



HOUSTON

SUSTAINABLE DEVELOPMENT INDICATORS:

A Comprehensive Development Review for
Citizens, Analysts and Decision Makers

ECONOMIC DEVELOPMENT

PILLAR OF SUSTAINABILITY

LESTER KING







Houston Sustainable Development Indicators: A Comprehensive Development Review for Citizens, Analysts and Decision Makers

by

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Economic Development Pillar of Sustainability

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Theme - Economic Development

Sub Theme - Employment

Indicator - Employment Status

In 2010 survey of area residents, 38% of respondents stated that the biggest problem facing Houston was unemployment, poverty and the cost of living (Klineberg, 2010). Employment is essential to gain access to health care, quality shelter, good communities, and quality of life among many other things. Education is a fundamental step in the process and indicators like the Drop-out Rate among high school students show trends leading to vulnerabilities like employment stability (Sanborn, 2012). In comparison to the 63 largest cities in the country Houston had the 18th highest unemployment rate in 2010.

Sustainability Benefit: The unemployment rate for Hispanics, which are the fastest growing segment of the population has not increased significantly between 1990 and 2010.

Sustainability Issue: In 2010 Houston had a very high unemployment rate at 10 percent.

The following metric, **Figure 25: Unemployment Rate**, is used to measure the indicator *Employment Status*.

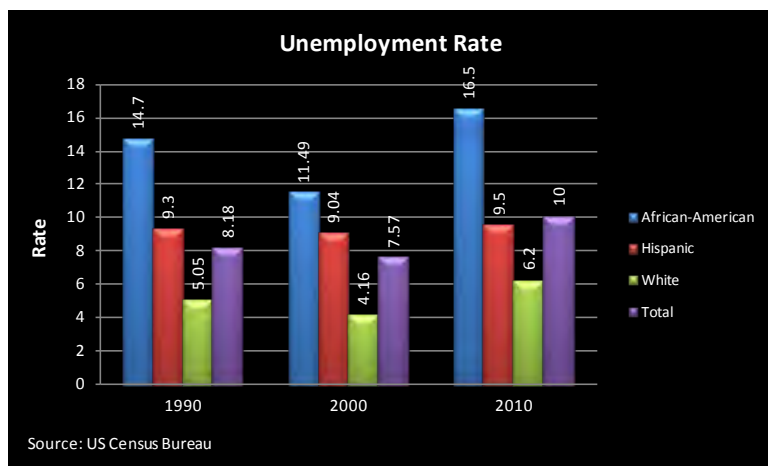


Figure 25: Unemployment Rate

- African Americans had a 16.5% unemployment rate in 2010. This is the highest rate of any racial or ethnic group and hence it demonstrates that African Americans are at a disadvantage when it comes to employment and job security in Houston.
- The unemployment rate among Hispanics remained stable at around 9.5%. This might lead some to erroneously state that Hispanic persons were not affected by the downturn in the economy starting in 2007.



- All groups show a reduction in unemployment percentage in 2000 and then an increase in unemployment in 2010. African Americans are the most adversely affected group in terms of unemployment.



Theme - Economic Development

Sub Theme - Macroeconomic Performance

Indicator - Primary Jobs and Green Jobs

Traditionally **primary jobs** (manufacturing) were considered the anchors of local economies and essential for reporting economic success. However sustainability promotes a more local emphasis on natural resources and economy to deter exploitation of weak economies by more robust ones. Local economies cannot sustain themselves without external capital since money will always leave the local economy through simple things like external purchases and people travelling to other places. Therefore the dilemma becomes, how can we calculate exactly the sustainable amount of external capital needed to generate the right mix of primary jobs to sustain local economies? This indicator looks at the development of primary jobs as an indicator to monitor the flow of new capital in the local economy (Leigh & Hoelzel, 2012). The city of Houston ranked 23rd among the largest 63 cities in the country, in terms of percentage of manufacturing jobs (U.S. Census Bureau, 2011). For this indicator primary jobs are defined as manufacturing jobs plus health sector jobs, for reasons as subsequently explained.

The indicator also looks at **green jobs** because they ensure that both private gains and public stewardship goals are met. Companies with job descriptions that qualify as green jobs, should be more resource efficient and hence more sustainable (McDonough & Braungart, 2002). Green Jobs can either be monitored by identifying products and services that are created or by the operational procedures followed in a company. In either case the products or procedures should improve or reduce impacts on the environment (Bureau of Labor Statistics, 2010).

Sustainability Benefit: Although traditional primary jobs were considered exclusively manufacturing, globalization has enabled the capture of foreign exchange from other sectors aside. Health care jobs in Houston, which are primarily service jobs, constitute a significant percentage of all jobs because the Texas Medical Center is the largest medical center in the world and attracts patients and researchers from all over the world. This is why primary jobs in Houston are defined as manufacturing jobs plus medical jobs in this study. The fact that Houston is not solely dependent on manufacturing for new capital creates a stronger base for a more sustainable local economy. This is especially important due to the lack of national and international competitiveness in the global manufacturing economy.

