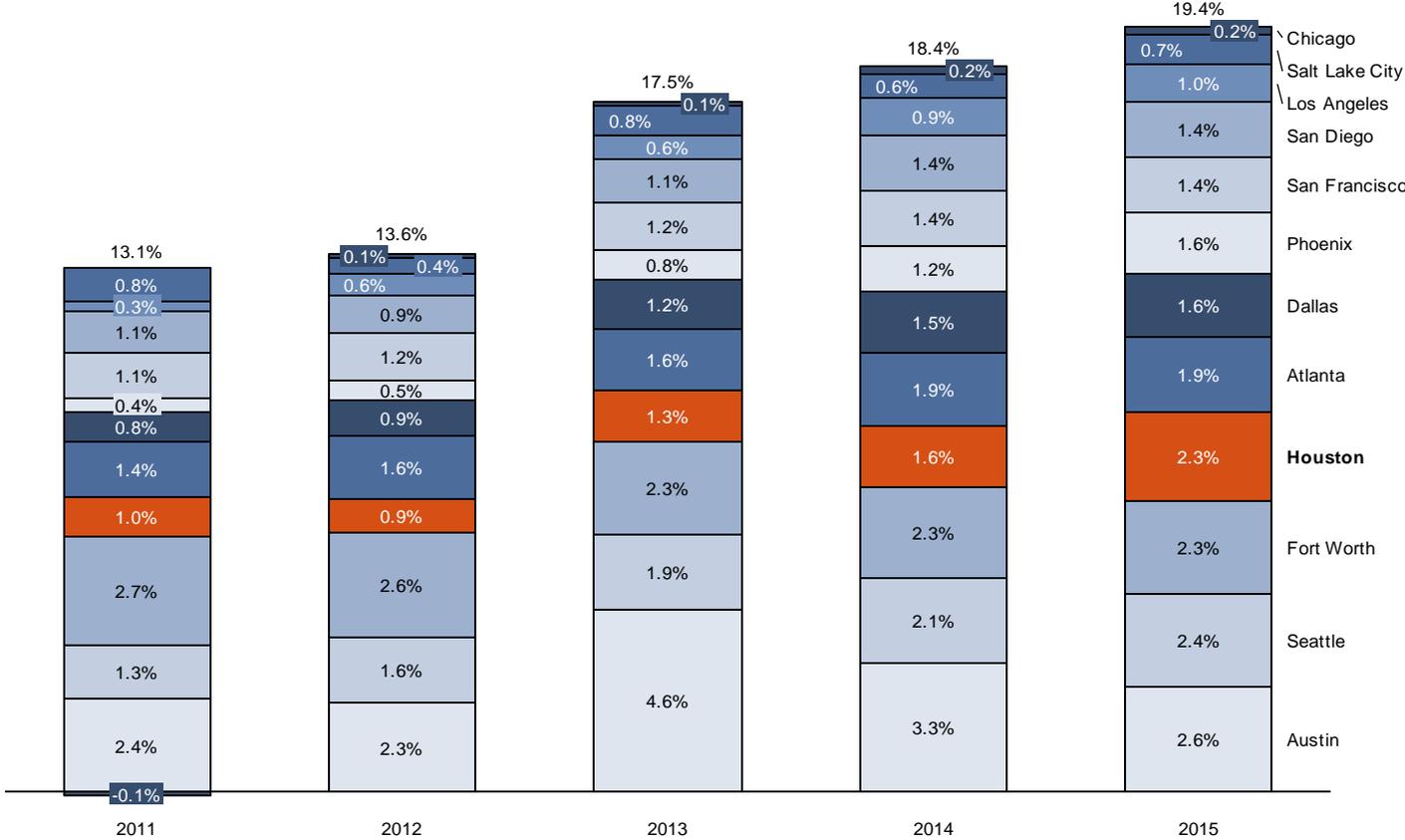
Note(s): (a)
Source(s): (1) U.S. Census Bureau, American Community Survey



Introduction

The city has continued to grow at an increasing pace over the last few years, with 2.3% population growth in 2015

Total population growth (% , 2011-15)



Note(s): (a)
 Source(s): (1) U.S. Census Bureau, American Community Survey



Introduction

Houston has higher overall employment than the majority of chosen peers...

Non farm employment ('000s, 2017)^{(a)(b)}



Note(s): (a) Average of January to September, of which September figures are preliminary; (b) Represents the total number of paid U.S. workers of any business, excluding general government employees, private household employees, employees of non profit organizations that provide assistance to individuals, and farm employees
 Source(s): (1) Bureau of Labor Statistics



Introduction

...but the city's employment growth appears to be slowing, partially due to challenges in the oil and gas industry

Non farm employment growth (% , 2017)^(a)



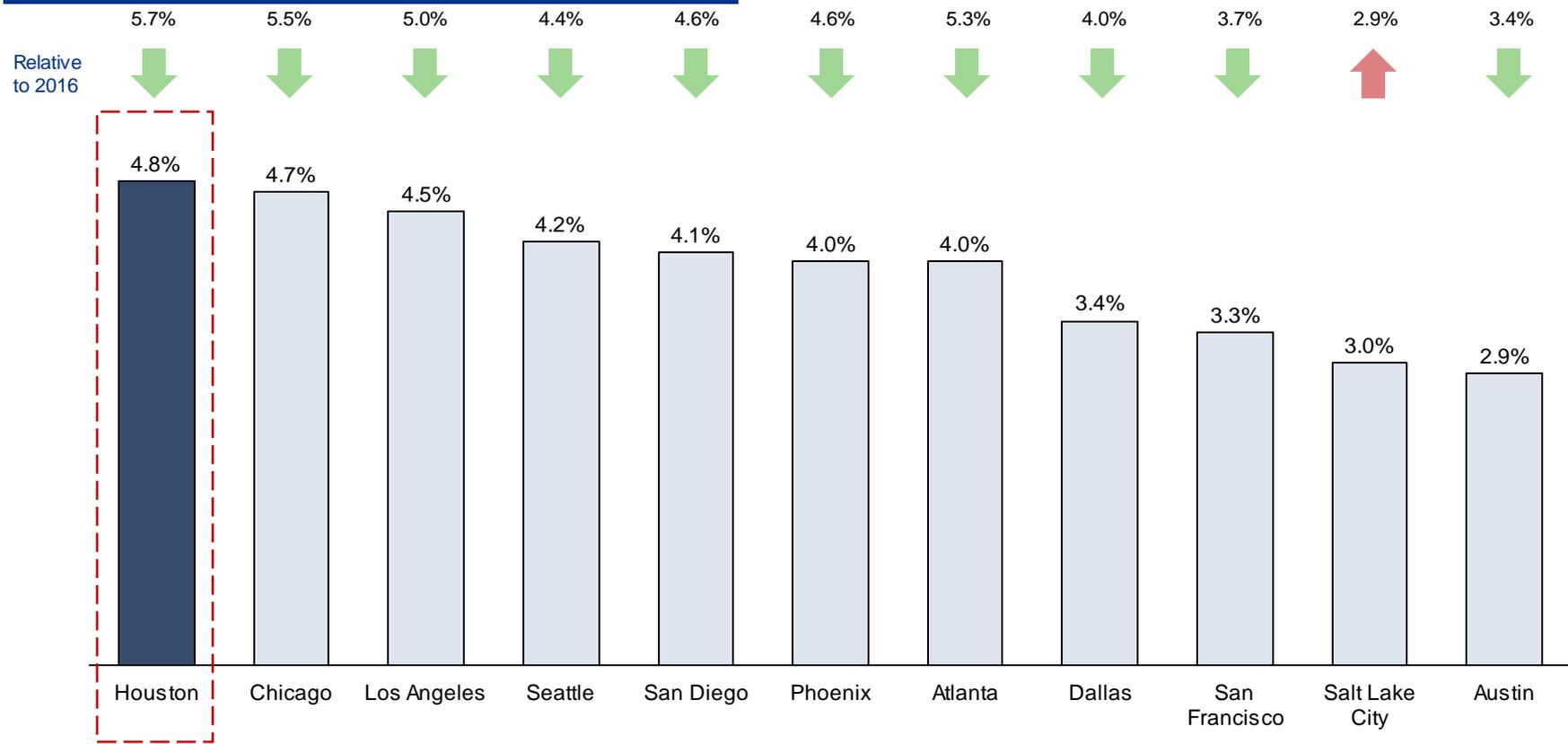
Note(s): (a) Average of January to September, of which September figures are preliminary; (b) Represents the total number of paid U.S. workers of any business, excluding general government employees, private household employees, employees of non profit organizations that provide assistance to individuals, and farm employees
 Source(s): (1) Bureau of Labor Statistics



Introduction

Furthermore, September 2017 unemployment rates show Houston with the highest rate of the peer set, although it has decreased from 2016

Unemployment rate (% of labor force, September 2017)^(a)



Note(s): (a) September 2017 figures – preliminary
Source(s): (1) Bureau of Labor Statistics



Introduction

80% of Houston's jobs are service providing, and trade, transportation and utilities comprise the highest employing industry sector

Employment by industry - Houston MSA 2016 (Annual averages)		
Industry	Jobs (000s)	% of total
Good producing	530.3	17.7%
Services providing	2470.3	82.3%
Mining and lodging	88.6	3.0%
Oil and gas extraction	50.5	1.7%
Support activities for mining	36.7	1.2%
Construction	218.3	7.3%
Manufacturing	223.4	7.4%
Durable goods	140.6	4.7%
Non-durable goods	82.8	2.8%
Trade, transportation and utilities	609.9	20.3%
Wholesale trade	163.7	5.5%
Retail trade	306.3	10.2%
Transportation, warehousing and utilities	139.8	4.7%
Information	32.6	1.1%
Financial activities	155.2	5.2%
Finance and insurance	99.2	3.3%
Real estate, rental and leasing	56	1.9%
Professional and business services	469.1	15.6%
Professional, scientific and technical services	218.4	7.3%
Management of companies and enterprises	37	1.2%
Admin, support and waste management	213.7	7.1%
Educational and health services	380.2	12.7%
Educational services	57.9	1.9%
Health care and social assistance	322.3	10.7%
Leisure and hospitality	312.6	10.4%
Arts, entertainment and recreation	34	1.1%
Accommodation and food services	278.6	9.3%
Other services	108.4	3.6%
Government	402.3	13.4%
Total private	2598.3	86.6%
Total non-farm	3000.6	100.0%

Note(s): (a)

Source(s): (1) Texas workforce commission, 2016 Annual employment estimates

Introduction

Occupation wise, office and administrative support and sales related jobs constitute ~25% of Houston employment

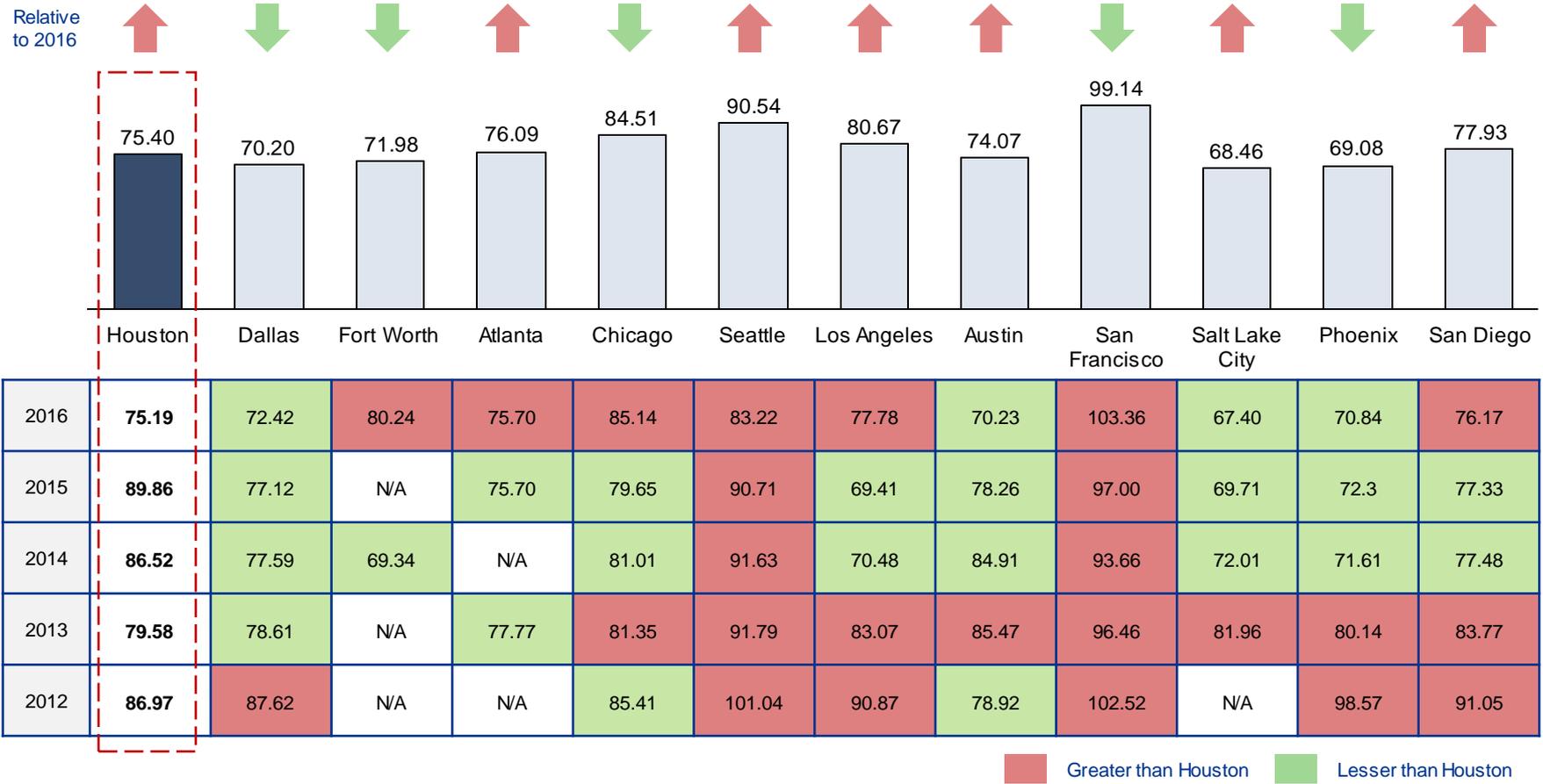
Occupation employment - Houston MSA, 2016		
Occupation	Jobs (000s)	% of total
Office and administrative support	467.89	15.9%
Sales and related	301.20	10.3%
Food preparation and serving related	276.52	9.4%
Transportation and material moving	213.33	7.3%
Production	185.14	6.3%
Construction and extraction	176.41	6.0%
Education, training and library	172.81	5.9%
Business and financial operation	154.98	5.3%
Health care practitioners and technical	153.68	5.2%
Management	128.13	4.4%
Installation, maintenance and repair	126.02	4.3%
Architecture and engineering	87.50	3.0%
Buildings and grounds cleaning and maintenance	84.66	2.9%
Personal care and service	81.74	2.8%
Computer and mathematical	80.78	2.8%
Protective service	70.66	2.4%
Health care support	64.19	2.2%
Life, physical and social science	30.71	1.0%
Arts, design, entertainment, sports and media	29.48	1.0%
Legal	23.61	0.8%
Community and social services	22.88	0.8%
Farming, fishing and forestry	2.67	0.1%
Total occupation employment	2,934.99	100%

Note(s): (a)
Source(s): (1) U.S. Department of Labor; (2) Bureau of Labor Statistics

Introduction

Houston is more affordable than the majority of cities in the chosen peer set, with a declining cost of living over the past few years...

Cost of living index^(a) (2017)



Note(s): (a) Indices relative to New York, which has been taken as 100
 Source(s): (1) Numbeo



Introduction

...and housing sales appear to have witnessed modest growth over the past year complimented by a less than 1% increase in average price

Housing activity for Houston - The Woodlands-Sugar Land

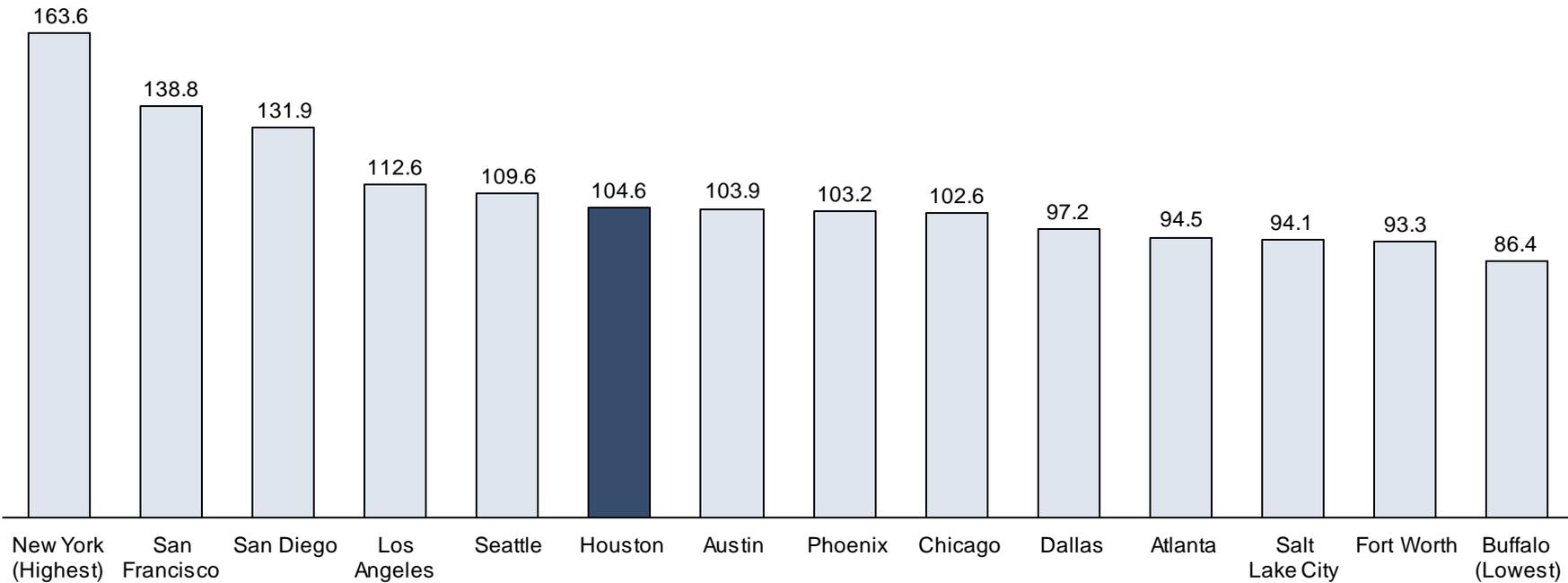
Year	Sales (\$)	Dollar Volume (\$)	Average Price (\$)	Median Price (\$)	Total Listings	Months Inventory
2010	54,922	11,546,779,015	210,240	153,695	35,143	7.3
2011	56,858	12,079,505,747	212,450	155,000	33,042	5.8
2012	66,313	14,870,792,684	224,252	165,000	25,511	3.6
2013	78,201	19,418,098,419	248,310	181,528	19,118	2.5
2014	80,429	21,678,661,049	269,538	199,900	17,178	2.3
2015	78,753	21,992,825,626	279,263	212,000	20,212	3.1
2016	80,613	22,722,805,377	281,875	220,000	23,733	3.3

Note(s): (a)
Source(s): (1) Housing Activity for Houston-The Woodlands-Sugar Land, Real Estate Center, Texas A&M university

Introduction

The cost of doing business, however, ranks higher among the more affordable cities in the peer set

Cost of doing business (Index)



Note(s): (a)
Source(s): (1) Amazon data



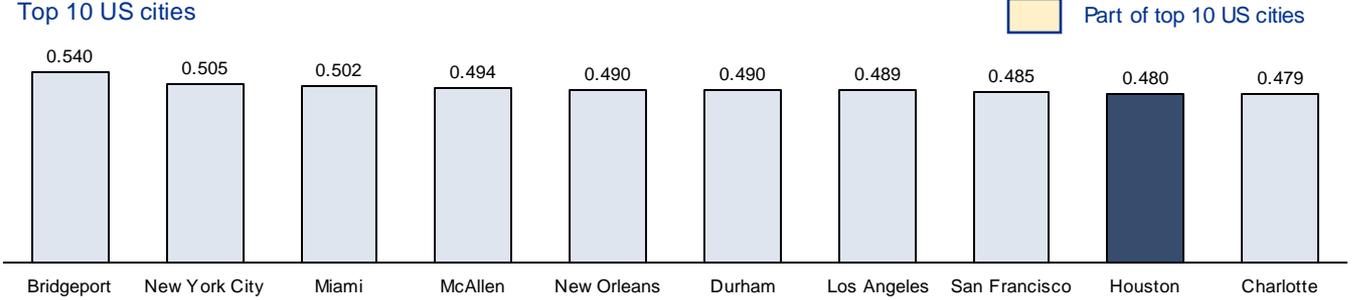
Introduction

While Houston is a diverse city, it ranks high in income inequality

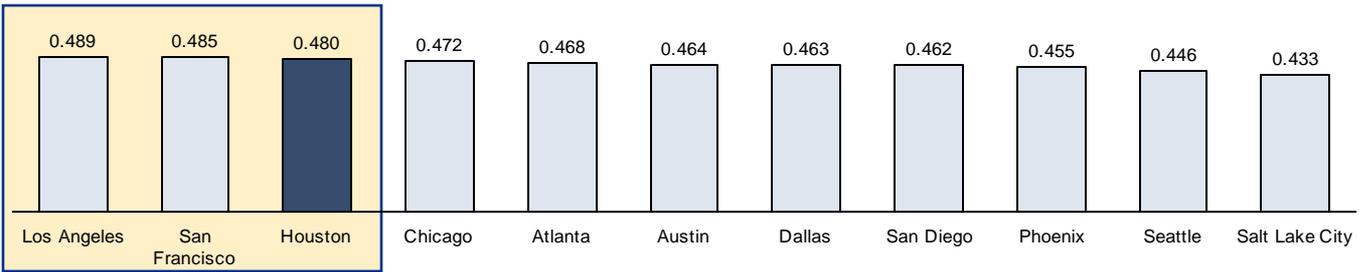
Gini Coefficient

- The Gini Coefficient is a measure of income distribution in society
- It is measured between 0-1
 - 0 being absolute equality
 - 1 being all income held by a single person

