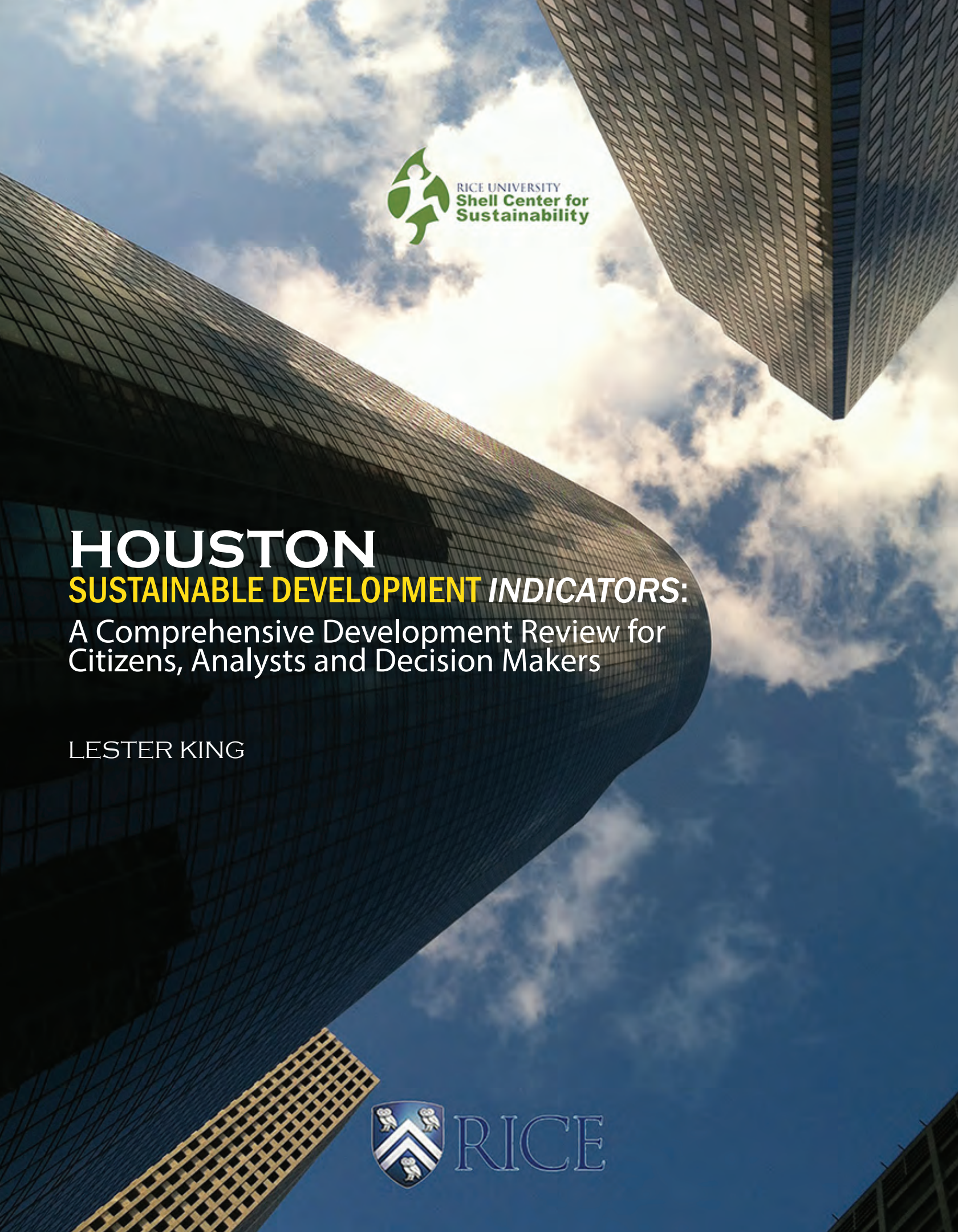

HOUSTON
SUSTAINABLE DEVELOPMENT *INDICATORS*:
A Comprehensive Development Review for Citizens, Analysts and Decision Makers

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Houston Sustainable Development Indicators:

A Comprehensive Development Review for Citizens, Analysts and Decision Makers

by

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Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author and do not necessarily reflect the views of the organizations or agencies that provided support for the project.