Sustainability Issue: Even with gains in medical jobs, these jobs plus manufacturing jobs, constitute less than one quarter of all jobs. High demand for single occupancy vehicles and the dependence, in Houston, on air conditioning contributes negatively to the environment and offsets both public and private gains from green jobs.

The following metrics are used to measure the indicator *Primary Jobs and Green Jobs*:

Figure 26: Houston Jobs 1990-2040

Figure 27: Green Jobs in Texas

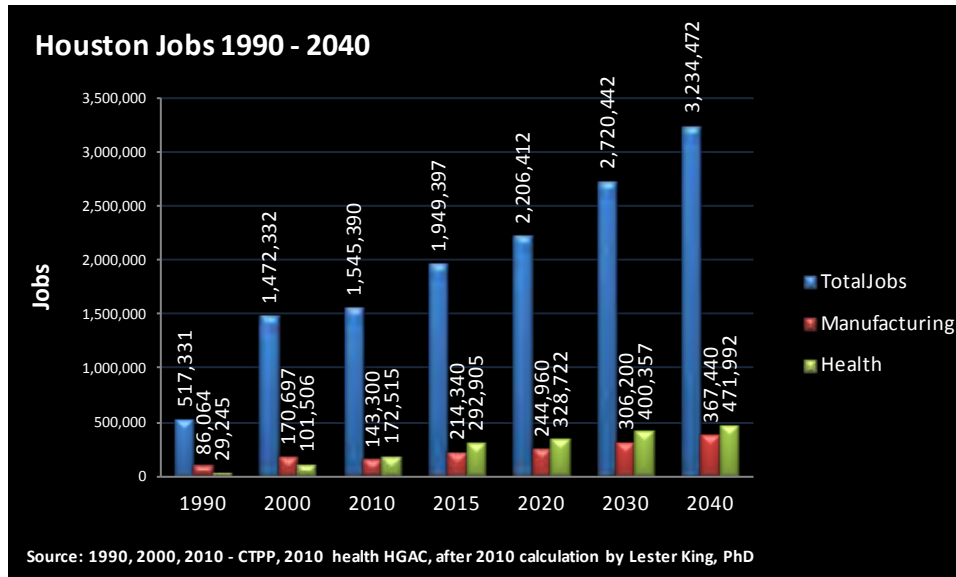


Figure 26: Houston Jobs 1990-2040

- In 1990, 22% of all jobs were primary jobs; in 2000, 18% of all jobs were primary jobs; in 2010 23% of all jobs were primary jobs. Primary jobs include traditional manufacturing jobs and medical jobs.
- Manufacturing jobs were 9% of all jobs in the city in 2010.
- The above figure shows that Houston has had tremendous growth in jobs between 1990 and 2000 adding almost 1 million jobs. In contrast the city added approximately 73,000 jobs between 2000 and 2010.
- Medical jobs in Houston are growing at a faster rate than manufacturing jobs. Manufacturing jobs have dropped by 7 percentage points between 1990 and 2010 relative to all jobs. Medical jobs have grown by almost 6 percentage points for that same period relative to all jobs.
- The number of medical jobs has now surpassed the number of manufacturing jobs in the city.

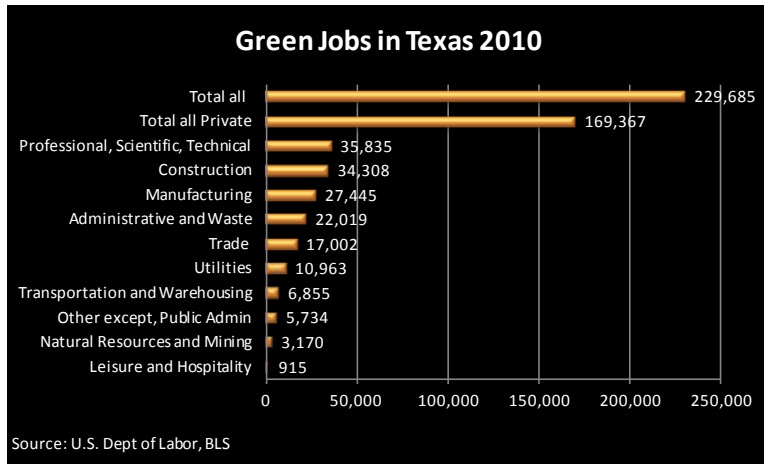


Figure 27: Green Jobs in Texas

- In 2010 Texas had a total of 229,685 Green Jobs. This was approximately 2% of the total number of jobs in Texas.
- The industries with the highest number of green jobs in Texas were Professional, Scientific, Technical – 35,835; Construction – 34,308; and Manufacturing – 27,445.
- The industries with the highest percentage of green jobs in Texas were Utilities – 16%; Professional, Scientific, Technical – 6.3%, followed by Construction – 6.1%.
- If all of the green jobs in Texas were in the Houston Metropolitan Statistical Area (MSA) region, they would only constitute 7% of all jobs in the Houston MSA region.
- Applying that 7% estimate as a fraction of the total personal income in the Houston MSA region (\$217 trillion). We can estimate a target for the green jobs market to contribute \$15.1 billion to personal income in the Houston MSA region.
- Applying the 2% state level estimate of green jobs to the total number of jobs in the City of Houston in 2010 would yield an estimated 32,000 green jobs in the City of Houston.