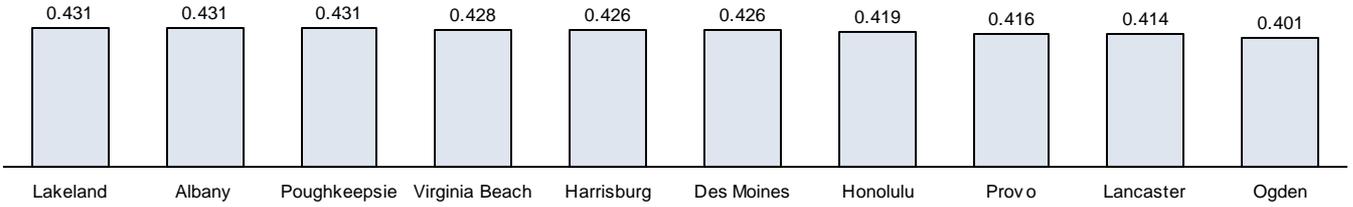
Top 10 US cities



Selected peer set



Bottom 10 US cities



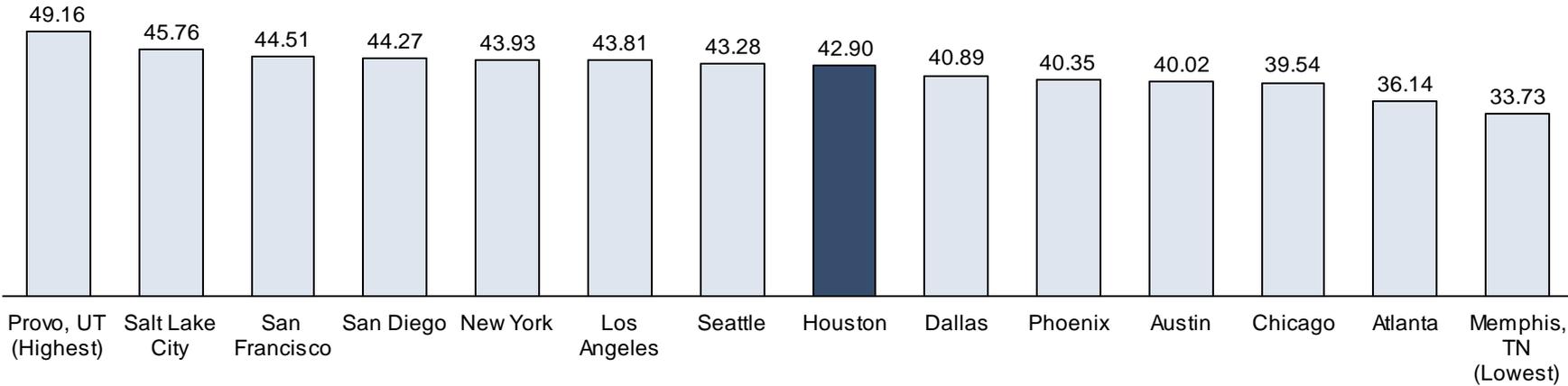
Note(s): (a)
 Source(s): (1) Gini indexes of income inequality in 102 major markets, Jan 31, 2014, The Business Journals; (2) Who, What, Why: What is the Gini coefficient?, Mar 12, 2015, BBC news



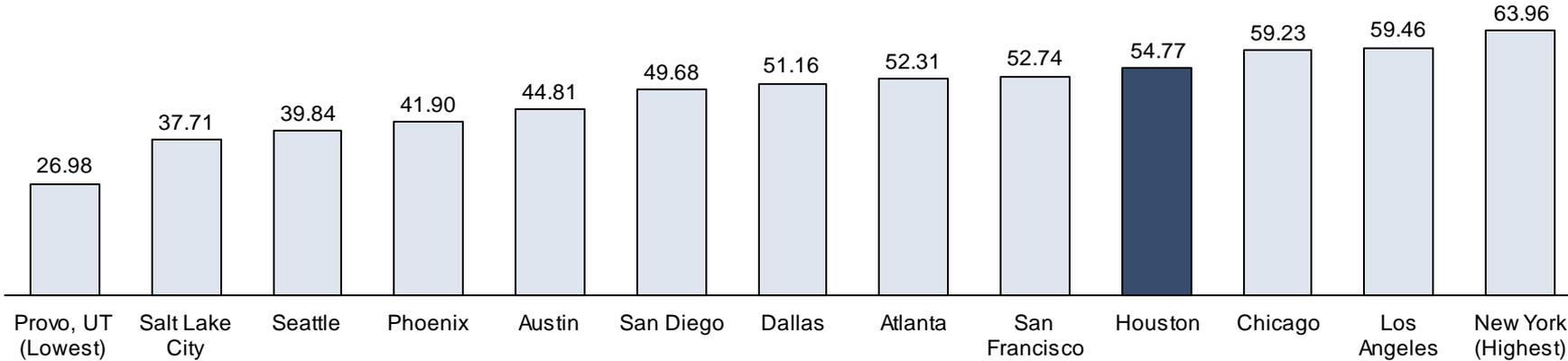
Introduction

Houston also has greater levels of racial segregation, but ranks higher in upward economic mobility than southern city peers

Absolute Upward Mobility Index



Racial Segregation Index



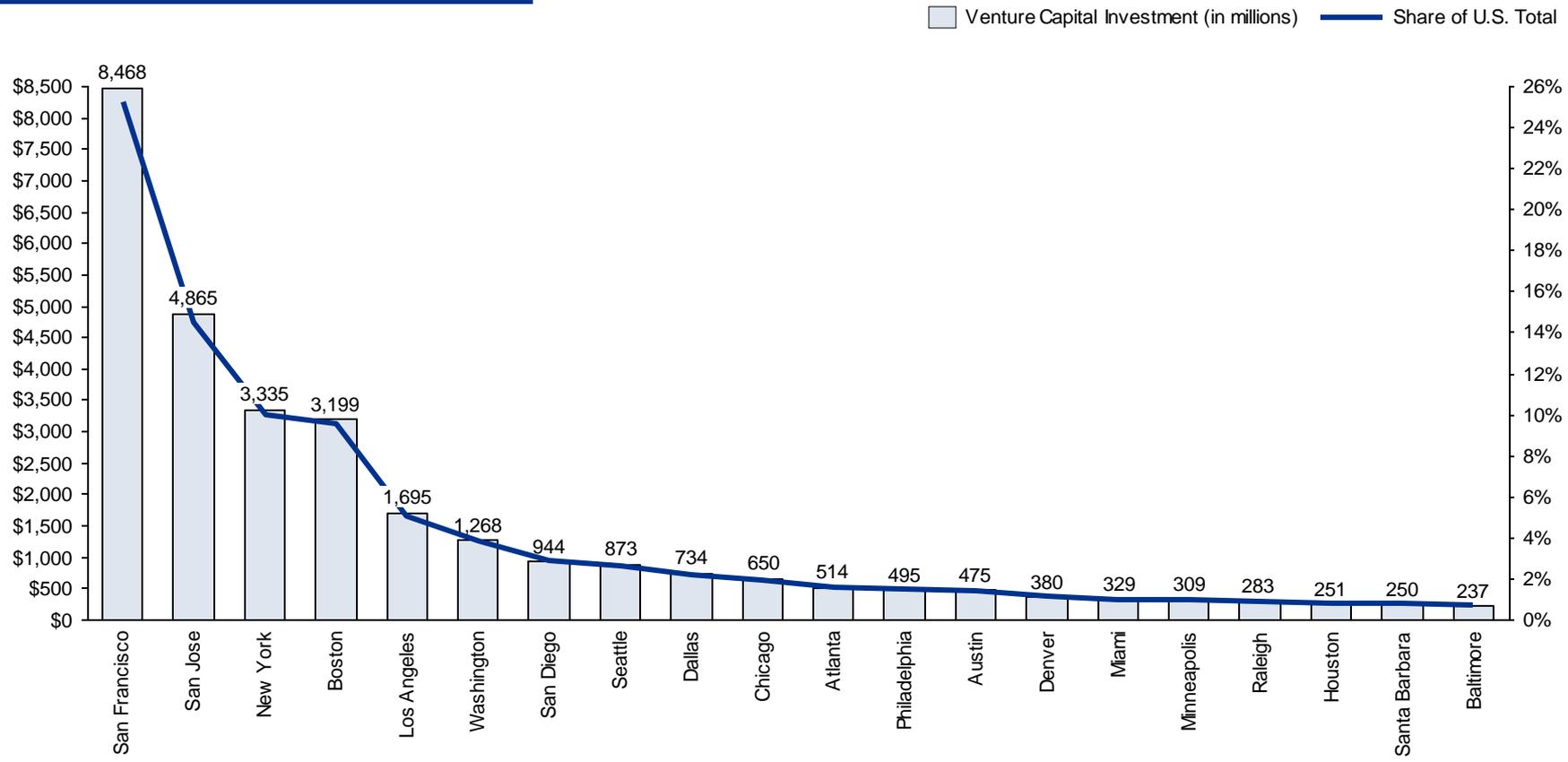
Note(s): (a) Source(s): (1) Sustainability Indicator Database; (2) Equal Opportunity Project, Harvard university; (3) Population Studies Center, University of Michigan



Introduction

Houston receives some of the lowest venture capital investment across the nation...

Venture capital investment by city (\$m)



Note(s): (a)
Source(s): (1) CityLab – Geography of Venture Capital in the US



Introduction

...which may be a cause for a low tech talent ranking, as this talent drives much of the innovation on the West Coast

Tech talent by city^{(a)(b)}

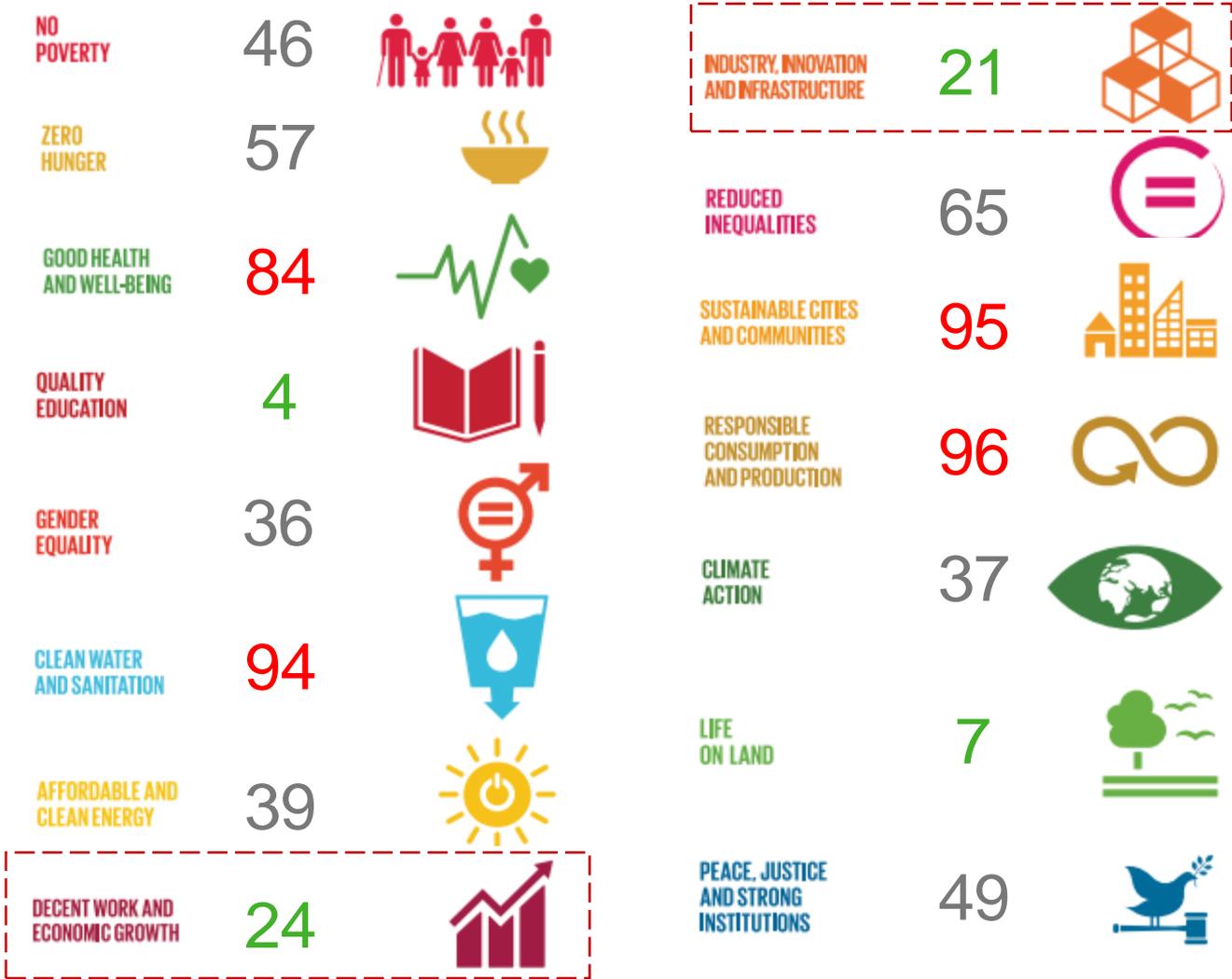
City	Rank 2017	Score	Tech Talent Jobs As A % Of Total Jobs	Average Apartment Rent	Tech Talent Labor Pool % Change (2010-2015)
San Francisco	1	81.28	10.30%	\$2.79k	49.90%
Seattle	2	67.83	8.60%	\$1.69k	33.40%
New York	3	64.21	3.70%	\$4.42k	32.90%
Washington	4	64.13	7.90%	\$1.70k	9.60%
Atlanta	5	59.55	5.20%	\$1.11k	47.60%
Raleigh-Durham	7	59.03	6.90%	\$1.04k	51.30%
Austin	8	58.73	7.10%	\$1.20k	28.30%
Boston	9	57.57	6.40%	\$2.15k	11.40%
Dallas-Fort Worth	10	55.4	4.70%	\$1.09k	33.40%
Baltimore	11	55.28	5.40%	\$1.26k	35.20%
Chicago	15	51.78	3.90%	\$1.51k	32.80%
Phoenix	17	51.24	4.30%	\$0.96k	33.50%
San Diego	19	50.83	4.80%	\$1.90k	27.70%
Salt Lake City	23	49.12	4.70%	\$1.04k	45.30%
Los Angeles	24	47.08	3.00%	\$2.21k	19.00%
Houston	31	42.57	3.30%	\$1.05k	31.40%

Note(s): (a) Analysis across US and Canada; (b) Toronto (Number 6) excluded, and Baltimore (Number 11) included for the top 10

Source(s): (1) 2017 scoring tech talent analyzer, CBRE

Introduction

In a recent sustainability study, Houston ranks 74 of 100, performing well in key areas of economic growth and industry and infrastructure



Source(s): (1) US Cities SDG Index, 2017



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Key Catalysts Energy Transition

Energy Transition

Energy transition

Situation:

The Houston area is well known for being the oil industry hub of the US, headquartering 15 Fortune 500 oil and gas companies. 26% of the country's oil and gas extraction jobs are located in the city, and the majority of oil and gas companies have an office presence in Houston. The Houston Coastal region, including Baytown and Galveston, has extensive refining and processing capacity, recently completing \$23M in plant construction projects in 2017. Houston is also one of the largest exporters of energy commodities and products, exporting \$21b in petroleum products in 2016.

Complication:

As the nation continues to transition towards electric vehicles and alternate energy, the long-term future of the petroleum industry is being called into question. Furthermore, the recent oil price crash and associated 'lower for longer' price consensus creates challenges for a city so dependent on the oil industry for economic growth. Refining and petrochemical project expansions along the Gulf Coast have kept the industry stable, but the upstream future and oil price recovery scenario remains in flux. Approximately 80,000 jobs were lost during the recent crash, and while job growth has returned to Houston in 2017, a return to peak oil related employment is not expected. While the oil and gas industry remains an important part of the Houston economy, and will continue to be for the near future, the city must begin to think about the future of the energy industry and begin to plan for the future US energy transition.

Energy Timeline:

1882: Houston Electric Light Co. is organized, making Houston and NYC the first cities to build electric power plants

1901: Oil discovered at Spindletop. Later discoveries in Humble in 1905 and Goose Creek in 1906 put Houston in the center of new oil and oilfield equipment development

1920-1940: Oil refineries proliferate along the Ship Channel, taking advantage of inexpensive waterborne shipping

1926: Natural gas is first piped into Houston

1940s: Petrochemical complex develops, taking feedstocks from nearby refineries

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2013: A \$60 billion boom in chemical plant construction begins along the Gulf Coast. This helps to offset job losses in the energy industry over the next two years

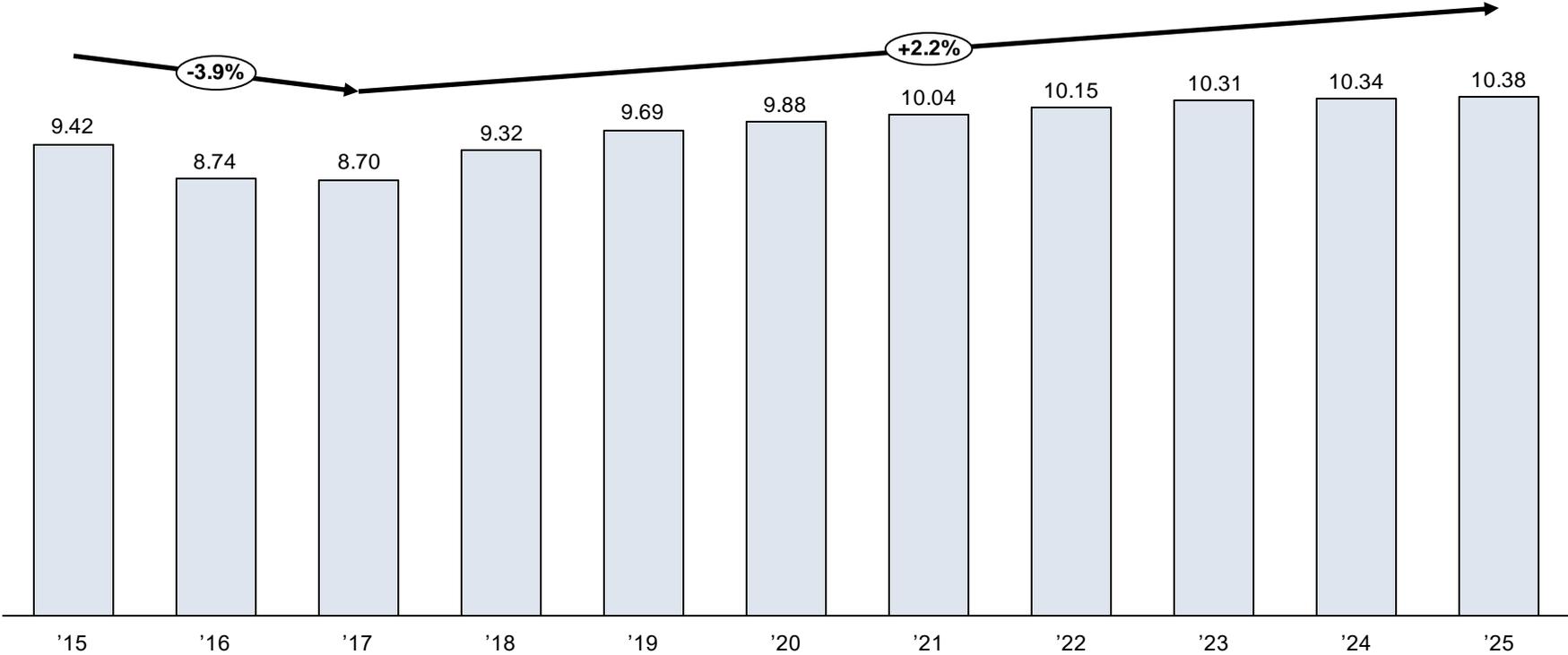
2014: Oil prices peak at \$108 per barrel in June before plunging 75% over the next 18 months. Nearly 80,000 energy related jobs are lost

2016: The energy downturn bottoms out and a slow recovery begins

Energy Transition

Despite a decline of ~4% in US crude oil production over the past 2 years, production is forecasted to increase at over 2% going forward