Additional copies of this report are available online at the Shell Center for Sustainability website. https://shellcenter.rice.edu. Call 713-348-2796 for further information.

Acknowledgements

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Dr. King is a researcher with the Shell Center for Sustainability. He specializes in sustainable development planning and the development of context sensitive solutions for urban development. He is a certified and skilled planner with experience in community development; master planning, transportation planning, and sustainability planning. He has experience developing consensus building techniques for public participation/ community involvement support for the identification and delineation of planning objectives; and facilitation of stakeholder meetings for federal, state, and municipal projects. He has conducted extensive research on developing sustainability indicators and contributed to several local, national and international efforts to develop sustainability planning systems.

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Dr. Anderson is the Academic Director for the Shell Center for Sustainability and the Maurice Ewing Professor of Oceanography in the Department of Earth Science at Rice University. John has conducted research on various aspects of Antarctic marine geology and coastal geology. He has participated in 24 scientific expeditions to Antarctica. The culmination of this research was published in "Antarctic Marine Geology" by Cambridge University Press. Anderson's other research has focused on the evolution of the northern Gulf of Mexico Basin and the response of coastal systems to global change. His most recent book is entitled "The Formation and Future of the Upper Texas Coast" and he recently co-edited a Geological Society of America Special Paper entitled "Response of Upper Gulf Coast Estuaries to Holocene Climate Change and Sea-Level Rise." He has published more than 200 peer-reviewed scientific papers.

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Lilibeth Andre is the Associate Director of the Shell Center for Sustainability at Rice University since 2007. She manages the research, outreach and education activities of the center working directly with faculty, students, and other organizations and institutions. Previously she was the Houston Bicycle-Pedestrian Coordinator where she oversaw public relations and engineering design of a $100M, 350-mile network, completing the first 15-year plan. She was Technical Communications Specialist for the Houston Airport System's Planning, Design and Construction Division, and managed the Houston Air Quality Program for the City of Houston, where she began her career in the Houston Recycling Division, in 1992.

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Dr. Ragsdale is the Dean of the School of Social Sciences, the Radoslav A. Tsanoff Chair in Public Affairs and Professor of Political Science at Rice University. She taught at the University of Arizona for nineteen years and moved to the University of Illinois at Chicago in 2001 serving as Political Science Department Head for five years. Lyn has been an editor of *Political Research Quarterly*, one of the main regional political science journals and the director of a survey research lab. She has published a variety of articles, books, and book chapters on the American presidency and American elections and is currently working on two books on these topics.

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Mr. Blackburn has been an attorney for more than 30 years. He is a partner in Blackburn Carter, P.C., and also a Professor in the Practice of Environmental Law in the Department of Civil and Environmental Engineering at Rice University. Jim serves as Director of the Interdisciplinary Minor in Energy and Water Sustainability at Rice and is a Faculty Associate for the SSPEED Center studying "Lessons Learned from Hurricane Ike". His current caseload includes litigation over the future of the whooping crane on the Texas Coast and opposition to permits needed to enable uranium mining in Goliad County. In 2004, Texas A&M press published his manuscript titled The Book of Texas Bays. In 2009, Blackburn co-authored a compilation of art and poems titled Birds: A Collection of Verse and Vision.