Theme - Economic Development

Sub Theme - Earnings

Indicator – Income

Growth in income is an important summary indicator that shows the rate at which private gains increase over time. This is especially important in an environment where municipalities compete for population and economic growth, as well as more basic things such as keeping up with the rate of inflation. The City of Houston ranked 45th out of the largest 63 cities in the country in terms of median household income in 2010. The median household income in Houston was \$42,962 in 2010. New York City ranked 16th highest in terms of median household income and California had 9 cities in the top 20 highest household income ranking, with San Jose City as the highest in the country with a median household income of \$79, 405 (U.S. Census Bureau, 2011).

Sustainability Benefit: The Houston region grew to surpass the Boston, Philadelphia, and San Francisco regions by 2006 and has maintained those gains. The Houston region is now the sixth largest metro region in the country in terms of Personal Income.

Sustainability Issue: The 2008 economic crises affected Houston MSA more that the Dallas MSA. This shows that the Dallas economy, which is the largest in the state of Texas, retained more jobs.

The following metrics are used to measure the indicator *Income*:

Figure 28: US Personal Income by MSA

Figure 29: Personal Income Houston vs Comparative Metros

Figure 30: Per Capita Income Houston MSA

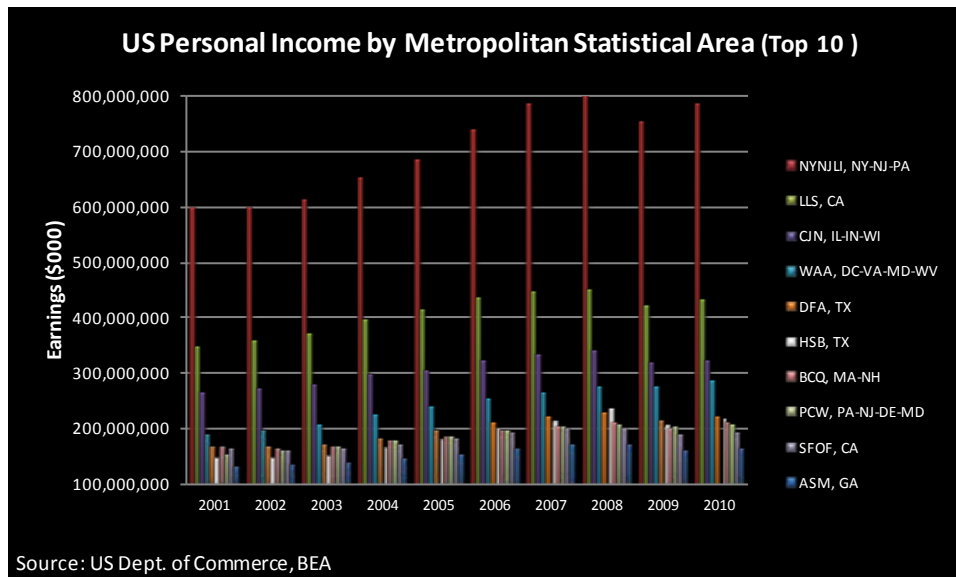


Figure 28: US Personal Income by MSA

- The top ten metropolitan areas in order of personal income by place of work in 2010 were as follows: New York-Northern New Jersey-Long Island (NYNNJLI), NY-NJ-PA – \$785,121,844,000; Los Angeles-Long Beach-Santa Ana (LALBSA), CA - \$430,869,194,000; Chicago-Joliet-Naperville (CJN), IL-IN-WI - \$321,124,866,000; Washington-Arlington-Alexandria (WAA), DC-VA-MD-WV - \$286,158,609,000; Dallas-Fort Worth-Arlington (DFA), TX - \$221,321,666,000; Houston-Sugar Land-Baytown (HSB), TX - \$217,004,867,000; Boston-Cambridge-Quincy (BCQ), MA-NH - \$208,433,714,000; Philadelphia-Camden-Wilmington (PCW), PA-NJ-DE-MD - \$205,731,927,000; San Francisco-Oakland-Fremont (SFOF), CA - \$191,330,208,000; Atlanta-Sandy Springs-Marietta (ASM), GA - \$163,796,051,000.
- The total metropolitan portion of US Personal Income was \$8 Trillion in 2010. The top ten ranked metro areas accounted for 38% of the total personal income in the U.S.
- The top ranked 4 metro areas, according to Figure 28, were the New York, LA, Chicago, and Washington DC regions. These regions accounted for 23% of the total US Metro area earnings. The remaining 6 metros in the top ten ranking contributed 15% of the US total and are similar in income numbers.