US crude oil production (million barrels per day, 2015-25E)



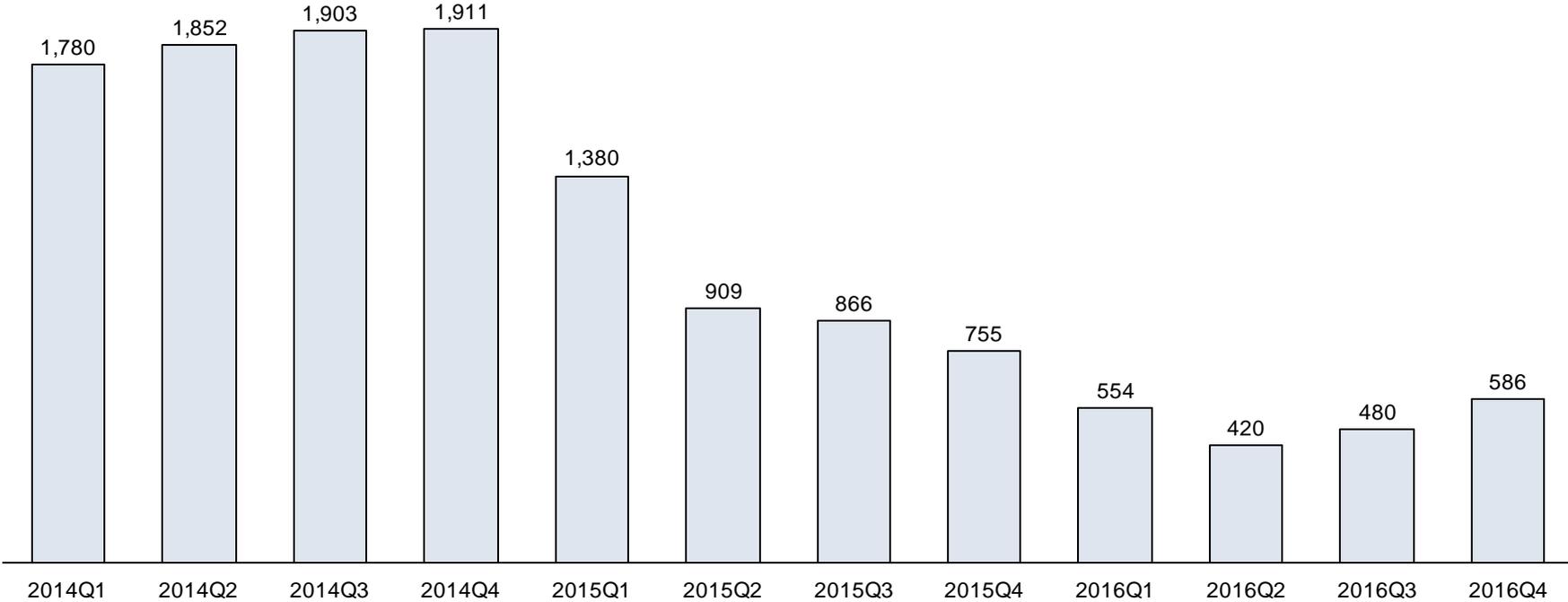
Note(s): (a)
Source(s): (1) US Energy Information Administration



Energy Transition

As the energy industry begins to recover, an increase in rig count in H2 2016 can be seen following the decline associated with the downturn

US rig count (2014Q1-17Q3)



Note(s): (a)
Source(s): (1) Baker Hughes



Energy Transition

The energy industry continues to be a major employment driver for Houston...

Energy related industries - Houston MSA (2016)			
Industry	Average annual employment	Firms	Total wages (\$m)
Oil and gas extraction	50,210	704	10,999.6
Engineering services	46,891	1,774	5,484.1
Chemical manufacturing	38,196	417	4,694.8
Oil and gas field machinery and equipment	28,345	242	3,261.7
Support activities for oil and gas operations	25,220	792	3,165.0
Oil and gas pipeline construction	18,448	182	1,691.3
Pipeline transportation	11,127	87	1,954.3
Drilling oil and gas wells	9,678	140	1,449.9
Petroleum refineries	9,106	39	1,380.5
Fabricated pipe and pipe fitting manufacturing	4,147	86	258.5
Industrial valve manufacturing	3,940	64	335.9
Geophysical surveying and mapping services	3,401	158	431.6
Pump and compressor manufacturing	1,887	55	165.9
Total energy related	250,596	4,740	35,273.2
Share of Metro Houston Total	8.7%	3.8%	19.2%

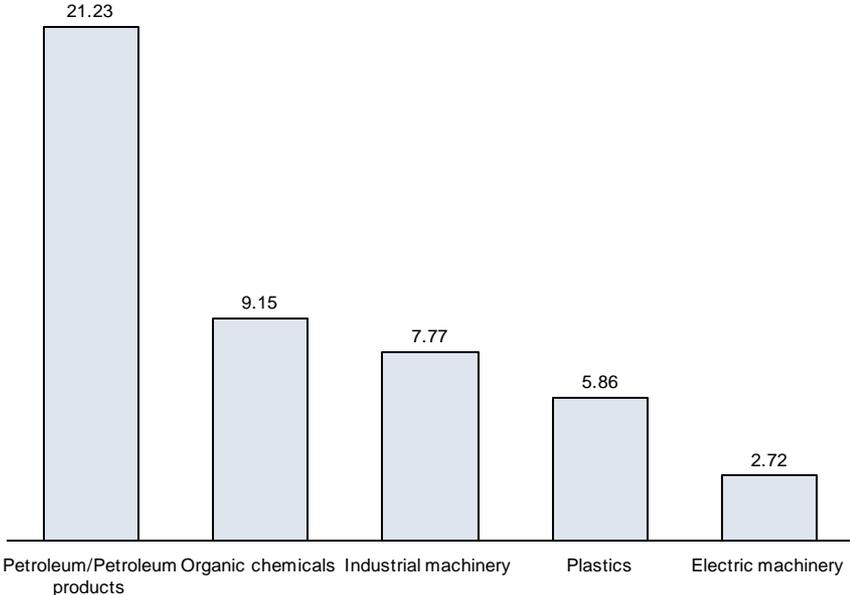
Note(s): (a)
Source(s): (1) Texas workforce commission, Quarterly census of employment and wages

Energy Transition

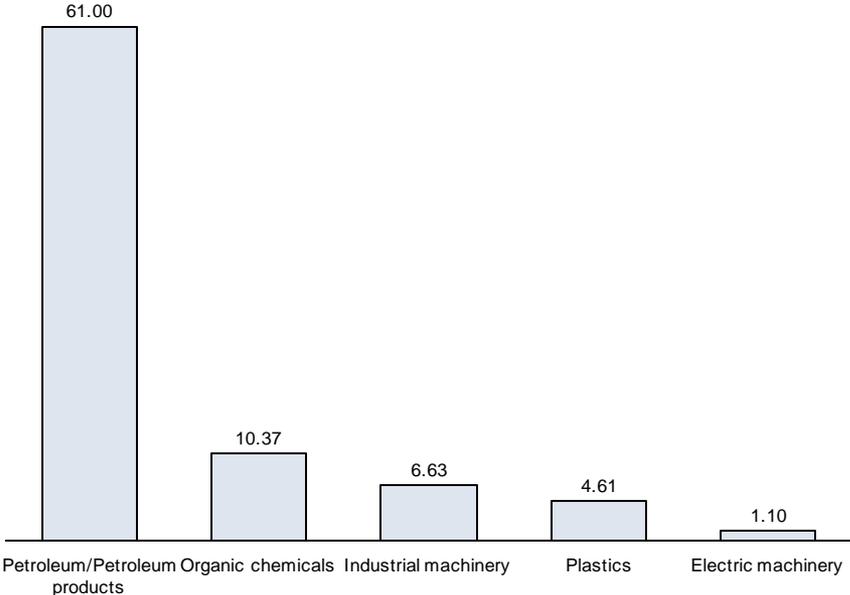
...and energy commodities, primarily petroleum products, lead Houston exports in terms of both value and weight

Leading export commodities – Port of Houston (2016)

By value (\$b)



By weight (million metric tons)



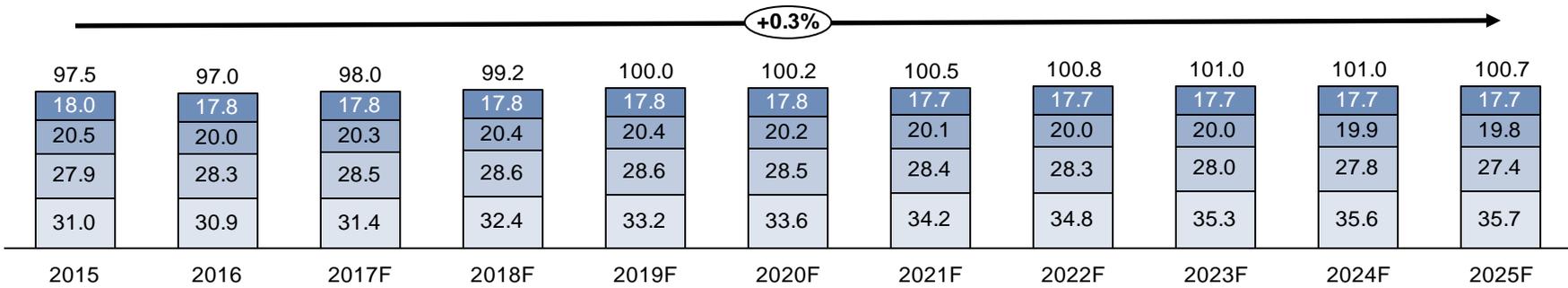
Note(s): (a)
Source(s): (1)



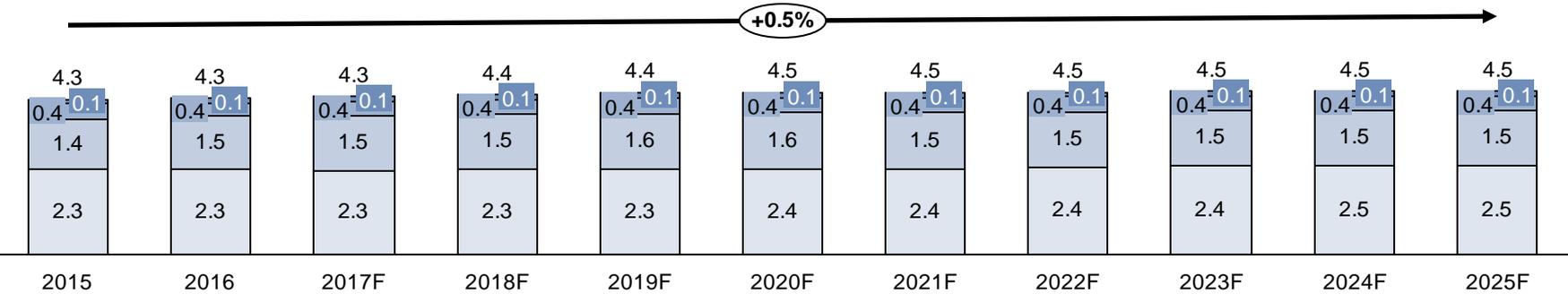
Energy Transition

US energy consumption continues to grow, with renewable consumption expected to grow at a slightly higher rate than overall consumption...

US energy consumption by sector (quadrillion Btu, 2015-25E)



US renewable energy consumption by sector (quadrillion Btu, 2015-25E)



Industrial +1.4% Transportation -0.2% Residential -0.3% Commercial -0.2%

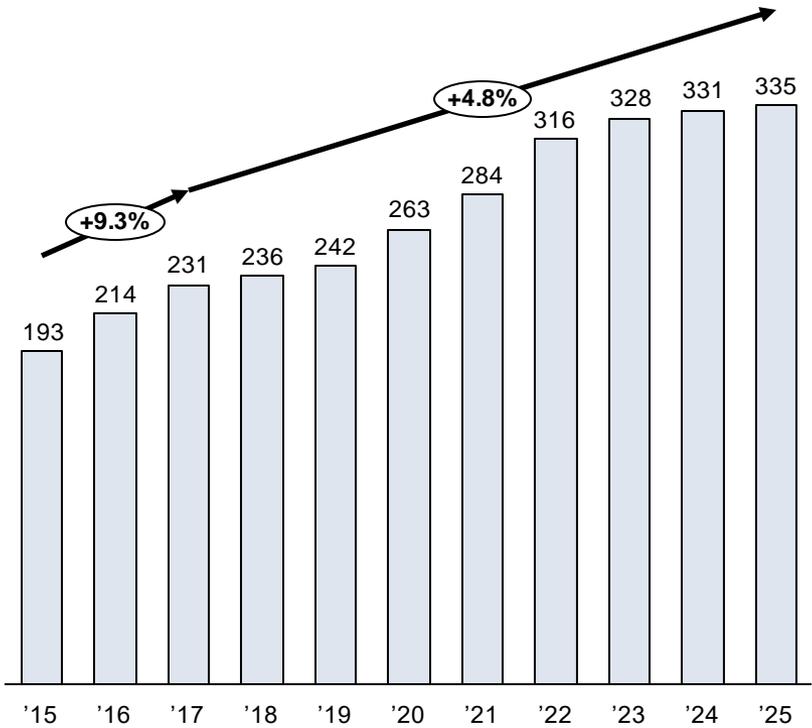
Note(s): (a)
Source(s): (1) US Energy Information Administration



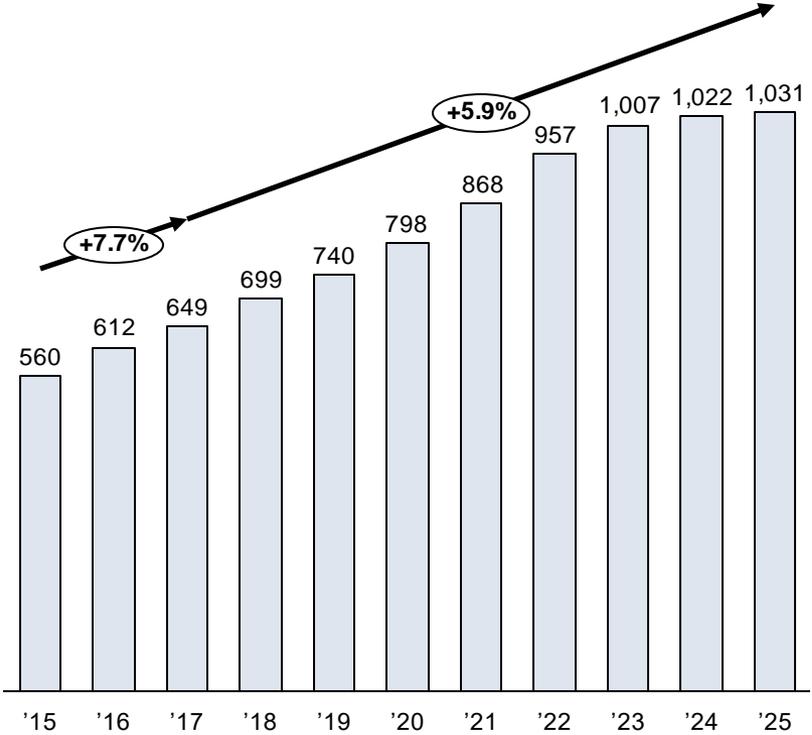
Energy Transition

...and renewable energy generation in US is expected to grow at ~6%, as renewable capacity increase is forecasted at a similar rate

US total renewable energy generation capacity All sectors (gigawatts, 2015-25E)



US total renewable energy generation All sectors (billion kilowatt-hours, 2015-25E)



Note(s): (a) Source(s): (1) US Energy Information Administration



Energy Transition

Houston, despite being an oil and gas centric city, is the EPA's highest ranked green energy partner, positioning the city for renewables growth

EPA's Top 20 green energy partners

Partner name	Annual green power usage (kwh)	GP% of total electricity use	Providers (listed in descending order by kwh supplied by partner)	Green power resources
City of Houston, TX	1,098,524,045	89%	Reliant Energy°, SolaireHolman, On-site Generation	Solar, Wind
City of Dallas, TX	715,086,000	100%	Invenery, TXU Energy°	Wind
District of Columbia	603,279,000	122%	WGL Energy°, Avangrid Renew ables°	Wind
Montgomery County Clean Energy Buyers Group	430,912,868	70%	Renew able Choice Energy°	Wind
City of Austin, TX	327,754,854	100%	Austin Energy°	Wind
Dallas/Fort Worth International Airport	176,255,000	40%	Texas General Land Office, On-site Generation	Solar, Wind
City of Portland, OR	141,217,930	86%	3Degrees°, On-site Generation	Biogas, Small-hydro, Wind
Chicago Park District	85,169,000	75%	Constellation°	Wind
Port of Portland	75,073,195	106%	3Degrees°, On-site Generation	Solar, Wind
Western Pennsylvania Energy Consortium	59,580,908	35%	Duquesne Light Energy	Various
Forest County Potaw atomi Community	58,811,752	101%	Renew able Choice Energy°, On-site Generation	Solar, Wind
Washington Suburban Sanitary Commission	56,815,920	28%	Constellation°	Wind
City of Columbus, OH	52,028,549	18%	American Municipal Pow er, American Electric Pow er°	Wind
City of San Jose, CA	51,900,689	35%	On-site Generation	Biogas, Solar
City of San Diego, CA	51,079,073	28%	On-site Generation	Biogas, Small-hydro, Solar
City of Boston, MA	44,568,000	30%	3Degrees°	Wind
City of Philadelphia, PA	29,286,253	4%	On-site Generation	Biogas, Solar
City of Denton, TX	27,998,685	78%	Denton Municipal Electric	Biogas, Wind
City of Grand Rapids, MI	27,140,667	27%	Consumers Energy°, On-site Generation	Biogas, Solar, Wind
Arlington County, VA	26,273,786	32%	Dominion Virginia Pow er°, Renew able Choice Energy°, On-site Generation	Solar, Wind

Note(s): (a)

Source(s): (1) Green Power Partnership Top 30 Local Government, Oct 30 2017, EPA





Key Catalysts Infrastructure Resiliency

Infrastructure Resiliency

Infrastructure resiliency

Situation:

Houston has one of the largest ports in the US, exporting \$80b worth of products a year. Houston also has significant air traffic presence, with 760,000 operations in 2017. Houston is a low density city, with an MSA spread out across 9,444 square miles. This has resulted in significant road and highway build-outs, with over 4,000 miles of expressways in the MSA. Houston's population is also growing at an increasing rate, resulting in housing expansions and a need for additional commercial real estate to support business growth. As the population has continued to grow, housing sales have increased by ~2% in 2016, and the city's home values reached a peak in Q3 2017 despite the effects of Hurricane Harvey.

Foreign Trade: Macro Factor

Houston is a top US exporter, falling behind only New York City in terms of value. The Port of Houston primarily exports chemicals and petroleum products, exporting over \$30b of these products in 2016. The Port is also a major economic driver for the city, both in terms of job creation – supporting over 1 million jobs - and economic output - \$255b estimated output in 2014.

Complication:

The recent hurricane exposed major shortfalls in Houston's flood control and housing infrastructure. The city's long-term response to this disaster will affect reputational risks related to business relocation into the region, home value, and metro-wide development. Furthermore, Houston's economy is dependent on key sectors located in coastal regions highly susceptible to flood and wind damage, with approximately 48% of the Greater Houston region falling into this category due to connections with the Port of Houston or coastal plants and refineries. Many are wondering whether or not there will be adequate land for future development for lower to middle class homes, especially in areas safe from potential flood damage. Houston home affordability is currently being hurt by slowed income growth coupled with rising home prices. Houston has also struggled to decrease reliance on automobiles and increase usage of public transportation, with only 2.4% of city residents utilizing public transportation in 2016.