Stephen L. Klineberg, PhD

Dr. Klineberg joined Rice University's Sociology Department in 1972. The recipient of ten major teaching awards, including the George R. Brown Lifetime Award for Excellence in Teaching, he is a faculty associate and divisional advisor at Lovett College. In March 1982, he and his students initiated the annual Houston Area Survey, now in its 29th year of tracking the changes in the demographic patterns, life experiences, attitudes, and beliefs of Harris County residents. Co-author of *The Present of Things Future: Explorations of Time in Human Experience*, Dr. Klineberg has written numerous journal articles and research reports, and appears frequently on radio and television. He is also the founding Co-director of Rice University's "Institute for Urban Research."

Ron Soligo, PhD

Dr. Soligo is a professor emeritus of economics at Rice University and a Rice scholar at the James A. Baker III Institute for Public Policy. His research focuses on economic growth and development and energy economics. Soligo was awarded the 2001 Best Paper Prize from the International Association for Energy Economics for his co-authored paper with Kenneth B. Medlock III, "Economic Development and End-Use Energy Demand" (Energy Journal, April 2001). Other recently published articles include "State-Backed Financing in Oil and Gas Projects," with Amy Myers Jaffe in "Global Energy Governance: The New Rules of the Game," eds. Andreas Goldthau and Jan Martin Witte (Brookings Press, 2010); "Market Structure in the New Gas Economy: Is Cartelization Possible?" with Amy Myers Jaffe in "Natural Gas and Geopolitics: From 1970 to 2040" (Oxford University Press, 2006).

Executive Summary

In order for citizens, analysts and elected officials to successfully pursue the sustainable development of the City of Houston, a robust set of indicators are needed to identify those issues that are integral to sustainable development and measure progress toward managing those issues. Sustainable development indicators, by definition, are distinct from traditional performance metrics in that they are value laden with sustainability principles and themes and a growing sustainability knowledge base.

Sustainability principles and themes include: ensuring balance among the pillars of sustainability (social, economic and environmental awareness); comprehensiveness; reliability and validity, timeliness and sensitivity. The interconnectedness of the various systems of city development is also an important principle of sustainability. Many city departments today enhanced their erstwhile reporting instruments by including reference to sustainability and focusing on such accomplishments as energy savings. While energy savings is indeed important, it is but one factor in the comprehensive sustainable development of a place where people live and work. In fact, it can be stated that the pursuit of energy savings should be business as usual for efficient company, organization or city management and hence does not validate the need for sustainable development. Further, many companies that pursue energy savings do so for the monetary savings and not the environmental or social impact of energy production and consumption.

This document is intended to facilitate discussion and decision making for the sustainable development of the City of Houston. The City of Houston municipal boundary was used for most of the metrics in the study. Some indicators like *Air Pollution* or *Water Resources* are regionally generated and have regional impacts, however it is important to understand how the City of Houston is affected.

In general, cities are classified with their regions based on a hierarchal relationship with the city being the anchor and the suburb dependent. For example, people may live in the suburbs and work in the city or people in the suburb may have to pass through the city to get to other suburban destinations. The city and county interdependency on natural resources such as those mentioned in the preceding paragraph are also important, where resources are mined in the suburbs for use in the city. In this traditional scenario, classifying the suburbs as part of the city may be appropriate, since the suburb is simply an extension of the city. However, in the event that the suburbs become less dependent on the central city, with own major governance systems and local economy then it becomes prudent to ensure that characterization and performance of the city, exclusive of the suburb, is conducted. This is because analyses of the region would no longer properly represent the true nature of the city.

The data and cultural climate shows that the City of Houston is losing economic and social prominence in the region and hence regional analyses for many social and economic indicators may not be valid. For example, the 2010 Decennial Census shows that the Houston region, Harris County and the City of Houston are growing in population. However, at the city level and county level the White population cohort has been declining over the past 30 years in absolute numbers. An environmental indicator such as *Water Demand* also highlights a local versus regional issue. The City of Houston provides water to regional consumers and this is captured in state and national reports as the total amount of water

demand for the City of Houston. This becomes even more problematic when per capita estimates are generated for water use, since many published studies use the population in the City of Houston only, or population projections of the City of Houston based on regional growth estimates. Many public agencies utilize the regional growth forecast for the City of Houston, which was overestimated by at least 500,000 people for the 2010 estimate.