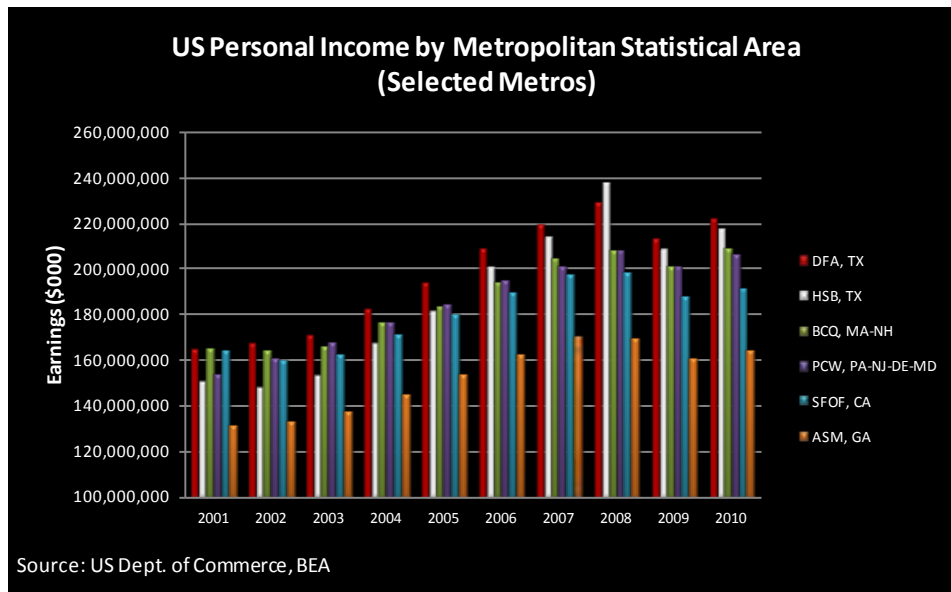


Figure 29: Personal Income Houston vs Comparative Metros

- Of the six similar metro regions in the top ten in the country according to Personal Income, the Dallas region reported the highest income in 2010.

- The Houston region made strong gains, in this comparative cohort, to become the top ranked region in 2008, and the highest grossing region across the 10 years of data collection between 2001 and 2010. However, the gains were not maintained after 2008 when all metro areas reported lower income earnings and Dallas again became the highest ranked metro according to the selected cohort.
- The Houston region surpassed the Boston, Philadelphia, and San Francisco regions by 2006 and maintained those gains. The Houston region is now the sixth largest grossing metro region in the country in terms of Personal Income.

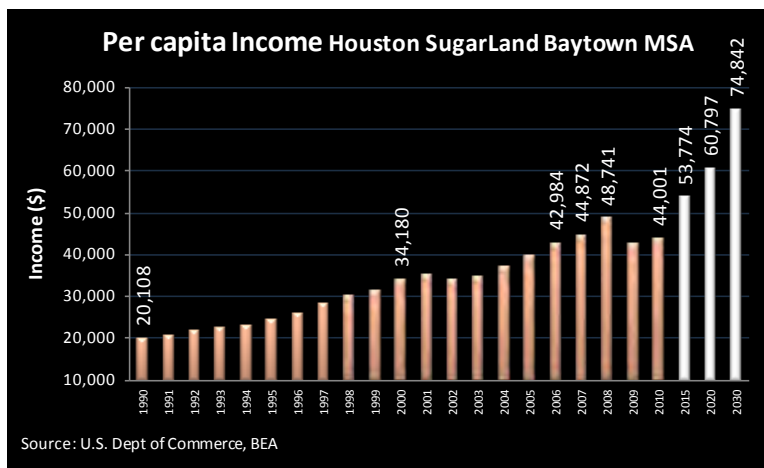


Figure 30: Per Capita Income Houston MSA

- The per capita income in the Houston – SugarLand – Baytown MSA reached a high of \$48,741 before the economy slowed.
- Since per capita income in 2010 (\$44,001), was a little below 2007 levels (\$44,872), we can estimate that the recession in the economy in 2007 set us back approximately 3 years.
- By 2015 if the historical trend continues as exhibited between 1990 and 2010, the Houston MSA should reach a per-capita income of \$53,774.

Theme - Consumption and Production

Sub Theme - Waste Generation and Management

Indicator - Waste Generation

In the United States, there were 250 million tons of municipal solid waste generated in 2010. Paper and paperboard constituted 28.5% of this total and another 28% was organic wastes such as food scraps, and yard trimmings (US Environmental Protection Agency, 2010). The data presented here covers waste generation. However, the other sustainability component of waste is the environmental justice issue of where landfills are located. Blackburn (2011) reports that 57% of persons living within a half mile of hazardous sites in Harris County are below the poverty line.

Sustainability Benefit: Municipal Solid Waste disposal numbers are decreasing in the 13 county region.

Sustainability Issue: Available data are estimates because private waste haulers account for a large portion of the market and do not have to report tonnage by types of waste or sources to the state. It is not clear the impact this may have on the reduction in tonnage reported.