Infrastructure Timeline:

- 1853: Houston's first railroad – the Buffalo Bayou, Brazos & Colorado Railroad – begins operations
- 1870: Congress designates Houston a port: the first survey of Houston's proposed ship channel is conducted
- 1900: Category 4 storm hits Galveston, claiming more than 6,000 lives and causing property damage of \$30 million (\$846 million in 2012 dollars)
- 1902: Congress appropriates \$1m for work on the Houston Ship Channel
- 1914: The 25 foot deep Houston Ship Channel is completed and formally dedicated
- 1928: Municipal airport opened – air service to Houston begins
- 1934: Intracoastal canal links Houston to Mississippi river navigation system
- 1941: New master plan for Houston roads emphasizes a loop system
- 1947: Engineering begins on the Gulf Freeway, Texas' first freeway
- 1969: Houston Intercontinental Airport begins operations
- 1978: Voters approve and fund Metropolitan Transit Authority
- 1983: Voters approve creation of Harris County toll road authority
- 2001: Tropical Storm Allison inundates Houston in June, inflicting \$4.9 billion in property damage
- 2004: Houston's first light rail line begins operations
- 2008: Hurricane Ike makes landfall in September, causing \$27 billion in property damage across the Texas Gulf Coast

Infrastructure Resiliency

There are major infrastructure gaps across the US, primarily in the surface transportation and electricity sectors

Losses to the national economy due to infrastructure investment gaps by sector (\$b)^(a)

	Surface transportation	Water/waste water	Electricity	Airports	Inland waterways and marine ports	Aggregate economic impact of all sectors
Business sales						
2016–2025	\$2,212	\$896	\$1,399	\$625	\$1,252	\$7,038
2026–2040	\$8,152	\$5,907	\$2,024	\$2,397	\$4,239	\$29,292
GDP						
2016–2025	\$1,167	\$508	\$819	\$337	\$784	\$3,955
2026–2040	\$1,981	\$3,215	\$1,071	\$1,073	\$2,003	\$14,201
Jobs						
2025	1,052,000	489,000	102,000	257,000	440,000	2,546,000
2040	473,000	956,000	242,000	494,000	1,153,000	5,809,000
Investment funding gap - 2016 through 2025						
Total needs	\$2,042	\$150	\$934	\$157	\$37	\$3,320
Funded	\$941	\$45	\$757	\$115	\$22	\$1,880
Funding gap	\$1,101	\$105	\$177	\$42	\$15	\$1,440
Investment funding gap - 2016 through 2040						
Total needs	\$7,646	\$204	\$2,458	\$376	\$112	\$10,796
Funded	\$3,312	\$52	\$1,893	\$288	\$69	\$5,614
Funding gap	\$4,334	\$152	\$565	\$88	\$43	\$5,182

Note(s): (a) 2015 dollars

Source(s): (1) Failure to act, Closing the infrastructure investment gap for America's economic future, 2016, American Society of Civil Engineers

Infrastructure Resiliency

This gap is expected to have significant impact on the US economy

Cumulative impact to the national economy (\$b)^(a)

	2016–2025	2026–2040	2016–2040	2016–2025	2026–2040	2016–2040
	Total			Annual averages		
Business sales	\$7,038	\$29,292	\$36,331	\$704	\$1,953	\$1,453
GDP	\$3,955	\$14,201	\$18,156	\$395	\$947	\$726



Note(s): (a) 2015 dollars
 Source(s): (1) Failure to act, Closing the infrastructure investment gap for America's economic future, 2016, American Society of Civil Engineers

Infrastructure Resiliency

Houston appears to excel at waste water treatment, but performs averagely or underperforms on other infrastructure parameters

Houston infrastructure grading by parameter

Parameter	Capacity	Condition	Funding	Future need	Operation and maintenance	Public safety	Resilience	Overall
Bridges	N/A	D	D	D+	D+	D	B	C-
Drinking water	B-	C	F	F	D-	C	C	D
Flood control and drainage	C-	C-	C	C-	C-	C-	C-	C-
Rail	C	A-	F	C	A-	C	A-	C+
Roads and highways	D-	C-	D-	F	B	C	C	D+
Solid waste	C	C	D	C	C	A-	B-	C
Transit	C	B	B-	F	C-	C	D-	C-
Waste water	A+	A+	A+	B	A-	A+	A+	A
Overall infrastructure								C^(a)

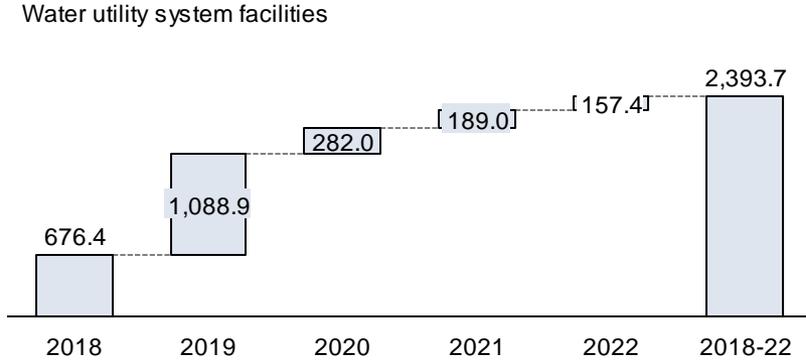
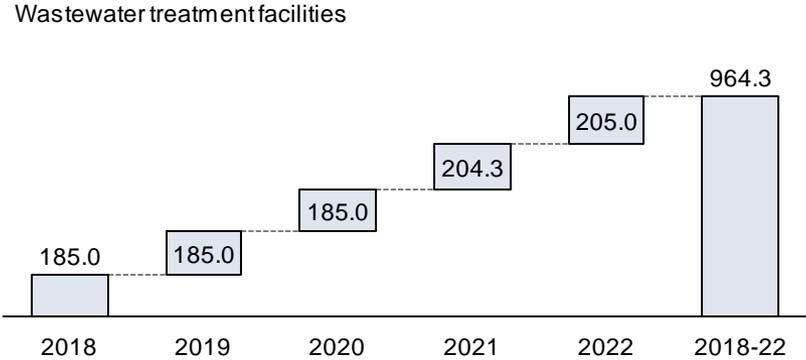
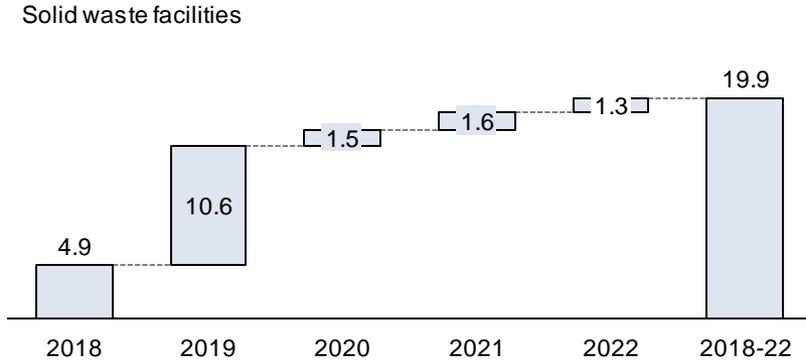
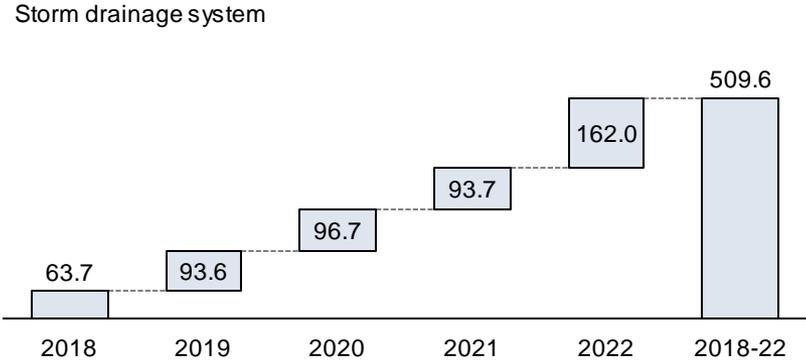
Note(s): (a) Calculated by providing a value of "13" to "A+", "12" to "A", and so on, and using the count of each grade provided at an overall parameter level to arrive at the weighted average grade for overall infrastructure

Source(s): (1) Capital improvement projects, The official website of the City of Houston

Infrastructure Resiliency

Houston storm drainage spend is expected to double in light of Harvey, and water utility system facility projects are an immediate area of focus

Houston drainage, waste treatment and water utility capital improvement project plans (\$'000, 2018-2022)



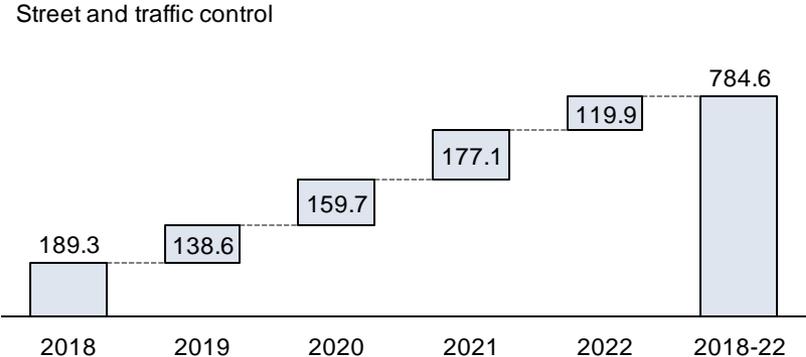
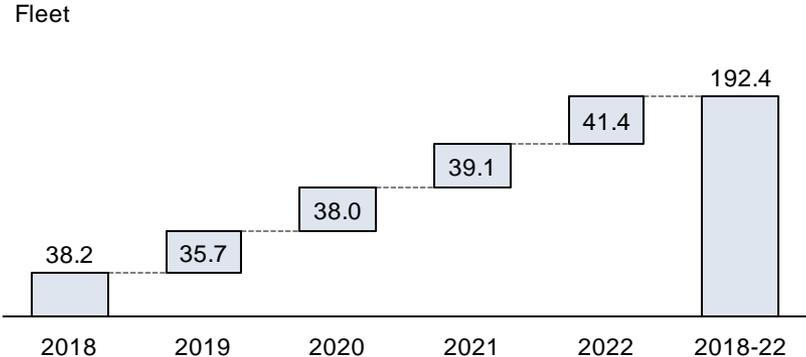
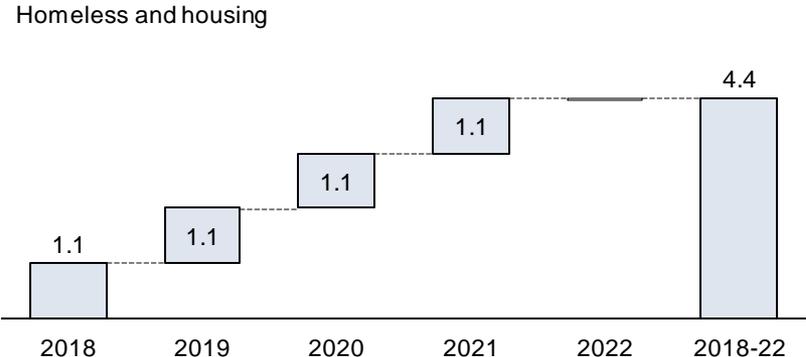
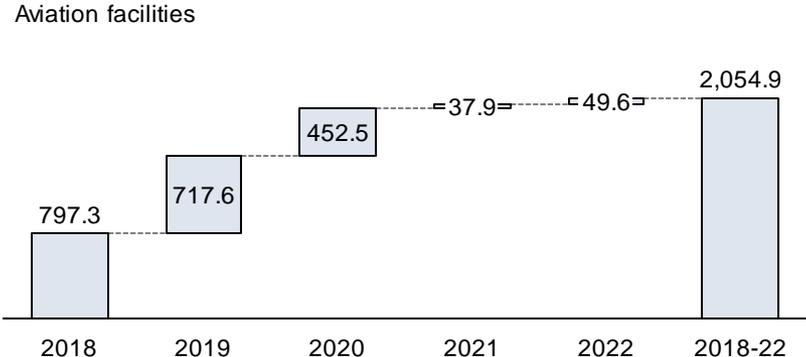
Note(s): (a) Source(s): (1) Capital improvement projects, The official website of the City of Houston



Infrastructure Resiliency

Houston is also frontloading investment on aviation facilities, and maintaining consistent investment on transport projects

Houston transportation, traffic and housing capital improvement project plans (\$'000, 2018-2022)



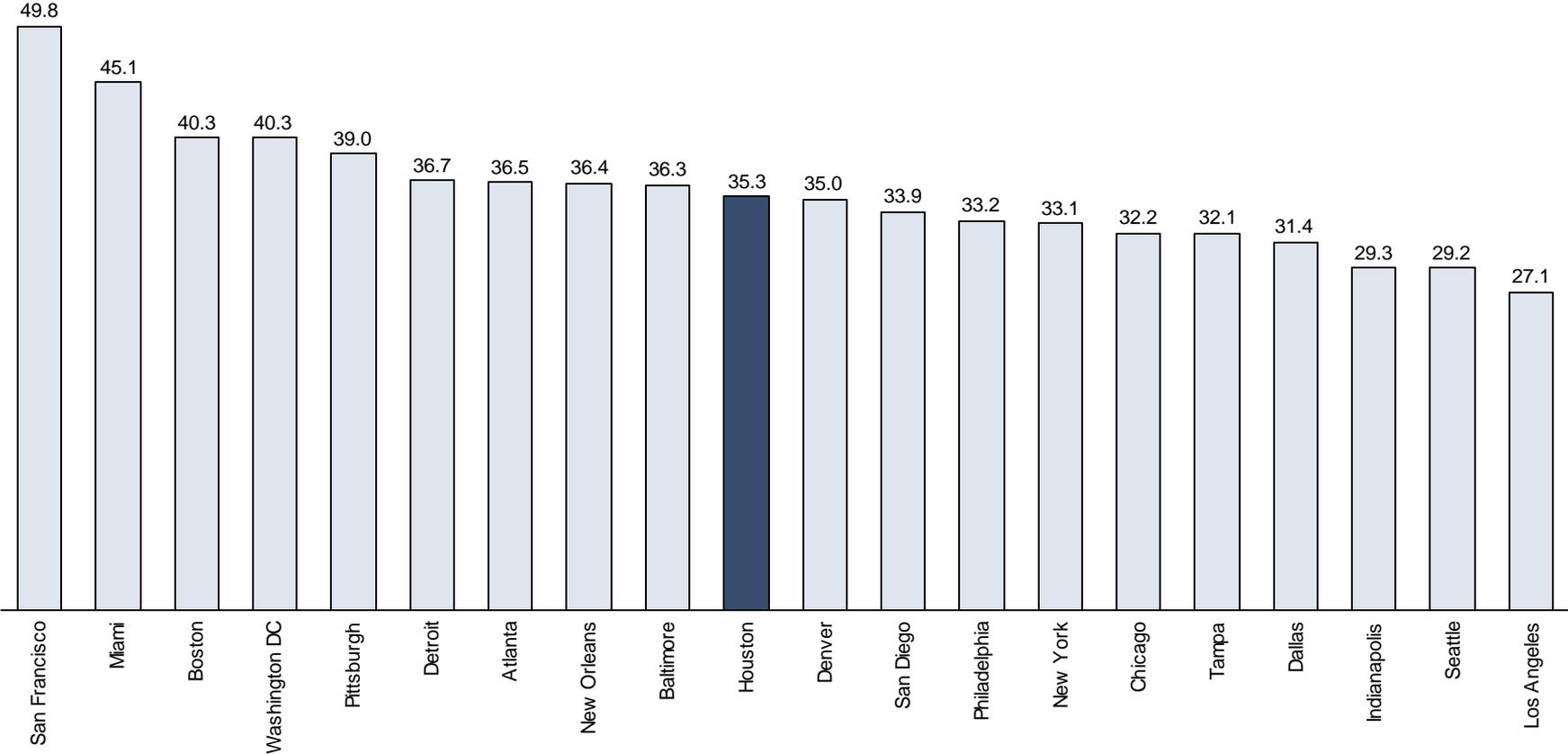
Note(s): (a)
 Source(s): (1) Capital improvement projects, The official website of the City of Houston



Infrastructure Resiliency

Houston falls in the middle of US cities when considering the economic efficiency and reliability of mobility systems and infrastructure...

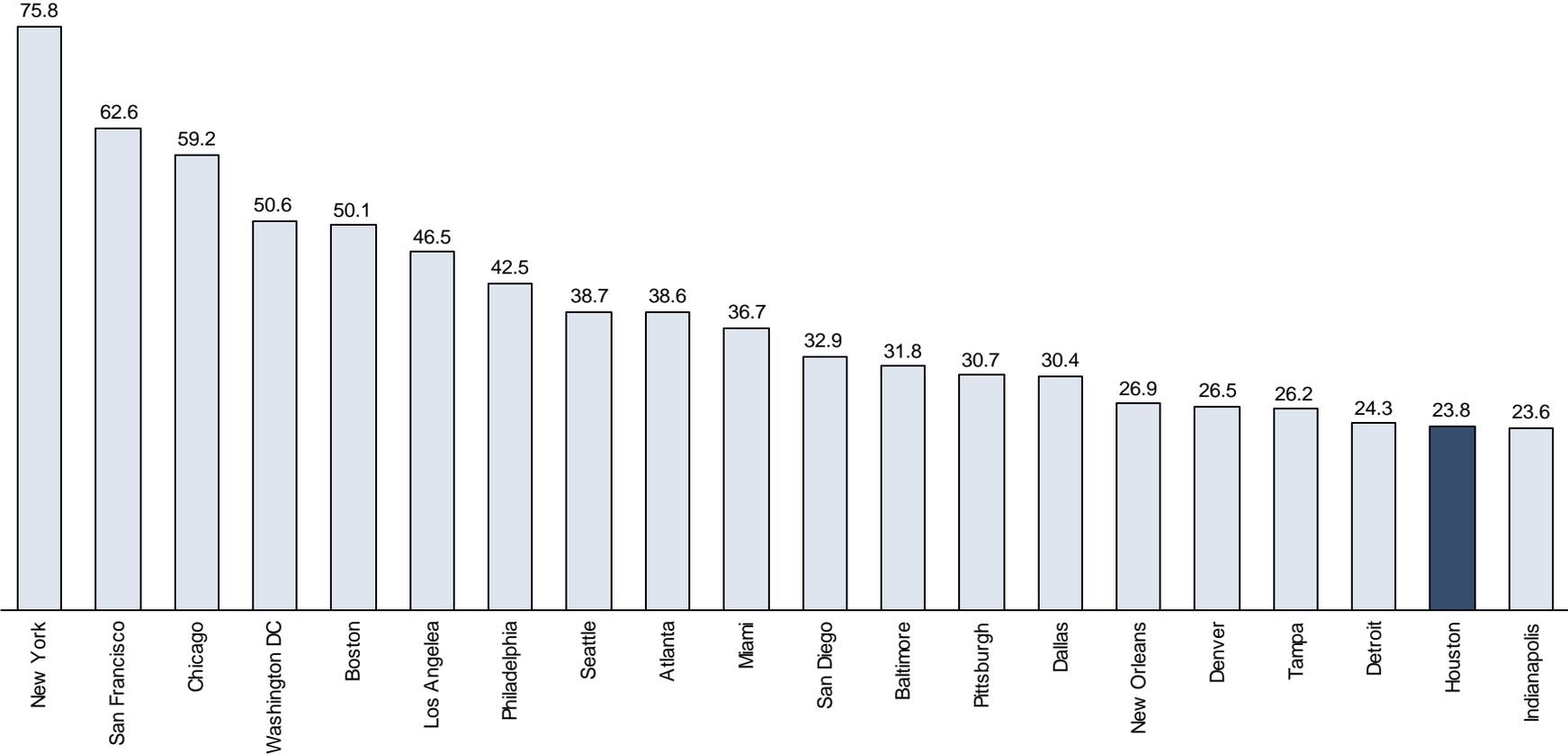
Global mobility index – Profit sub-index



Note(s): (a) Chart is based on 'profit' index score, which includes commute time, economic opportunity, public infrastructure financing, road network efficiency, public transport utilization, and public transport affordability
Source(s): (1) Arcadis sustainable cities mobility index - 2017

Infrastructure Resiliency

...but scores low on the social and human implications of mobility systems and infrastructure due to low public transportation scores



Note(s): (a) Chart is based on 'people' index score, which includes access to transport services, rider connectivity, upkeep of public transportation, uptake of active commuting, hours of public transport accessibility, airport passengers, and transport digital capabilities

Source(s): (1) Arcadis sustainable cities mobility index - 2017



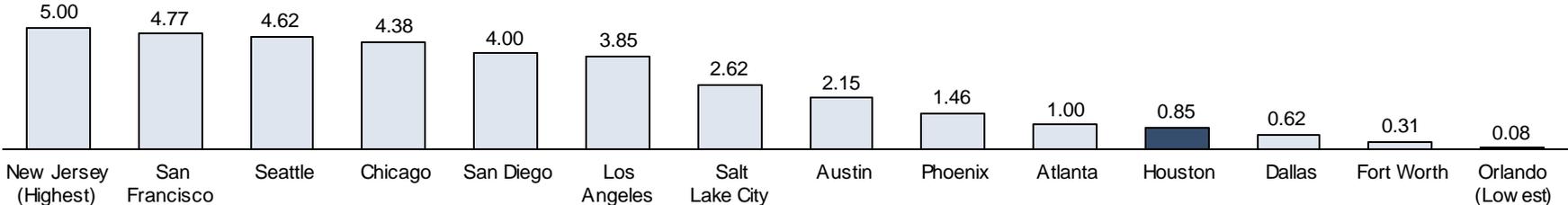
Infrastructure Resiliency

This ranking is supplemented by low public transit usage and car commute scores amongst the chosen peer set

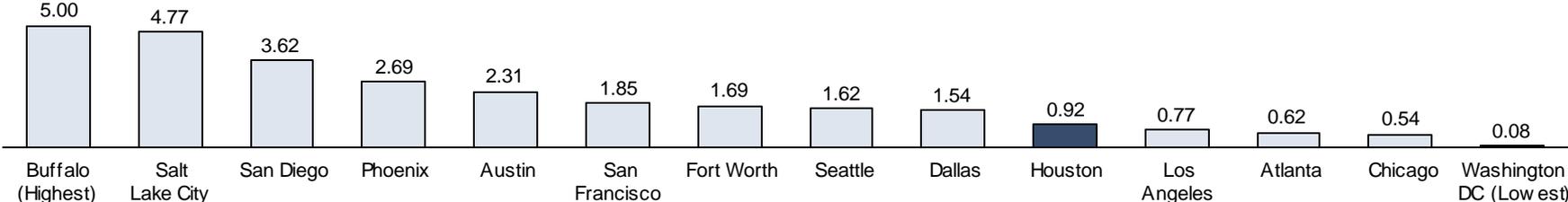
Public transit (Index)



Walking (Index)



Car commute (Index)



Note(s): (a) Source(s): (1) Amazon data



Infrastructure Resiliency

The Houston housing market has shown resiliency despite damage from Harvey, growing 4.2% year over year with peak values in Sep 2017

Region	Home Value Index (\$ USD)	Month over Month Increase (%)	Year over Year Increase	5 Year Increase	10 Year Increase	Peak Month
United States	202,700	0.4%	6.9%	5.7%	0.4%	Sep 2017
New York, NY	426,300	0.3%	7.8%	4.7%	-0.2%	Sep 2006
Los Angeles-Long Beach-Anaheim, CA	613,200	0.3%	5.7%	8.6%	0.7%	Sep 2017
Chicago, IL	213,600	0.4%	6.4%	5.1%	-1.3%	Apr 2007
Dallas-Fort Worth, TX	214,800	0.7%	8.9%	9.2%	3.8%	Sep 2017
Philadelphia, PA	218,200	0.2%	3.1%	2.6%	-0.5%	Sep 2006
Houston, TX	182,200	0.0%	4.2%	7.4%	2.5%	Sep 2017
Washington, DC	385,300	0.4%	3.1%	3.9%	-0.4%	Apr 2006
Miami-Fort Lauderdale, FL	257,900	0.7%	7.1%	11.8%	-0.8%	Aug 2006
Atlanta, GA	182,700	0.8%	7.9%	9.0%	0.6%	Sep 2017
Boston, MA	430,700	0.4%	7.0%	6.4%	2.0%	Sep 2017
San Francisco, CA	865,400	0.3%	6.0%	11.2%	2.4%	Sep 2017
Detroit, MI	142,400	0.6%	8.5%	11.8%	0.3%	Jun 2005
Riverside, CA	333,000	0.5%	6.0%	10.9%	-1.0%	Aug 2006
Phoenix, AZ	240,500	0.5%	6.5%	9.3%	-0.4%	Apr 2006

Note(s): (a) Zillow Home Value Index represents the median estimated market value for homes in a particular region
Source(s): (1) Zillow

Infrastructure Resiliency

Houston has the second highest trade value in the US, with petroleum, chemicals and machinery being key exports...