This document discusses several of the issues important for the sustainable development of Houston. It is organized by first outlining the big issues and topics relevant to the city by presenting them as Themes and Sub-Themes; then selecting indicators to define those themes; then identifying metrics to measure those indicators, and finally describing the metrics. Policy and programmatic recommendations to improve the indicators of sustainable development in Houston are included after each section. These recommendations are the result of three workshops convened on the campus of Rice University with experts and advocacy groups representing several different fields and agencies in Houston.

The study is primarily intended to assist citizens, staff analysts, and decision makers to understand the answer to the question, ***'How are we developing with regards to sustainability in Houston?'***

This document is a follow up to *Measuring City Sustainability: Project Houston* by Jim Blackburn (2010). That document, the first in this series published by the Shell Center for Sustainability, was based on a class review and selection of the most cited indicators of city sustainability in the country in 2010. The present document is an expansion of that work based on: allocation of Indicators according to the *Theme – Sub-theme* framework; systematic structure of indicators to achieve balance among the three pillars in sustainability; data collection for 1990, 2000, and 2010; data collection for indicators not measured in the previous study; and inclusion of methodological sheets for further study. The next document in this series will be a manuscript on neighborhood comparisons in Houston, the expected publication date is Spring 2013.

The following summary is a quick reference guide to data analyzed for each Sustainability Indicator in this report. Green icons indicate good trends towards sustainability. Amber icons indicate moderate trends towards sustainability and some intervention needed. Red icons indicate poor trends towards sustainability and major intervention needed.

1. Population Growth	**1.42% - per year population increase** Population in Houston is growing at an average annual rate of approximately 1.42%.
2. Education Attainment	**74.3% - Completion Rate** There continues to exist an attainment gap between the White Student cohort and other student groups, but in general all graduation rates have improved. However, the Houston Independent School District (HISD) graduation rate was only 74.3% in 2010.
3. Voter Participation	**7% - Voting** Only 7% of the population voted in the local election of 2011. This was the lowest participation rate in 14 years and reflects a decreasing trend in citizen participation.
4. Income Inequality	**13.51% - Ratio of top 20% to bottom 20%** Income inequality has reduced since 2000, but is still higher than in 1990. Between 1990, 2000 and 2010, income inequality changed from 13.01% to 16.76% to 13.51% respectively.
5. Poverty Rate	**23% - Below poverty level** The percentage of persons below poverty was 19% in 2000. This metric is increasing, which is not a sustainable trend. In 2010, 23% of the population was below the poverty level which accounts for 474,346 persons.
6. Health Coverage	**28% - Uninsured** Thirty one percent of persons are uninsured in Houston as of the 2010 Decennial census. In 2000, Harris County had 20% of people uninsured, which increased to 28% in 2010.

	**7. Affordability**	**30% - Spend more than 30% income on housing** Thirty percent of Houstonians spent more than 30% of their income on housing in 2010. This number was up from 20% in 2000. Since housing in Houston is cheaper than in other parts of the country, this problem may be a result of unemployment or underemployment.
	**8. Accessibility of Public Spaces**	**44% - Lives within ¼ mile to park** Forty four percent of the population lives within a quarter mile of a public park, which increased from 25% in 2000. This number needs to increase to support a livability agenda.
	**9. Food Deserts**	**36% - Lives in food desert** Thirty six percent of Houstonians live more than 1 mile from a grocery store or supermarket selling fresh fruit and vegetables. This percentage decreased from 56% in 2000.
	**10. Employment Status**	**10% - Unemployment rate** The unemployment rate in Houston increased from 7.5% in 2000 to 10% in 2010. For the White cohort it was 6.2% and for African Americans it was 16.5% in 2010. This points to gravely disproportionate hiring and/or employment stability being practiced in Houston.
	**11. Primary Jobs and Green Jobs**	**23% - Primary Jobs. Less than 7% green jobs** Medical jobs in Houston are increasing as an absolute percentage of total jobs while industrial jobs are decreasing as an absolute percentage of all jobs. Together, health sector and manufacturing jobs make up 23% of all jobs and are considered the primary jobs for Houston in this report. Less than 7% of all jobs in Houston are green jobs.
	**12. Income**	**$44,001 - Per capita income** Since per capita income in 2010 ($44,001), was a little below 2007 levels ($44,872), we can estimate that the crash in the economy in 2008 set us back approximately 3 years.