The following metrics are used to measure the indicator *Waste Generation*:

Figure 31: Houston Region MSW Disposal (tons)

Figure 32: Houston Region MSW Disposal Rate (lbs/person/day)

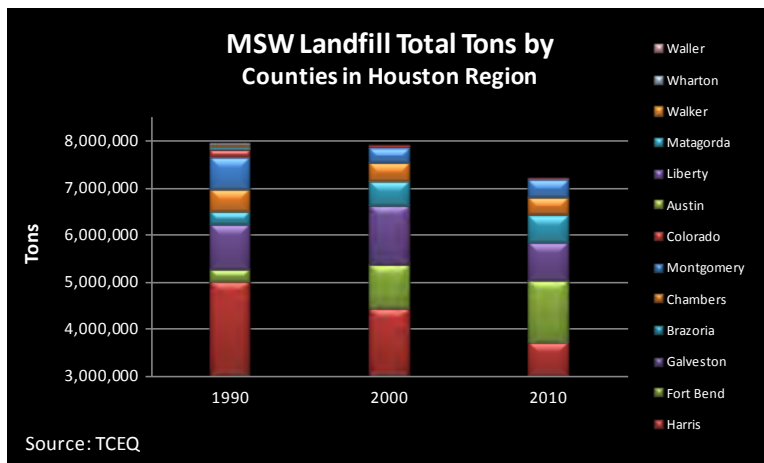


Figure 31: Houston Region MSW Disposal (tons)

- Waste statistics are reported for the Houston-Galveston 13 county region. Waste generated in one county can be deposited in other counties.
- The total tonnage of municipal solid waste dropped tremendously in 2010 when compared to levels in 1990 and 2000.

- The total tonnage of municipal solid waste reported for the region was 7,946,258 tons in 1990; 7,907,760 tons in 2000; and 7,214,143 tons in 2010.
- Most of the waste was landfilled in Harris County, Fort Bend County, and Galveston County.
- Between 1990 and 2010 Harris County had a reduction in the amount of solid waste landfilled; while Fort Bend County had an increase in the amount of waste landfilled.

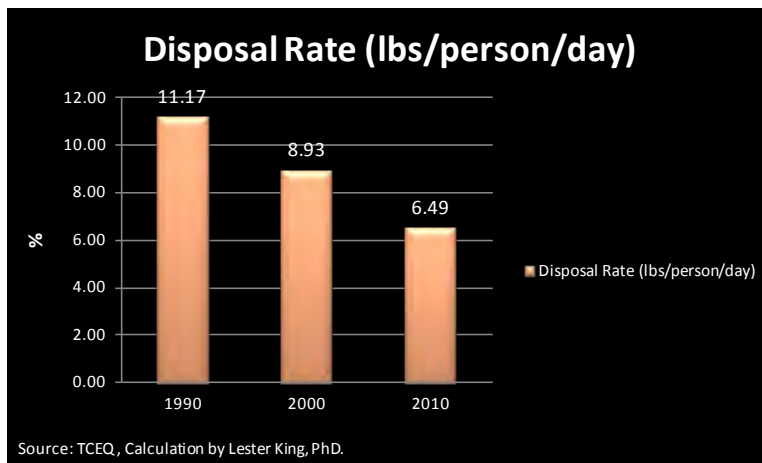


Figure 32: Houston Region MSW Disposal Rate (lbs/person/day)

- The Disposal rate measured in pound per person per day serves as a standardized measure for compared waste statistics.
- Between 1990 and 2000 the disposal rate dropped in the Houston-Galveston 13 county region from 11.17 lbs/person/day to 6.49 lbs/person/day.



Theme - Consumption and Production

Sub Theme - Energy Use

Indicator - Energy Consumption

Coal, natural gas and oil are the carbon-based resources we depend on for energy. These resources are all non-renewable and as such raise the issue of sustainability. Additionally, these resources emit high levels of pollution into the atmosphere, which affect our health and the health of other living organisms. There are three elements in our ecosystem that we have the capability to harness to produce energy to power our way of life. Those elements are carbon, plutonium and hydrogen. Since the use of plutonium is a threat to peace and hydrogen needs further research, we will be dependent on carbon-based fuels for some time (Tour, Kittrell, & Colvin, 2010).

Sustainability Benefit: We have a robust supply of infrastructure to ensure redundancy of energy access for most areas in the city.

Sustainability Issue: Houstonians are dependent on air conditioning for the majority of the year.