Trade summary by city

City	State	Relevant counties			Total value (\$b)	Highest trade partners			Key products		
New York	New York	New York	Northern New Jersey	Long Island	85.10	Canada	China	Japan	Misc. manufactured commodities	Chemicals	Computer
Houston	Texas	Houston	Sugar Land	Baytown	80.60	Mexico	Canada	China	Chemicals	Petroleum and coal products	Machinery
Los Angeles	California	Los Angeles	Long Beach	Santa Ana	62.20	Mexico	Canada	China	Computer & electronic products	Transportation equipment	Misc. manufactured commodities
Detroit	Michigan	Detroit	Warren	Livonia	44.00	Mexico	Canada	Saudi Arabia	Transportation equipment	Machinery	Computer and electronic products
Miami	Florida	Miami	Fort Lauderdale	Pompano Beach	35.90	Venezuela	Brazil	Colombia	Computer and electronic products	Transportation equipment	Machinery
Seattle	Washington	Seattle	Tacoma	Bellevue	35.40	China	Japan	Canada	Computer and electronic products	Fishing, hunting, trapping	Misc. manufactured commodities
Chicago	Illinois	Chicago	Naperville	Joliet	33.70	Canada	Mexico	Germany	Chemicals	Computer and electronic products	Machinery
San Jose	California	San Jose	Sunnyvale	Santa Clara	26.30	Canada	South Korea	Mexico	Computer and electronic products	Machinery	Chemicals
Minneapolis	Minnesota	Minneapolis	St. Paul	Bloomington	23.20	Canada	China	Mexico	Crop production	Computer and electronic products	Machinery
Philadelphia	Pennsylvania	Philadelphia	Camden	Wilmington	22.70	Canada	U.K.	Mexico	Chemicals	Computer and electronics	Transportation equipment

Note(s): (a)

Source(s): (1) Top 50 Cities for Global Trade, Jul 30, 2012, Global trade magazine



Infrastructure Resiliency

...and the Port of Houston is a major economic driver for the city, creating over 1.1 million jobs and \$255 billion in total economic output

	PHA	Private	Total
Jobs			
Direct	19,586	36,528	56,113
Induced	27,469	52,982	80,451
Indirect	17,460	32,564	50,024
Related	587,009	400,970	987,979
Total	651,524	523,043	1,174,567
PERSONAL INCOME (MILLIONS)			
Direct	\$1,177	\$2,286	\$3,463
Re-spending/Local Personal Consumption	\$3,328	\$6,463	\$9,790
Indirect	\$706	\$1,316	\$2,022
Related	\$29,474	\$22,019	\$51,493
Total	\$34,684	\$32,084	\$66,768
ECONOMIC OUTPUT(MILLIONS)			
Direct Business Revenue	\$4,460	\$14,724	\$19,185
Related Output	\$134,907	\$101,051	\$235,957
Total	\$139,367	\$115,775	\$255,142
LOCAL PURCHASES(MILLIONS)	\$1,537	\$2,866	\$4,403
STATE/LOCAL TAXES (MILLIONS)			
Direct	\$88	\$171	\$260
Induced	\$250	\$485	\$734
Indirect	\$53	\$99	\$152
Related	\$2,211	\$1,651	\$3,862
Total	\$2,601	\$2,406	\$5,008

Note(s): (a)
Source(s): (1) Port of Houston – 2014 economic impact report





Key Catalysts Diversity & Immigration

Diversity & Immigration

Diversity & Immigration

Situation:

Houston is one of the most diverse cities in the nation – 37% of the Houston MSA is Hispanic, and 17% African American – and the city's population has continued to grow at an increasing rate since 2010 (3.8% in 2016). 145 languages are spoken in the city of Houston, and immigrants are a major part of the Houston workforce. Immigrant workers in Texas provide over \$145b per year in net direct benefits to the Texas economy, and Houston continues to be a top destination for the nation's immigrants, with 18% of the 2017 population increase being attributed to international migration. Immigrants account for approximately 29% of Houston's workforce, and contribute 21% of the city's economic output, providing over \$116 billion to Houston's annual GDP.

Complication:

Recent US policy changes may greatly affect US immigration rates, calling into question the future of Houston's immigrant workforce. Restrictive immigration policy may result in substantial economic losses for the Houston economy – Many working class jobs are supported by immigrants, and immigrants have generated 1.2 million permanent jobs in Texas over the past year. In Houston, net migration is shown to follow job growth, a cause for concern as Houston employment rates have slowed over the past few years (1% growth in 2017). Houston leaders must consider necessary actions to develop social and economic programs to help immigrants succeed and contribute to the economy, and strive to reduce inequality across the Houston region in order to maintain the city's strong diversity profile.

Diversity & Immigration Timeline:

1927: Houston Junior College is established (Now TX Southern and U of H)

1947: Texas Southern University acquired by Texas Legislature

1955: Houston metro area population reaches 1 million

2000: Census finds Houston MSA has no racial or ethnic majority

Diversity & Immigration

Houston is one of the nation's most diverse cities, and has representation across ethnicity profiles

City Population – Ethnicity (2015)

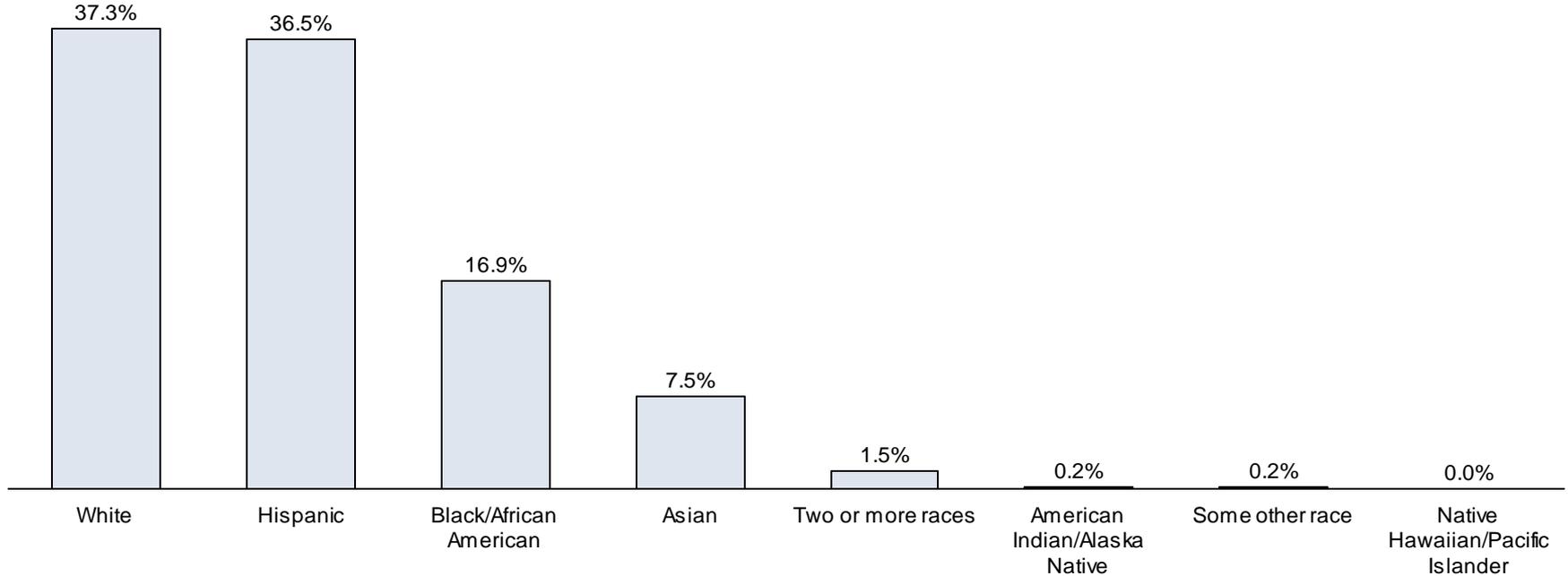
	Total	Hispanic	White	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races
Houston, Texas	2,217,706	972,785	565,792	502,619	3,370	141,146	1,023	3,562	27,409
Phoenix, Arizona	1,514,208	625,378	680,907	99,475	25,097	49,668	2,860	1,833	28,990
Los Angeles, California	3,900,794	1,898,577	1,107,571	341,357	6,223	445,738	6,150	12,340	82,838
San Diego, California	1,359,791	408,714	586,863	84,155	3,564	224,337	4,800	2,347	45,011
San Francisco, California	840,763	128,619	346,732	44,879	1,520	281,896	3,370	3,941	29,806
Atlanta, Georgia	448,901	22,495	165,309	235,331	631	17,461	133	592	6,949
Chicago, Illinois	2,717,534	790,649	875,333	840,208	3,493	160,316	419	4,228	42,888
Austin, Texas	887,061	306,072	431,789	65,233	1,461	59,571	601	1,320	21,014
Dallas, Texas	1,260,688	526,022	370,257	303,767	1,649	37,908	387	1,484	19,214
Fort Worth, Texas	796,614	273,582	324,407	147,936	2,114	30,407	866	942	16,360
Salt Lake City, Utah	190,679	39,262	124,790	4,828	2,060	10,412	4,623	847	3,857
Seattle, Washington	653,017	42,490	430,085	46,391	3,695	92,332	2,509	1,197	34,318

Note(s): (a)
Source(s): (1) US Census Bureau

Diversity & Immigration

The diversity profile is also evident when looking at the greater MSA...

Race and ethnicity – Houston MSA (2015)



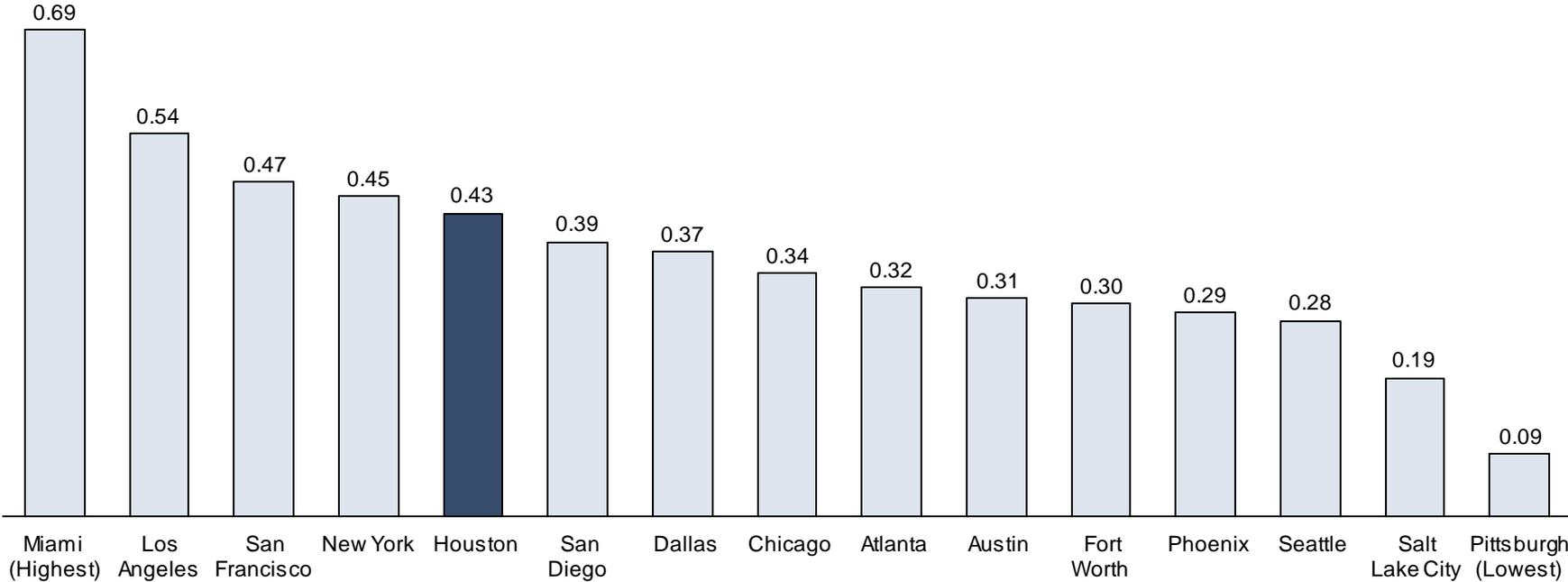
Note(s): (a)
Source(s): (1) U.S. Census Bureau, American Community Survey



Diversity & Immigration

...which results in Houston performing well versus selected peers on the MSA diversity index

Diversity (Index)



Note(s): (a)
Source(s): (1) Amazon data



Diversity & Immigration

Aside from Los Angeles, Houston MSA has the highest net international migration, although West Coast cities have higher percentage rates

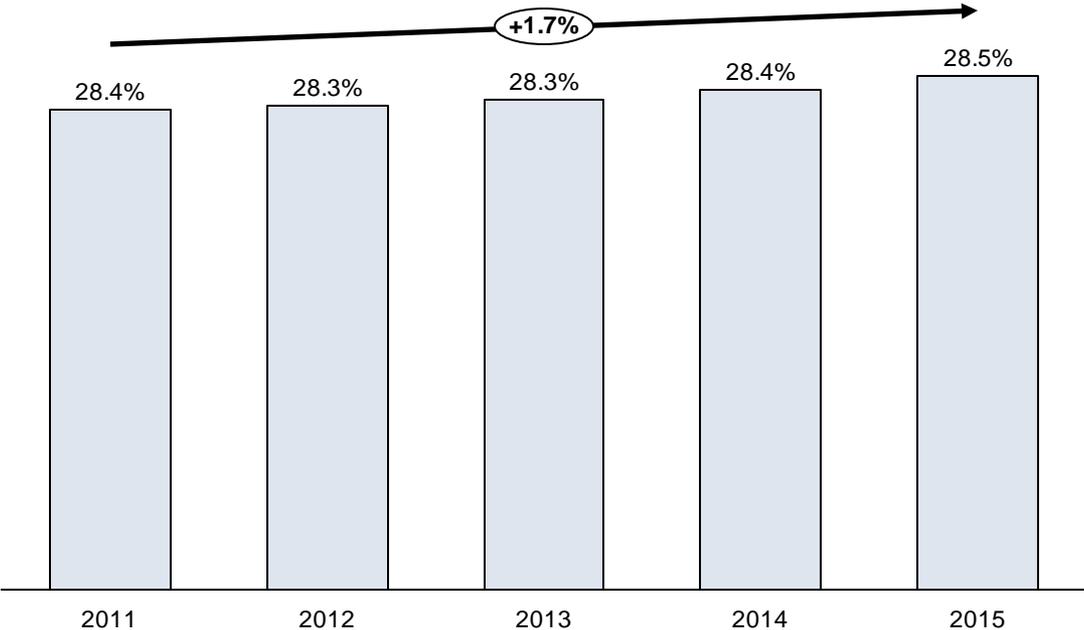
Components of population change (2010-16)							
Geography	Population (July 1 2016)	Net domestic migration	Net international migration	Births	Deaths	Total population change ('10-'16)	% population increase due to international migration
Houston	6,772,470	283,239	193,618	599,542	226,559	851,971	18%
Phoenix	4,661,537	215,447	61,506	371,027	189,479	468,410	9%
Los Angeles	13,310,447	-372,990	315,879	1,048,792	494,357	481,486	32%
San Diego	3,317,749	-15,477	89,838	276,631	128,855	222,407	26%
San Francisco	4,679,166	42,847	164,527	326,874	184,519	343,605	31%
Atlanta	5,789,700	153,366	104,223	455,443	213,954	502,975	15%
Chicago	9,512,999	-409,167	148,505	752,946	431,416	51,449	30%
Austin	2,056,405	192,375	37,592	161,908	57,043	340,085	10%
Dallas	7,233,323	304,468	140,476	611,857	254,032	807,082	13%
Salt Lake City	1,186,187	2,006	19,062	118,171	39,297	98,388	14%
Seattle	3,798,902	105,516	114,434	286,468	148,112	359,094	23%

Note(s): (a)
Source(s): (1) U.S. Census Bureau, 2016 population estimates

Diversity & Immigration

The foreign born population percentage in the City of Houston has continued to grow over the past five years...