13. Waste Generation	**7 lbs/person/day - Waste generation** The total disposal tonnage for all counties in the Houston region dropped between 2000 and 2010. Additionally the disposal rate per person dropped from 9 to 7 lbs/person/day between those same years. It is not clear if this trend is the result of waste reduction, recycling or reuse practices.
14. Energy Consumption	**14,221 kwh - Per household/ year** Average residential energy consumption per household increased between 2000 and 2010 from 13,496 kwh to 14,221 kwh. This accounts for 11 million Mwh needed to power Houston homes in 2010. The city administration uses 10% of this energy and HISD uses 4%.
15. Access to Public Transportation	**68.5% - Live ¼ mile to transit stop** As of 2010, 68.5% of people in Houston live within a quarter of a mile to a bus stop.
16. Vehicle Miles Travelled	**8,497 miles/per capita/year - Driving** Per capita VMT is projected to increase in Houston. In 2000 8,560 miles was the average per person. In 2010 that average dropped to 8,497 miles per capita. However the average is expected to surpass 10,000 annual miles per person by 2030.
Travel Choice	**75% - Drove alone to work** A higher percentage of people in Houston were travelling alone in private cars in 2010 than in 2000. In 2000 28% of persons travelled to work alone in private cars. The number dropped to 25% in 2010.
17. Ambient concentrations of air pollutants	**Not in attainment for Ozone** Houston is managing regulated air pollutants under federal standards except for Ozone levels, which has consistently been higher than the federal standards.

18. Greenhouse Gas Emissions	**Harris County is 2nd Highest CO_2 emitting county in country** Harris County has reduced industrial CO_2 emissions between 2000 and 2008. However, CO_2 emissions from private vehicles are increasing and now constitute the largest source for CO_2 emissions in Harris county.
19. Water Pollution	**Meets Federal Standards for Drinking Water** The City of Houston publishes annual updates of drinking water quality to all residents and is currently meeting all federal regulations regarding water quality. However, emerging and unregulated contaminants are not accounted for concerning drinking quality and these constitute an unknown risk to consumers.
20. Water Use	**165 Gallons/person/day – Water consumption** Per capita municipal water use in Houston increased from 159 gallons per day in 2000 to 165 gallons per day in 2010. Unless this trend is reversed, water usage will increase disproportionally with population growth.
21. Water Availability	**1.8 Billion gallons/day - Access rights** The City of Houston owns access rights to a little less than half of the available water in the region. This was 1,264, 231 acre-feet in 2010. Although this availability was lower than in 2000, the Houston municipal water demand for 2010 was 389,082 acre-feet.
22. Flooding	**25% - Population in floodplain** One quarter of the city of Houston is at risk of flooding.
23. Land Cover Change	**46% - Land area is medium to low development** The highest increase in land cover between 2001 and 2006 was for medium intensity development. This was an increase from 150 square miles to 160 square miles. Medium intensity development accounts for the highest land coverage type in Houston and most commonly includes single family housing units

24. Jobs / Housing Balance

21% - Housing located ¼ mile from job centers

The percentage of jobs and housing close to job centers is increasing, which is good for agglomeration. However only 21% of housing units are located within a quarter mile of the business centers in 2010. This means that 78% of persons are commuting to work, and primarily travelling alone in private autos.

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