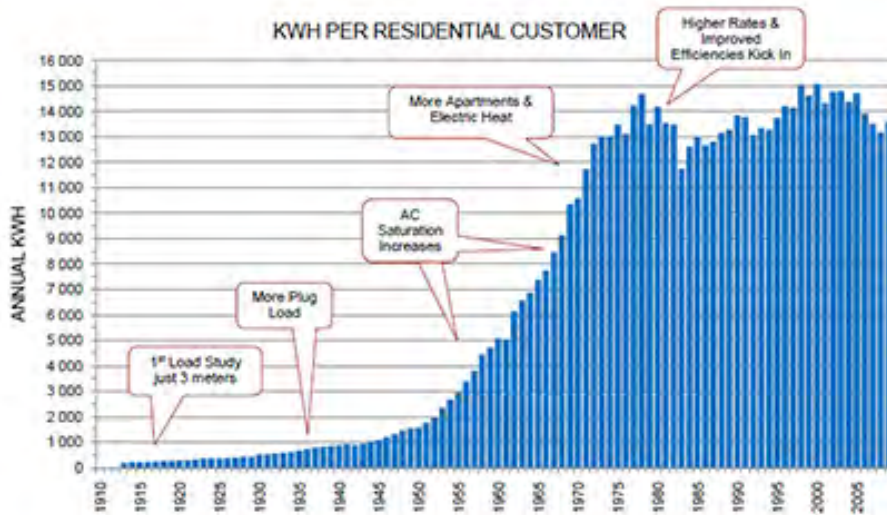
The following metrics are used to measure the indicator Energy Consumption:

Figure 33: Centerpoint Energy Residential Energy Use History

Figure 34: Houston vs National Ave Residential Energy Use

Figure 35: Houston Residential Energy Demand vs City Administration and HISD

In The Beginning



Source: Summers, B. (2010). Presentation at the AEIC Annual Load Research Conference

Figure 33: Centerpoint Energy Residential Energy Use History

- The figure shows the steep rise in electricity demand between the 1950s and 1970s, which was largely a result of air conditioning.
- Since the 1970s customers in the Houston region consumed an average of more than 13,000 kwh/ year, worth of electricity, except for a few years in the 1980s.

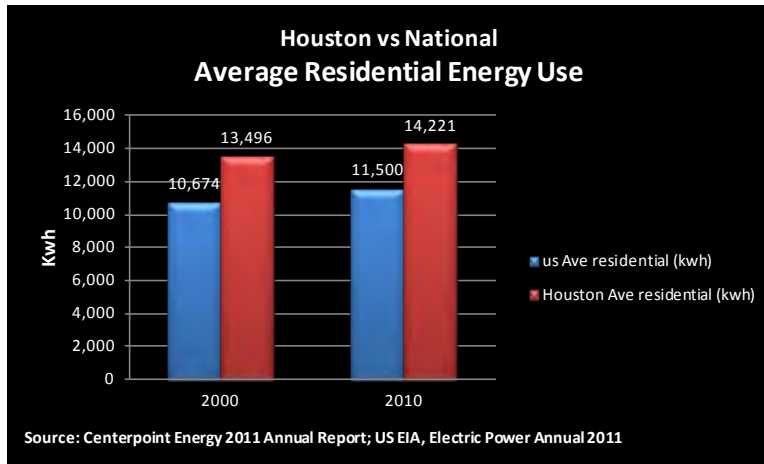


Figure 34: Houston vs National Ave Residential Energy Use

- The average household in the CenterPoint region, which includes Houston, consumes more electricity per year than the national average.
- Between 2000 and 2010 both the national average and the average Houston household increased electricity use by approximately 2,700 Kwh.

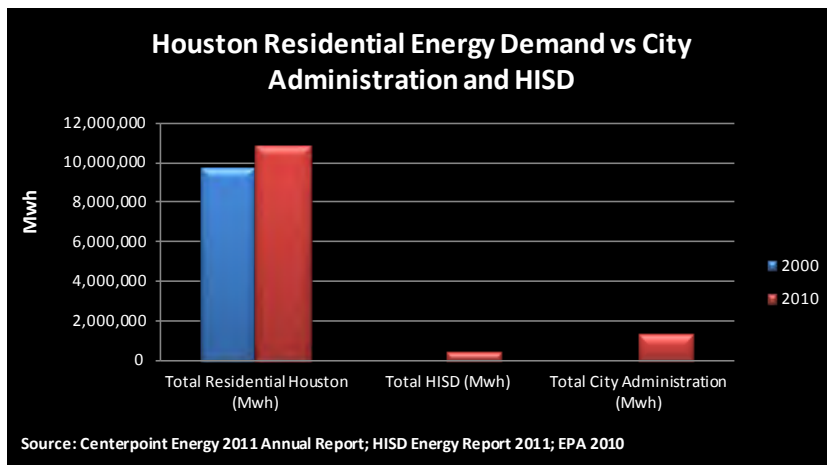


Figure 35: Houston Residential Energy Demand vs City Administration and HISD

- The total residential electricity demand in Houston was almost 11 million Mwh in 2010.
- A previous study by Edward Glaeser et.al. (2010) showed that the Houston metropolitan area generated 18.74 MWh of electricity in 2000 (Glaeser & Kahn, 2010). Using our estimate of 13,496 kwh per household and an estimated 1,462,665 households in the Houston MSA we get 19.74Mwh of electricity used by the Houston MSA.