Foreign born population as a % of total population – Houston City (2011-15)



Note(s): (a)
Source(s): (1) U.S. Census Bureau, American Community Survey

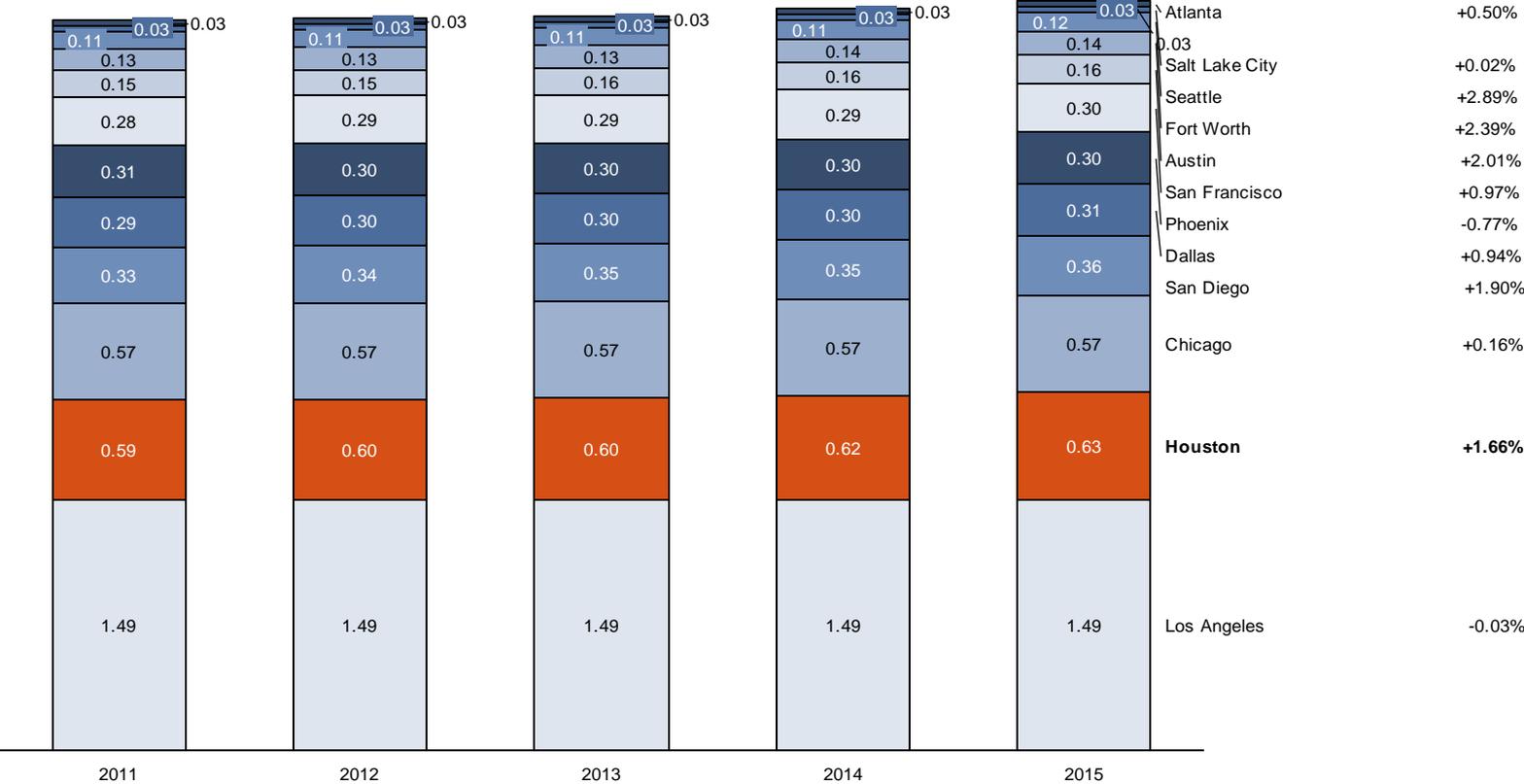


Diversity & Immigration

...and Houston continues to have one of the highest foreign born populations overall, trailing only Los Angeles

Foreign born population (millions, 2011-15)

CAGR (2011-15)



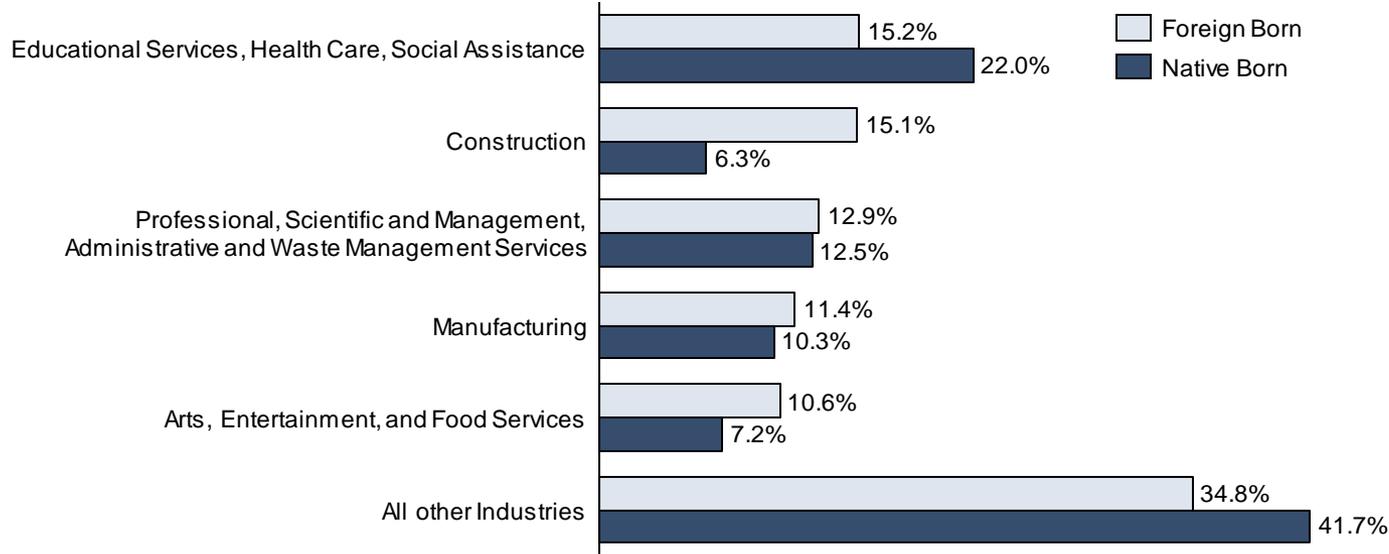
Note(s): (a)
Source(s): (1) U.S. Census Bureau, American Community Survey



Diversity & Immigration

Immigrants have proven to be a crucial driver of the Houston economy, accounting for 29% of Houston’s labor force and 21% of economic output

Where Houston Immigrants Work – Top 5 Industries by Foreign Born Population



Immigrants make up **29%** of the Houston labor force, and **31%** of business owners. They account for **21%** of the Houston metro area’s total economic output, and work in a variety of job sectors across Houston. In 2014, **95%** of working age immigrants were employed.

Note(s): (a) Source(s): (1) Center for public policy; (2) US Census Bureau; (3) New American Economy



Diversity & Immigration

It is estimated that immigrants have contributed over \$116 billion to Houston’s annual GDP, and help foster local entrepreneurship

In 2014, foreign-born residents in Houston contributed

\$116.5 billion
to the area’s GDP.²

The foreign-born population in Houston holds considerable economic weight. In 2014, immigrants held

\$31.8 billion
In spending power.³

Immigrants’ spending power accounted for more than a quarter (25.8%) of the total for the Houston area. **Hispanic immigrants contributed \$14.1 billion** in spending power, and **Asian immigrants contributed \$10.3 billion.**⁴

Given their income, we estimate that in 2014, the foreign-born population in Houston contributed

\$2.9 billion In state and local taxes

including property, income, sales, and excise taxes levied by either the State of Texas or by municipal governments. **Hispanic immigrants paid \$1.5 billion** and **Asian immigrants paid \$852.4 million** of these state and local taxes.⁵

Immigrant entrepreneurs are heavily concentrated in several key industries in the area. These includes:

General services ¹¹	58.7%
Retail trade	53.4%
Construction	51.1%
Transportation and warehouse	47.8%

In 2012, Hispanic residents in Houston owned 152,766 businesses, generating

\$21.3 billion In sales
and paying 100,395 employees.

Asian residents owned 61,304 businesses, generating

\$25.6 billion In sales
and paying 114,773 employees.¹²

Note(s): (a)
Source(s): (1) New American Economy, ‘New Americans in Houston’ – 2014



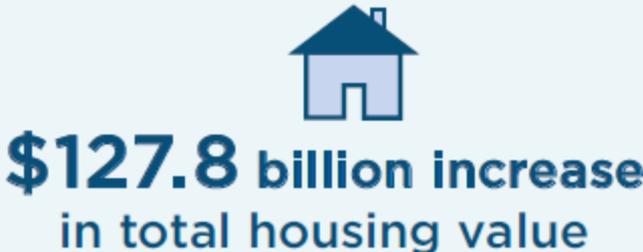
Diversity & Immigration

Immigrants have also been crucial to maintaining a local workforce, and as a result have boosted Houston housing value

Because of the role immigrants play in the workforce helping companies keep jobs on U.S. soil, we estimate that the immigrants living in Houston in 2014 helped **create or preserve 64,224 local manufacturing jobs** that would have otherwise vanished or moved elsewhere.

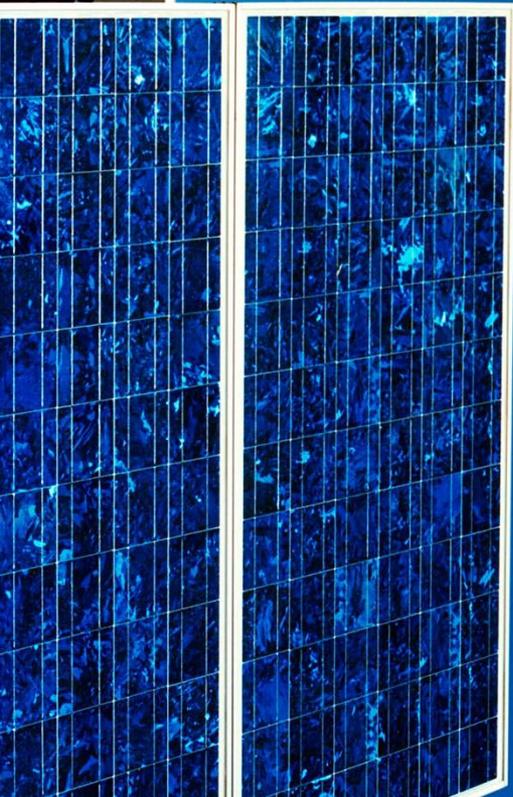


As immigrants settle in Houston, they push up the demand for local houses, boosting property values. Between 2000 and 2014, the growth in the immigrant population **increased the total housing value in Houston by \$127.8 billion**. Looking at just the period after the Great Recession, between 2009 and 2014, the growth of the immigrant population increased the total housing value in the area by \$46.6 billion.⁹





Appendix



Diversity & Immigration

Diversity is also evident in HISD area public schools, with Hispanics encompassing the majority of 2016-2017 enrollment

Ethnicity	Student count
Black or African American	3,732
American Indian or Alaska Native	251
Asian	1,060
Hispanic	60,496
Native Hawaiian/Other or Pacific Islander	98
Two or more races	1,038
White	21,725

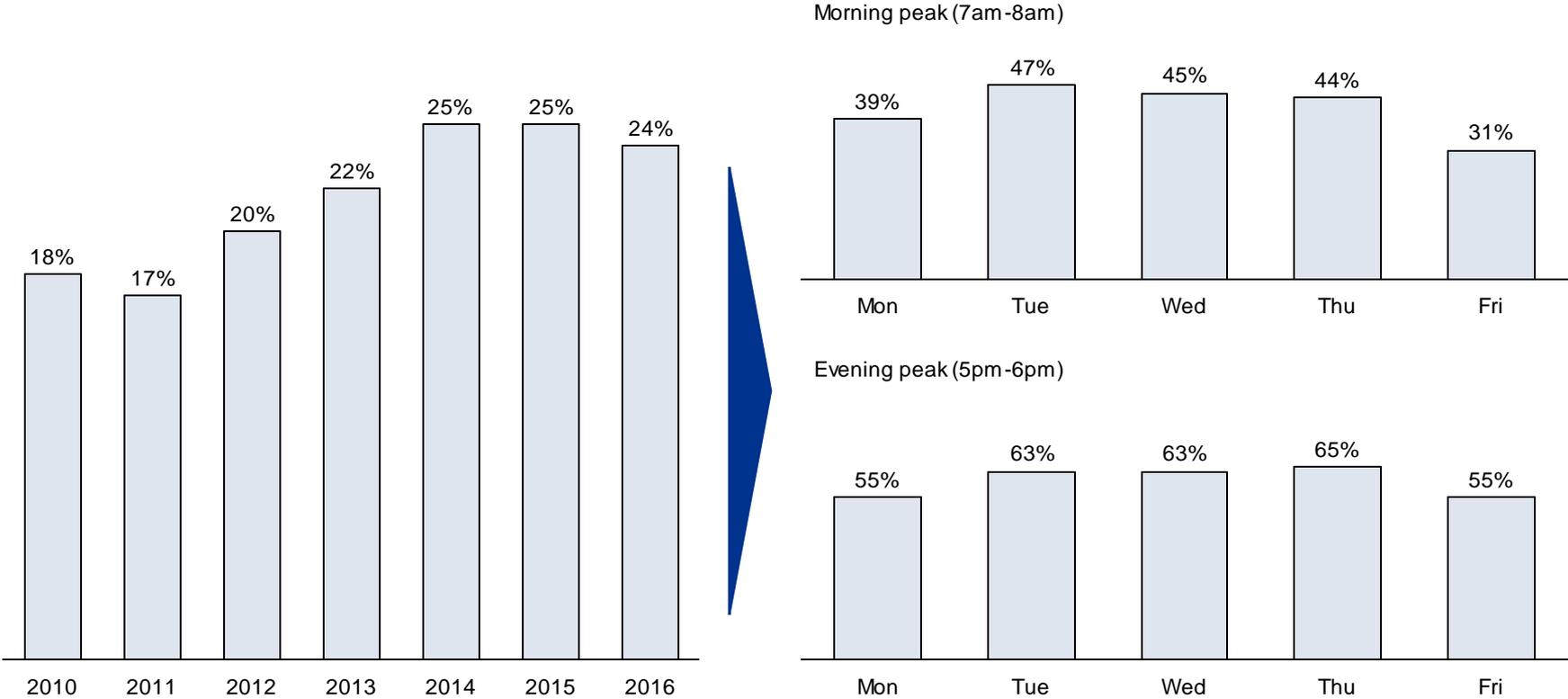
Note(s): (a)
 Source(s): (1) format...Houston ISD region enrollment from 2016-2017 , Texas Education Agency



Infrastructure Resiliency

Congestion in Houston appears to have been rising since 2010 with peak time congestions between 30-60%

Houston congestion over time and by day (% , 2010-16)



Note(s): (a) Calculated by providing a value of "13" to "A+", "12" to "A", and so on, and using the count of each grade provided at an overall parameter level to arrive at the weighted average grade for overall infrastructure
Source(s): (1) Houston falls in new congestion ranking, Feb 20 2017, Houston Chronicle

Infrastructure Resiliency

However Houston appears to be the only city, of the top 20 most congested in US, that successfully lowered congestion levels last year

Top 20 congested cities in US

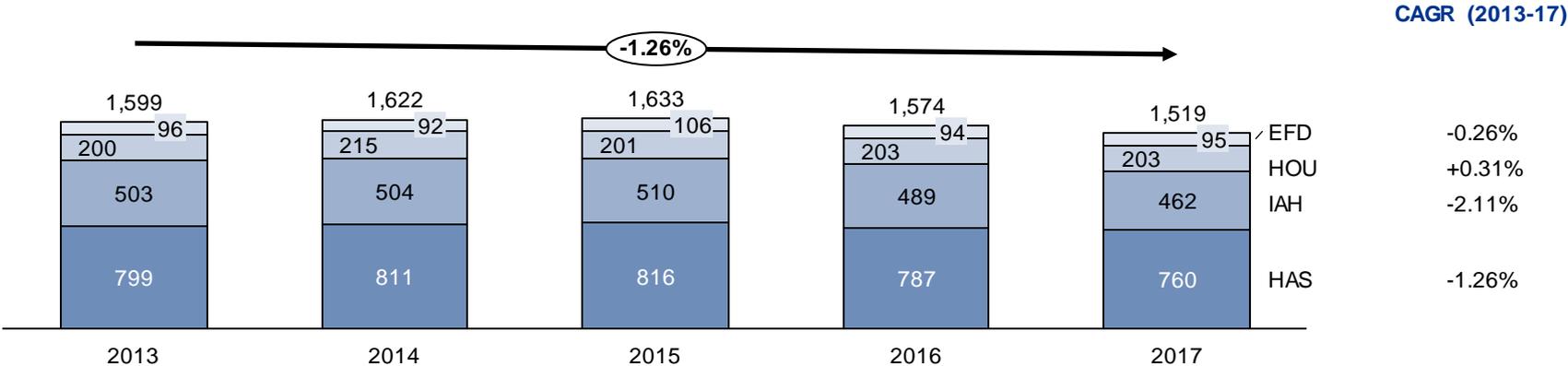
Rank	City	Congestion level	Change from previous year (%)
1	Los Angeles	45%	4%
2	San Francisco	39%	3%
3	New York	35%	2%
4	Seattle	34%	3%
5	San Jose	32%	2%
6	Miami	30%	2%
7	Portland	29%	3%
7	Honolulu	29%	No change
7	Washington	29%	3%
10	Boston	28%	3%
11	San Diego	27%	3%
11	Atlanta	27%	3%
13	Baton Rouge	26%	3%
13	Chicago	26%	No change
15	Austin	25%	3%
16	Houston	24%	-1%
16	Tampa	24%	No change
16	Las Vegas	24%	2%
19	Nashville	23%	1%
19	New Orleans	23%	1%
19	Philadelphia	23%	No change

Note(s): (a)
Source(s): (1) Houston falls in new congestion ranking, Feb 20 2017, Houston Chronicle

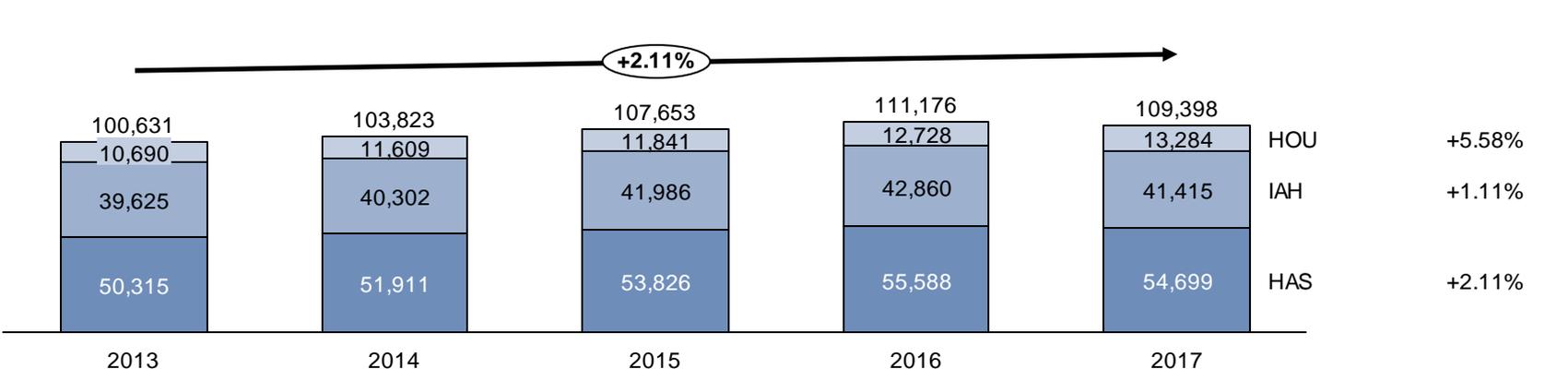
Infrastructure Resiliency

Despite number of operations declining across airports in Houston, total number of passengers has witnessed modest growth of ~2% since 2013

Total operations by airport in Houston ('000)(a)



Total passengers enplaned and deplaned



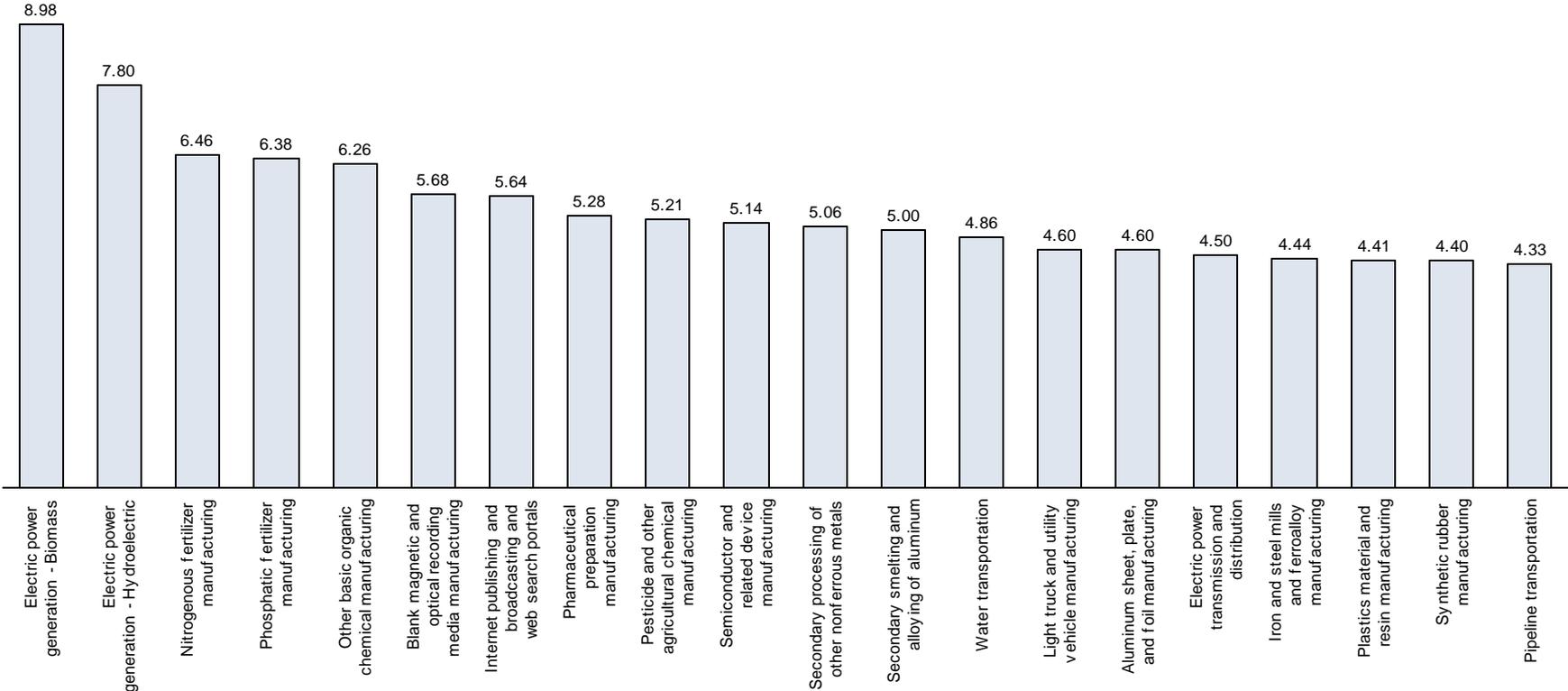
Note(s): (a) An operation is described as a landing and takeoff of an aircraft; (b) HAS = Houston Airport System; IAH = George Bush Intercontinental; HOU = William P. Hobby; EFD = Ellington Airport
 Source(s): (1) Houston Airport System, Statistical Report, 2017 Fiscal Year Summary

Energy Transition

Electric power generation emerges as the industry with the highest impact on Houston’s employment