- The total electricity consumption for City of Houston facilities was approximately 10% of the residential demand in 2010.
- HISD electricity consumption was approximately 4% of residential use in the City of Houston.

Theme - Transportation

Sub Theme - Access

Indicator - Access to Public Transportation

Dr. Martin Luther King, Jr. commented on the failure of public transit to overcome disparities in access to jobs among racial minorities. Several historical studies in the country have pointed to the need to connect central city residents with jobs using transit (Sanchez, 1999). **Access to Transit** in this study will be measured by Euclidean proximity to bus stops, however other accessibility measures such as frequency of bus routes; proximity to destinations; and congestion time also contribute to accessibility issues.

Sustainability Benefit: Houstonians have moderate access to transit stops that are within walking distance for most areas in the city.

Sustainability Issue: Houston has poor street connectivity and neighborhoods tend to be separated from places of work and school. As a result even though accessibility to bus stops is good, trip times are long.

The following metric, **Percentage of population and housing units close to transit stops** is used to measure the indicator *Access to Public Transportation*.

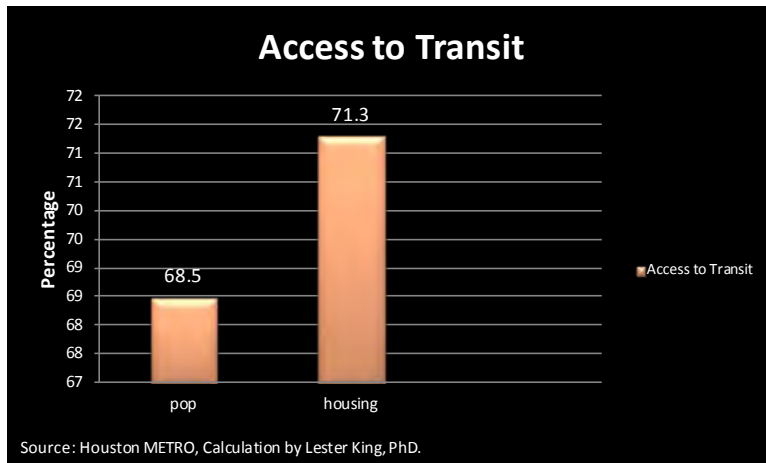


Figure 36: Percentage of population and housing units close to transit stops

- The percentage of population within a quarter mile from a bus stop was 68.5% in 2010.
- The percentage of housing units within a quarter mile of a bus stop was 71.3% in 2010.

Theme - Transportation

Sub Theme - Demand

Indicator - Vehicle Miles Traveled

Reducing the amount of **vehicle miles traveled** (VMT) is one method for curbing air pollution and traffic congestion. Population growth and economic development inhibit reductions in VMT (ICF International, 2011). Most contemporary urban planners agree that locating jobs and services close to homes would aid in reducing VMT numbers (Cervero & Duncan, 2006). In a representative sample of Harris County residents, 48% thought that traffic was the biggest problem in 2005, while in 1990 9% thought that traffic was the biggest problem (Klineberg, 2005). In 2007 the City of Houston reported the highest auto sales of any city in the country, with 379 auto dealers reporting \$9.4 billion dollars of sales (U.S. Census Bureau, 2011).

Sustainability Benefit: High VMT is an indicator of a robust economy.

Sustainability Issue: VMT per capita in Houston is projected to increase over time.

The following metric, **Figure 37: Annual VMT PerCapita**, is used to measure the indicator *Vehicle Miles Travelled*.

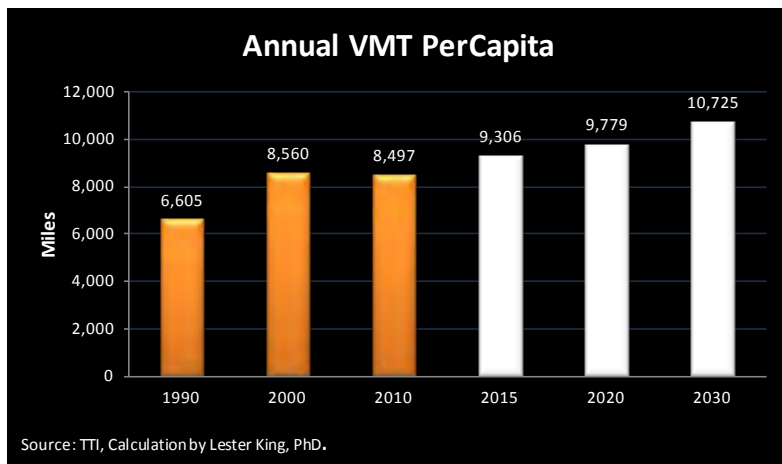


Figure 37: Annual VMT PerCapita

- The annual VMT per capita is projected to increase in Houston.
- Annual VMT per capita decreased slightly between 2000 and 2010. The 2000 VMT was 8,560 miles per person. The 2010 VMT was 8,497 miles per person.
- Annual VMT is expected to rise above 10,000 miles per person by 2030. This is greater than five times the distance between Houston and New York City (1,600 miles).

Theme - Transportation

Sub Theme - Mode

Indicator - Travel Choice

The private automobile has long been the preferred method of travel for most Houstonians (Klineberg, 2010). Is the percentage of persons traveling in private vehicle alone a sign of decreasing community standards; an indicator that population growth is occurring in areas not serviced by public transit; or an indicator that the current transit system, which relies heavily on buses is not efficient?

Sustainability Benefit: No benefit identified in Houston

Sustainability Issue: The percentage of persons travelling alone by private car is increasing in Houston.

The following metric, **Figure 38: Alternative Means of Travel**, is used to measure the indicator *Travel Choice*.

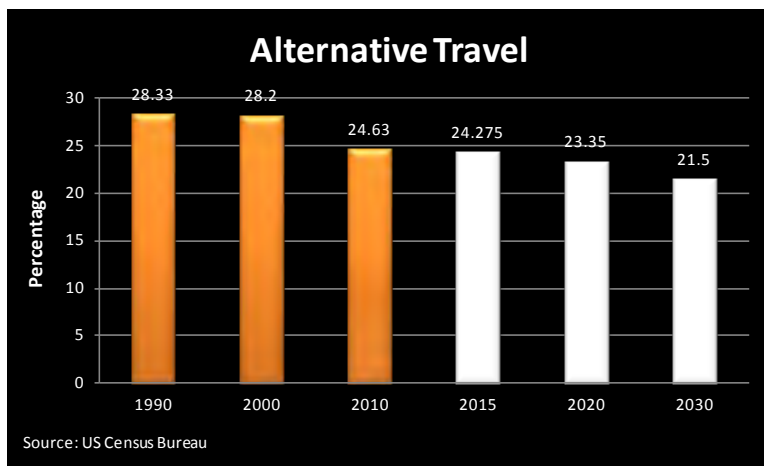


Figure 38: Alternative Means of Travel

- A higher percentage of people are traveling alone by private car in Houston.
- In 1990, 28% of persons did not travel alone by car. By 2010, that number was 25%.
- If the present trend continues, the number of persons not traveling alone will decrease to 21.5% by 2030.

Economic Development Policy Recommendations

THEME – Economic Development

Sub Theme – Employment: Indicator – Employment Status



- Need to match skills training from universities and colleges with demand from employers. **Collaboration** between universities, community colleges, school district, and major employers, with support from the city, is necessary. Develop apprenticeships programs.
- Utilize Science, Technology, Engineering, Math (**STEM**) training programs more effectively.

Sub Theme – Macroeconomic Performance: Indicator – Primary Jobs/Green Jobs



- **Develop alternative energy industry** to attract high end jobs in that sector.
- **Develop IT/ Advanced Technologies skills** and knowledge labor force.
- Need to improve quality of life to attract professionals and jobs (eg. Arts, eco-tourism, attractions).
- Need to foster and **grow Life Science and Bio-Technology industries** in Houston.

Sub Theme – Earnings: Indicator – Income



- Foster **development of energy trading** (Collaboration between Greater Houston Partnership, Banks, and Universities).
- Develop our opportunity to **increase international trade** based on large diversity.

THEME – Economic Development

Sub Theme – Waste Generation and Management: Indicator – Waste Generation



- Reporting **requirement for waste haulers to report sources of waste collected**.
- We need to be more conscious about **decreasing land fill space** to work towards a green and sustainable region.
- City of Houston needs to **expand the household recycling program to all households**. Charging a fee for regular stream waste disposal will offset the cost of this important program.

Sub Theme – Energy: Indicator – Energy Consumption



- We need to **utilize energy efficient building technology** such as smart energy meters.
- **Educate and Incentivize residents** on weatherization and energy conservation.
- Need to **develop real time pricing policy** since we have smart meter capability.
- Need **energy disclosure policies and required audits** for large users.

THEME – Economic Development

Sub Theme – Access: Indicator – Access to Transit



- **Transit service improvements** - Frequency, circulation services/linkages within strategic areas such as the job centers, and **travel time need to be improved** to circumvent congestion and long travel time.
- **Transit accessibility improvements** - Infrastructure such as ramps, sidewalks, bridges over ditches, and sufficient amount of shelters need to be addressed as part of a **complete trips package** to make public transportation safe, feasible, and desirable.
- **Transit coordination** - We need **coordination of public agencies** to plan for improving transit (METRO, Houston Planning Department, Houston Public Works, HGAC, HISD).
- **Transit Planning** - **Transit corridor ordinance has not been utilized effectively** in Houston.

Sub Theme – Demand: Indicator – Vehicle Miles Traveled (VMT)



- **Incentivize housing development near employment areas.**
- **Flex Work program is not being effectively promoted and utilized.**

Sub Theme – Mode: Indicator – Travel Choice



- The **pedestrian and bicycle network should be developed** to complement the bus and rail network as the rail network cannot be as effective without the other modes.
- **Develop technologies such as apps to coordinate transit options** such as bus, rail, and ride share programs.







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