Employment multipliers by industry – Houston metro

Work with Jenny on indexing



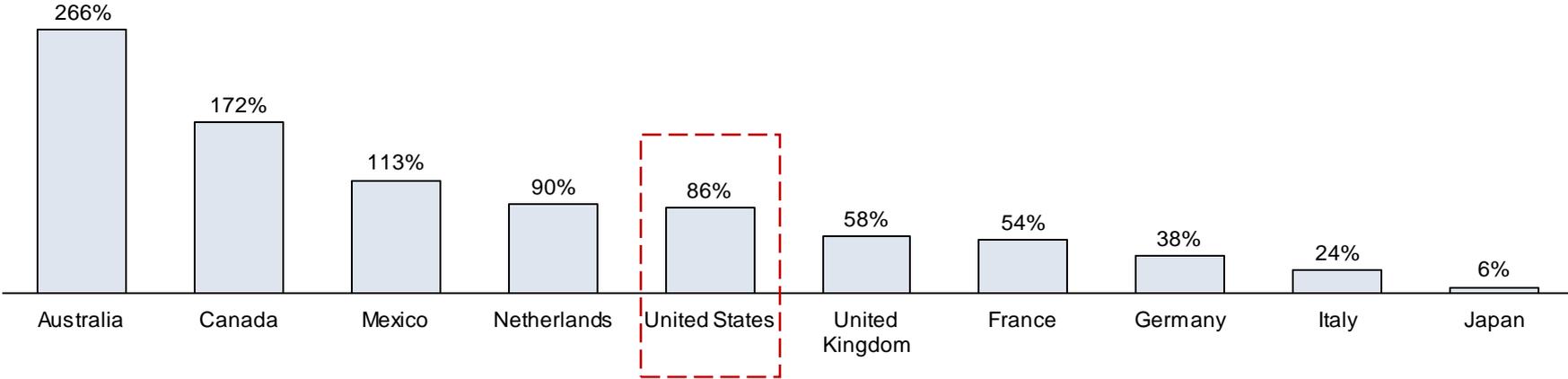
Note(s): (a)
Source(s): (1) IMPLAN



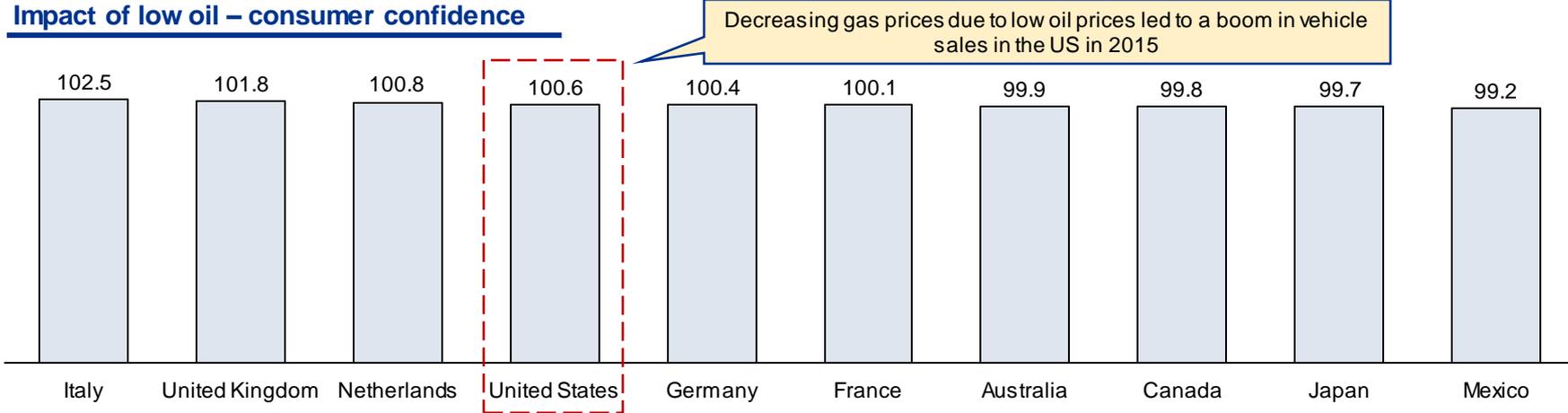
Energy Transition

Since US appears to be a net energy importer, that may help moderate the negative impact of oil prices and strengthen consumer confidence

Impact of low oil – energy self sufficiency (%)



Impact of low oil – consumer confidence

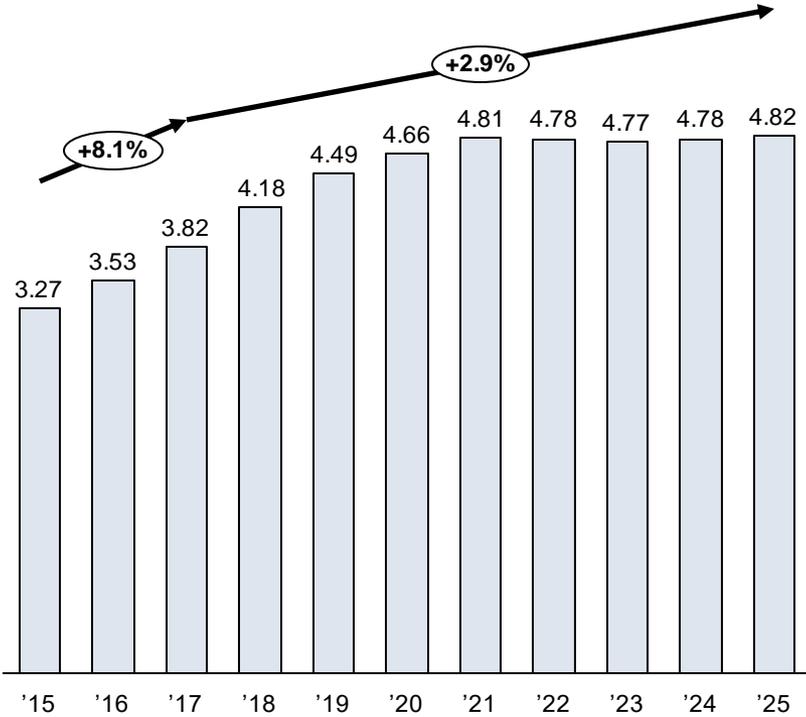


Note(s): (a)
Source(s): (1) KPMG competitive alternatives, 2016 edition

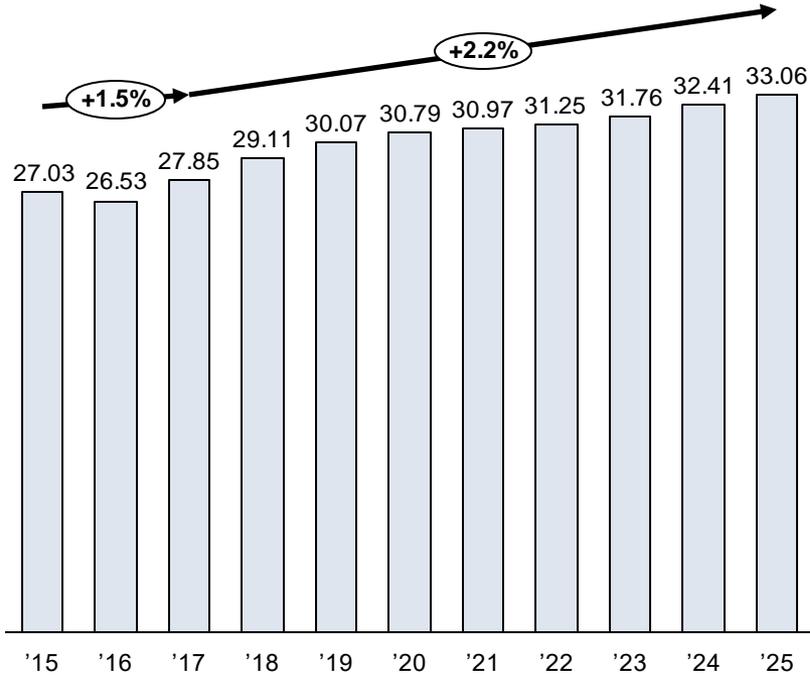
Energy Transition

Natural gas production is also estimated to witness modest growth till 2025

US natural gas plants liquid production (million barrels per day, 2015-25E)



US natural gas dry production (trillion cubic feet, 2015-25E)



Note(s): (a)
Source(s): (1) US Energy Information Administration

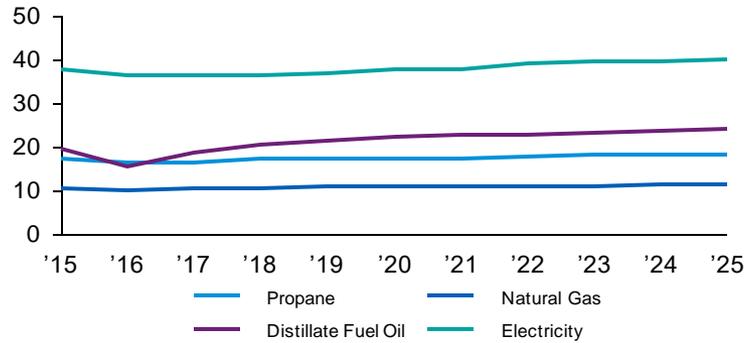


Energy Transition

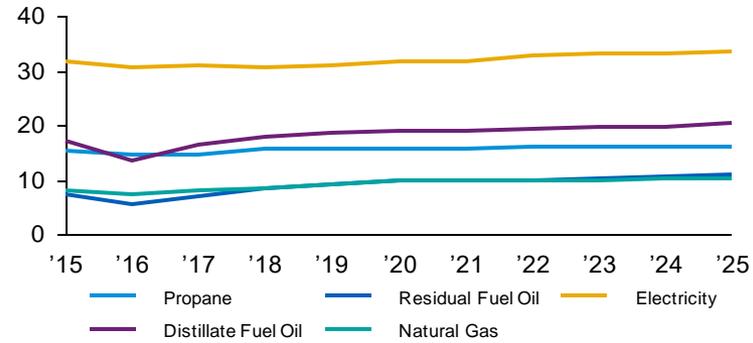
Energy prices are estimated to be stable in residential and commercial sectors while industrial and transport uses may witness price hikes

US energy prices by sector and source (2016 dollars per million Btu, 2015-25)

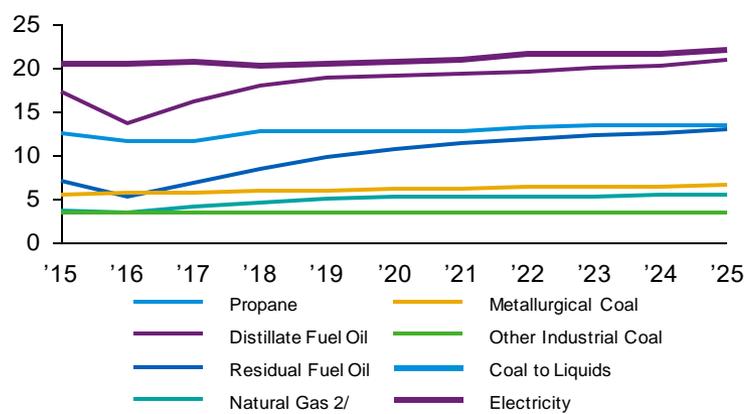
Residential



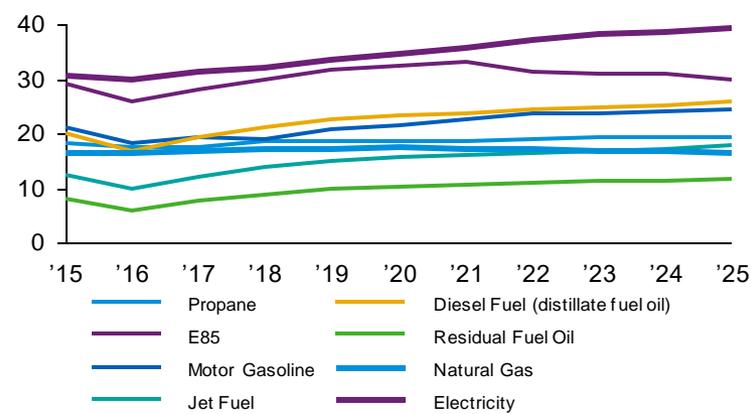
Commercial



Industrial



Transportation



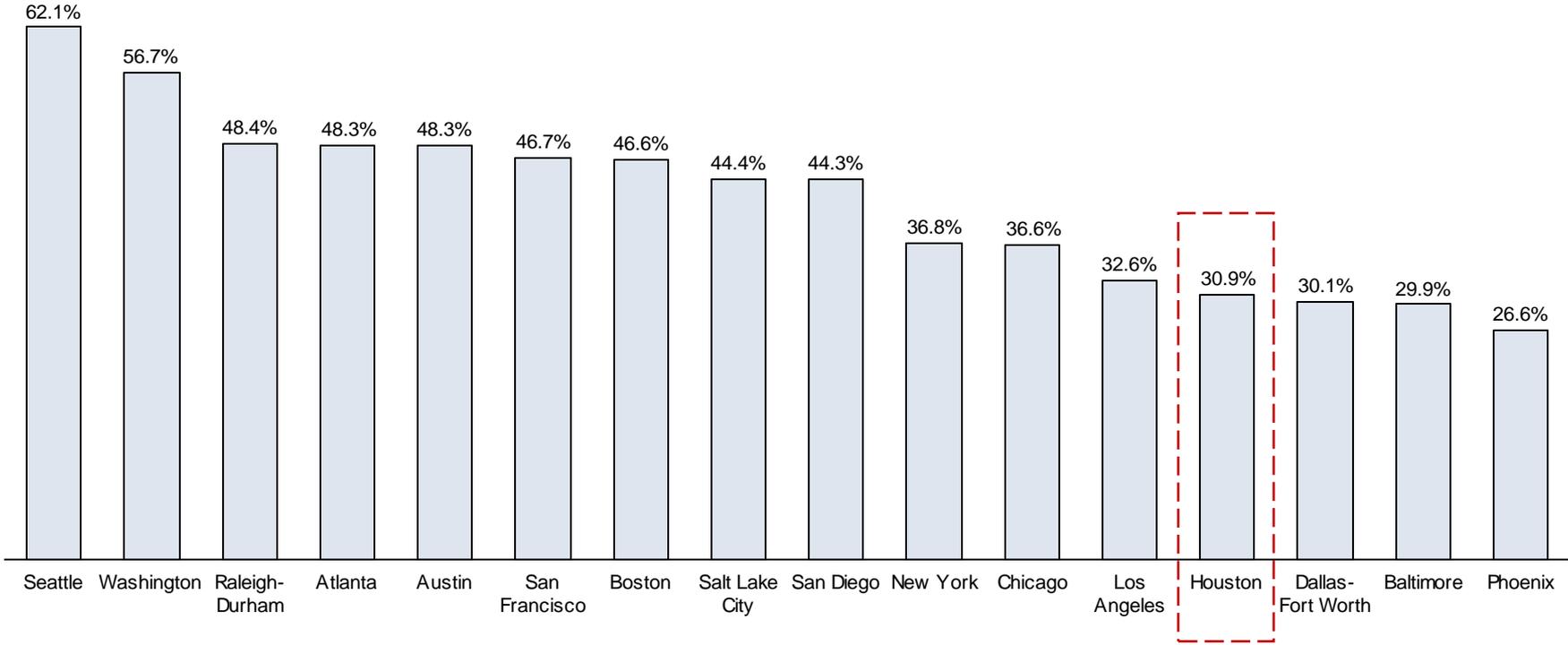
Note(s): (a)
Source(s): (1) US Energy Information Administration



Benchmarking

Education attainment also emerges as an area of concern

Education attainment rate by city^(a)



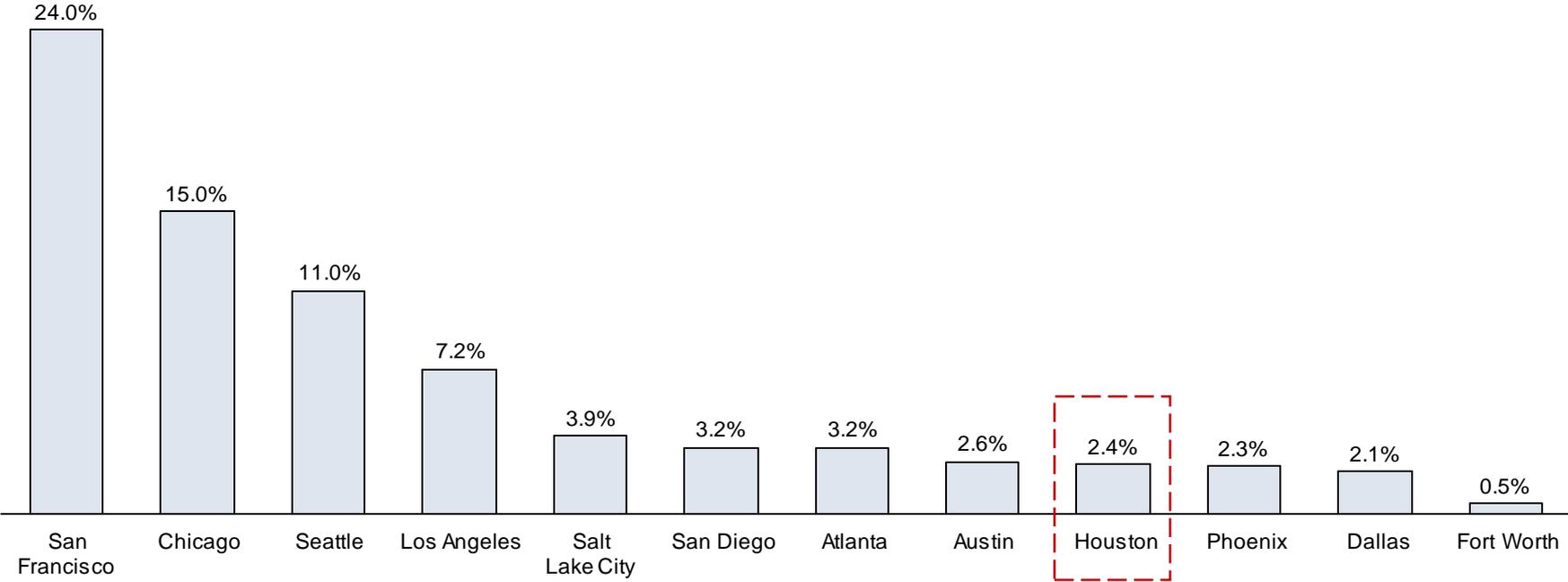
Note(s): (a) Analysis across US and Canada
Source(s): (1) 2017 scoring tech talent analyzer, CBRE



Benchmarking

Texas cities appear to have a comparatively lower population that uses public transportation

Share of workforce using public transit (%)



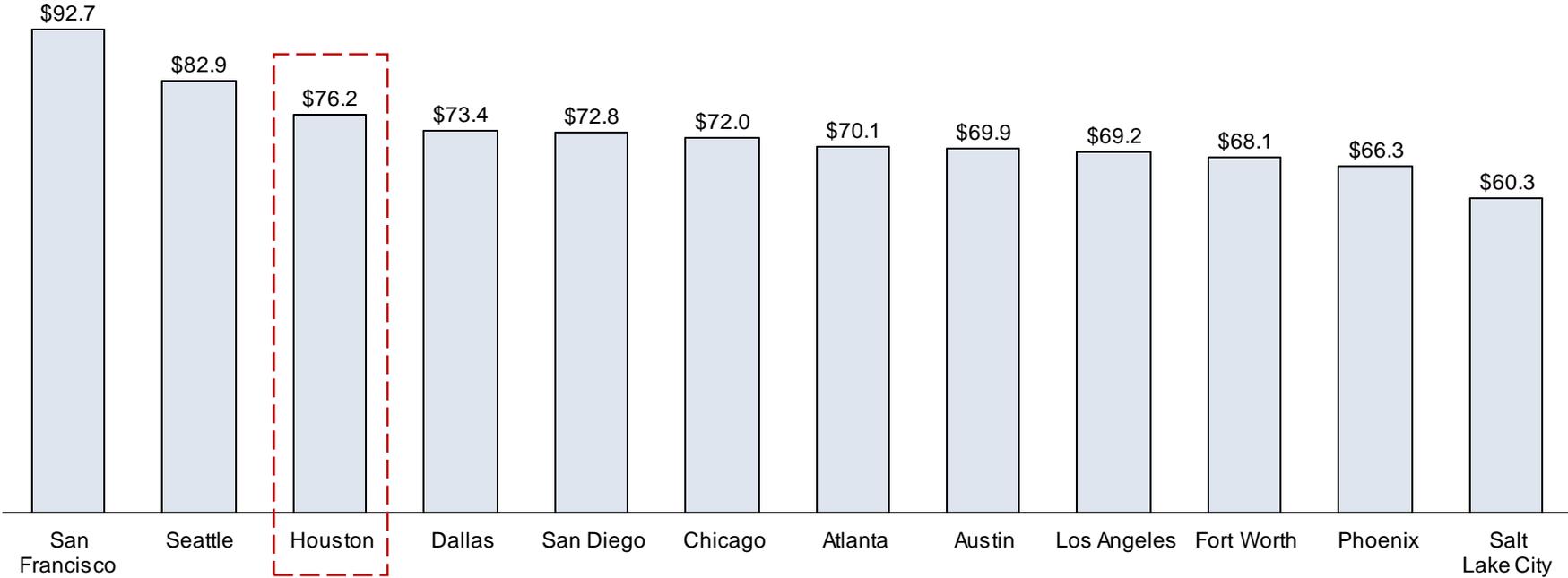
Note(s): (a)
Source(s): (1) Amazon data



Benchmarking

Houston appears to have a relatively higher average salary within the peer set

Salary: Biz/fin, management, comp/math, engineering (\$000s)



Note(s): (a)
Source(s): (1) Amazon data



Benchmarking

Demographics (1/10)

By gender and age (2015)

	Total population	Male	Female	Under 20 years	20-44 years	45-64 years	65 years and above
Houston city, Texas	2,217,706	1,108,500	1,109,206	617,776	886,845	500,384	212,701
Phoenix city, Arizona	1,514,208	755,143	759,065	447,949	566,110	357,601	142,548
Los Angeles city, California	3,900,794	1,933,424	1,967,370	965,009	1,565,787	932,774	437,224
San Diego city, California	1,359,791	682,040	677,751	325,307	559,118	318,795	156,571
San Francisco city, California	840,763	427,909	412,854	127,074	377,744	216,768	119,177
Atlanta city, Georgia	448,901	221,101	227,800	101,654	201,463	98,840	46,944
Chicago city, Illinois	2,717,534	1,318,494	1,399,040	676,936	1,125,031	618,091	297,476
Austin city, Texas	887,061	447,815	439,246	217,458	412,675	190,130	66,798
Dallas city, Texas	1,260,688	626,758	633,930	356,126	506,812	280,073	117,677
Fort Worth city, Texas	796,614	387,317	409,297	251,001	299,627	175,277	70,709
Salt Lake City, Utah	190,679	98,491	92,188	46,586	86,166	38,833	19,094
Seattle city, Washington	653,017	327,600	325,417	117,400	302,794	157,026	75,797

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (2/10)

By gender and age (2014)

	Total population	Male	Female	Under 20 years	20-44 years	45-64 years	65 years and above
Houston city, Texas	2,167,988	1,085,874	1,082,114	604,840	865,796	492,062	205,290
Phoenix city, Arizona	1,490,758	743,960	746,798	448,086	557,519	350,122	135,031
Los Angeles city, California	3,862,210	1,916,149	1,946,061	974,064	1,549,373	916,374	422,399
San Diego city, California	1,341,510	675,782	665,728	325,788	550,367	314,599	150,756
San Francisco city, California	829,072	421,516	407,556	126,925	371,386	214,688	116,073
Atlanta city, Georgia	440,641	217,938	222,703	100,959	197,813	97,180	44,689
Chicago city, Illinois	2,712,608	1,315,199	1,397,409	685,274	1,121,033	615,613	290,688
Austin city, Texas	864,218	435,573	428,645	215,552	401,747	183,499	63,420
Dallas city, Texas	1,240,985	620,240	620,745	352,417	499,945	274,084	114,539
Fort Worth city, Texas	778,573	378,337	400,236	246,338	294,587	170,368	67,280
Salt Lake City, Utah	189,267	97,404	91,863	47,388	84,786	38,309	18,784
Seattle city, Washington	637,850	318,757	319,093	116,298	293,955	155,219	72,378

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (3/10)

By gender and age (2013)

	Total population	Male	Female	Under 20 years	20-44 years	45-64 years	65 years and above
Houston city, Texas	2,134,707	1,069,676	1,065,031	600,268	850,919	484,859	198,661
Phoenix city, Arizona	1,473,639	739,775	733,864	449,444	552,312	343,554	128,329
Los Angeles city, California	3,827,261	1,900,701	1,926,560	984,836	1,537,257	896,286	408,882
San Diego city, California	1,322,838	669,119	653,719	324,531	542,619	308,657	147,031
San Francisco city, California	817,501	415,283	402,218	125,041	367,668	211,662	113,130
Atlanta city, Georgia	432,589	214,376	218,213	99,915	194,454	95,134	43,086
Chicago city, Illinois	2,706,101	1,313,565	1,392,536	691,949	1,116,630	613,314	284,208
Austin city, Texas	836,800	422,511	414,289	210,498	388,859	177,460	59,983
Dallas city, Texas	1,222,167	612,003	610,164	347,816	493,185	269,286	111,880
Fort Worth city, Texas	761,092	369,695	391,397	243,480	289,406	164,243	63,963
Salt Lake City, Utah	188,141	96,138	92,003	48,627	82,890	38,320	18,304
Seattle city, Washington	624,681	310,551	314,130	113,475	286,408	154,304	70,494

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (4/10)

By gender and age (2012)

	Total population	Male	Female	Under 20 years	20-44 years	45-64 years	65 years and above
Houston city, Texas	2,107,449	1,055,975	1,051,474	601,346	838,014	474,776	193,313
Phoenix city, Arizona	1,462,368	735,194	727,174	454,077	549,013	336,744	122,534
Los Angeles city, California	3,804,503	1,887,976	1,916,527	994,811	1,527,637	881,973	400,082
San Diego city, California	1,308,619	661,264	647,355	323,236	540,300	303,237	141,846
San Francisco city, California	807,755	409,803	397,952	125,494	362,817	208,427	111,017
Atlanta city, Georgia	425,931	211,553	214,378	99,476	190,874	93,730	41,851
Chicago city, Illinois	2,702,471	1,309,079	1,393,392	698,685	1,112,445	608,193	283,148
Austin city, Texas	799,939	405,203	394,736	203,798	373,500	167,270	55,371
Dallas city, Texas	1,207,202	603,648	603,554	348,349	488,471	261,882	108,500
Fort Worth city, Texas	743,865	361,793	382,072	238,686	284,169	159,262	61,748
Salt Lake City, Utah	186,740	95,266	91,474	48,414	82,570	37,319	18,437
Seattle city, Washington	612,916	303,982	308,934	111,754	281,021	151,926	68,215

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (5/10)

By gender and age (2011)

	Total population	Male	Female	Under 20 years	20-44 years	45-64 years	65 years and above
Houston city, Texas	2,089,090	1,044,997	1,044,093	599,279	831,534	467,989	190,288
Phoenix city, Arizona	1,455,565	733,842	721,723	457,304	549,833	330,157	118,271
Los Angeles city, California	3,782,544	1,879,856	1,902,688	1,002,917	1,522,873	864,496	392,258
San Diego city, California	1,296,437	656,707	639,730	321,953	537,388	298,435	138,661
San Francisco city, California	797,983	404,490	393,493	123,621	359,952	205,133	109,277
Atlanta city, Georgia	419,250	208,201	211,049	99,894	186,773	91,814	40,769
Chicago city, Illinois	2,700,741	1,311,382	1,389,359	708,226	1,107,155	604,817	280,543
Austin city, Texas	782,149	396,932	385,217	200,903	365,335	162,058	53,853
Dallas city, Texas	1,196,258	598,591	597,667	348,061	486,127	256,442	105,628
Fort Worth city, Texas	724,699	352,681	372,018	231,961	278,534	154,633	59,571
Salt Lake City, Utah	186,009	94,511	91,498	48,317	82,624	37,006	18,062
Seattle city, Washington	603,174	299,624	303,550	111,348	275,685	150,494	65,647

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (6/10)

By race (2015)

	Total	Hispanic	White	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races
Houston city, Texas	2,217,706	972,785	565,792	502,619	3,370	141,146	1,023	3,562	27,409
Phoenix city, Arizona	1,514,208	625,378	680,907	99,475	25,097	49,668	2,860	1,833	28,990
Los Angeles city, California	3,900,794	1,898,577	1,107,571	341,357	6,223	445,738	6,150	12,340	82,838
San Diego city, California	1,359,791	408,714	586,863	84,155	3,564	224,337	4,800	2,347	45,011
San Francisco city, California	840,763	128,619	346,732	44,879	1,520	281,896	3,370	3,941	29,806
Atlanta city, Georgia	448,901	22,495	165,309	235,331	631	17,461	133	592	6,949
Chicago city, Illinois	2,717,534	790,649	875,333	840,208	3,493	160,316	419	4,228	42,888
Austin city, Texas	887,061	306,072	431,789	65,233	1,461	59,571	601	1,320	21,014
Dallas city, Texas	1,260,688	526,022	370,257	303,767	1,649	37,908	387	1,484	19,214
Fort Worth city, Texas	796,614	273,582	324,407	147,936	2,114	30,407	866	942	16,360
Salt Lake City, Utah	190,679	39,262	124,790	4,828	2,060	10,412	4,623	847	3,857
Seattle city, Washington	653,017	42,490	430,085	46,391	3,695	92,332	2,509	1,197	34,318

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (7/10)

By race (2014)

	Total	Hispanic	White	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races
Houston city, Texas	2,167,988	951,493	553,310	494,900	3,600	135,506	856	3,198	25,125
Phoenix city, Arizona	1,490,758	603,460	685,378	97,043	23,593	48,786	3,256	2,021	27,221
Los Angeles city, California	3,862,210	1,876,711	1,100,413	341,960	6,323	439,382	5,969	10,749	80,703
San Diego city, California	1,341,510	396,338	585,517	85,526	3,361	219,856	5,133	2,247	43,532
San Francisco city, California	829,072	126,524	343,368	45,653	1,680	276,094	3,409	4,109	28,235
Atlanta city, Georgia	440,641	24,489	160,424	230,856	539	16,576	109	756	6,892
Chicago city, Illinois	2,712,608	785,292	872,513	853,214	3,437	154,287	417	4,247	39,201
Austin city, Texas	864,218	300,976	420,506	64,781	1,557	56,089	571	1,165	18,573
Dallas city, Texas	1,240,985	517,901	363,349	301,461	1,832	36,742	367	1,568	17,765
Fort Worth city, Texas	778,573	266,472	318,732	145,330	2,262	28,534	966	1,228	15,049
Salt Lake City, Utah	189,267	39,607	124,411	5,166	2,288	9,425	3,850	854	3,666
Seattle city, Washington	637,850	40,577	422,287	45,871	3,508	90,286	2,956	998	31,367

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (8/10)

By race (2013)

	Total	Hispanic	White	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races
Houston city, Texas	2,134,707	931,154	549,758	491,973	3,463	132,008	742	2,871	22,738
Phoenix city, Arizona	1,473,639	593,458	685,445	94,773	23,125	45,824	2,509	2,344	26,161
Los Angeles city, California	3,827,261	1,859,792	1,093,728	346,201	6,306	429,480	6,293	10,573	74,888
San Diego city, California	1,322,838	387,367	584,412	84,588	3,151	213,733	5,693	2,128	41,766
San Francisco city, California	817,501	124,167	341,100	45,909	1,942	270,621	3,362	3,747	26,653
Atlanta city, Georgia	432,589	23,089	157,114	229,023	551	15,644	129	645	6,394
Chicago city, Illinois	2,706,101	775,748	870,611	862,567	3,473	152,952	488	4,195	36,067
Austin city, Texas	836,800	289,449	410,982	64,544	1,549	51,766	566	1,324	16,620
Dallas city, Texas	1,222,167	512,077	357,744	296,480	1,781	36,048	270	1,398	16,369
Fort Worth city, Texas	761,092	260,349	314,642	142,467	2,426	26,261	710	1,369	12,868
Salt Lake City, Utah	188,141	39,098	125,196	5,185	2,120	8,377	3,841	849	3,475
Seattle city, Washington	624,681	40,110	416,569	45,193	3,360	87,555	2,567	925	28,402

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (9/10)

By race (2012)

	Total	Hispanic	White	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races
Houston city, Texas	2,107,449	917,133	546,133	489,529	3,018	128,223	761	3,659	18,993
Phoenix city, Arizona	1,462,368	586,414	688,427	90,714	22,847	44,825	3,260	2,450	23,431
Los Angeles city, California	3,804,503	1,840,058	1,090,516	350,232	6,097	428,653	6,268	11,411	71,268
San Diego city, California	1,308,619	377,842	585,196	85,186	3,057	207,989	6,636	2,605	40,108
San Francisco city, California	807,755	121,628	337,443	46,293	2,044	268,548	3,422	3,178	25,199
Atlanta city, Georgia	425,931	22,929	154,065	227,067	706	14,112	156	804	6,092
Chicago city, Illinois	2,702,471	768,128	865,254	877,891	3,348	148,547	610	5,228	33,465
Austin city, Texas	799,939	281,318	389,023	63,210	1,435	49,225	613	1,492	13,623
Dallas city, Texas	1,207,202	507,405	353,165	293,877	1,875	34,336	268	1,883	14,393
Fort Worth city, Texas	743,865	252,656	310,637	137,957	2,868	26,979	592	1,010	11,166
Salt Lake City, Utah	186,740	40,007	124,203	4,969	1,849	7,931	3,590	687	3,504
Seattle city, Washington	612,916	37,880	409,073	46,894	3,984	85,567	2,170	1,196	26,152

Note(s): (a)
Source(s): (1) US Census Bureau

Benchmarking

Demographics (10/10)

By race (2011)

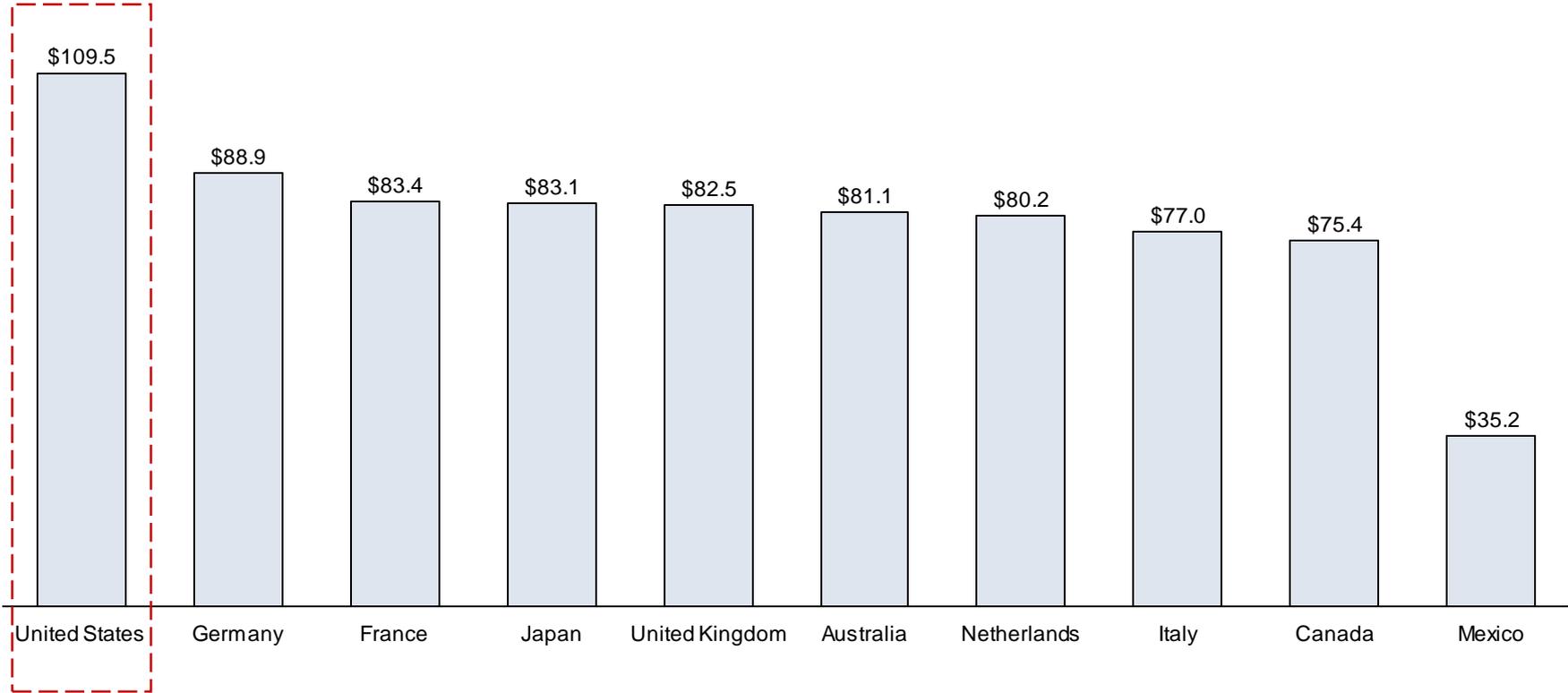
	Total	Hispanic	White	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some other race	Two or more races
Houston city, Texas	2,089,090	901,268	550,128	488,322	3,100	124,854	857	4,087	16,474
Phoenix city, Arizona	1,455,565	584,212	689,128	88,738	22,999	44,549	3,190	2,748	20,001
Los Angeles city, California	3,782,544	1,820,261	1,094,282	352,937	6,031	425,888	6,612	11,741	64,792
San Diego city, California	1,296,437	365,076	593,190	85,133	3,061	201,730	6,045	3,113	39,089
San Francisco city, California	797,983	119,029	334,808	47,345	2,064	265,685	3,234	2,895	22,923
Atlanta city, Georgia	419,250	21,045	152,159	224,860	663	13,824	78	843	5,778
Chicago city, Illinois	2,700,741	759,303	864,688	890,947	3,560	144,528	804	6,381	30,530
Austin city, Texas	782,149	276,366	380,278	62,016	1,368	47,704	594	1,608	12,215
Dallas city, Texas	1,196,258	501,663	352,302	291,289	2,124	33,056	285	2,362	13,177
Fort Worth city, Texas	724,699	243,676	306,814	134,705	2,888	25,220	299	1,160	9,937
Salt Lake City, Utah	186,009	39,290	125,335	5,097	1,924	7,460	3,020	715	3,168
Seattle city, Washington	603,174	37,926	402,143	45,684	3,857	85,069	2,344	1,367	24,784

Note(s): (a)
Source(s): (1) US Census Bureau

Current State Assessment: U.S.

While US appears to have the highest labor costs compared to selected peers, surpassing more than ~\$100,000 on average per employee....

Total labor (Average per employee, \$'000)



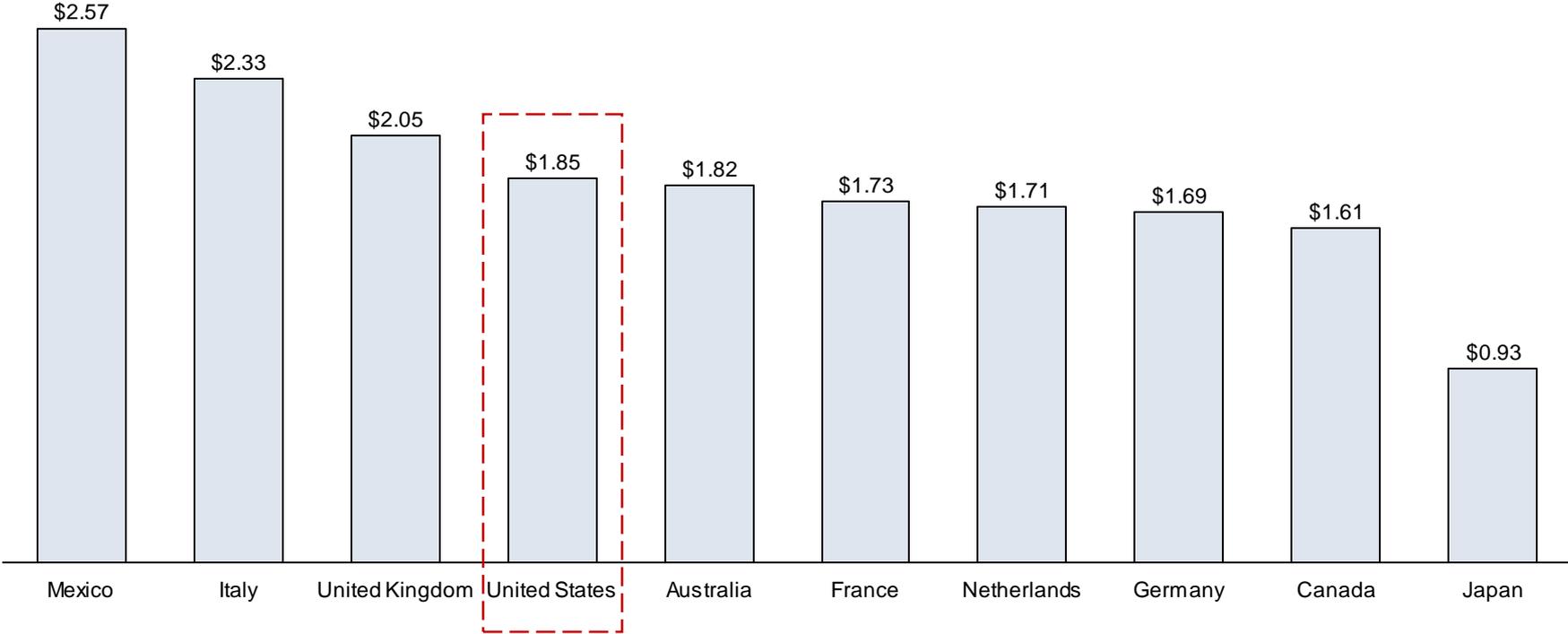
Note(s): (a)
Source(s): (1) KPMG competitive alternatives, 2016 edition



Current State Assessment: U.S.

.... It appears to have lower annual product distribution costs than Mexico, Italy and United Kingdom

Total annual product distribution costs (\$'000)



Note(s): (a)
Source(s): (1) KPMG competitive alternatives, 2016 edition

