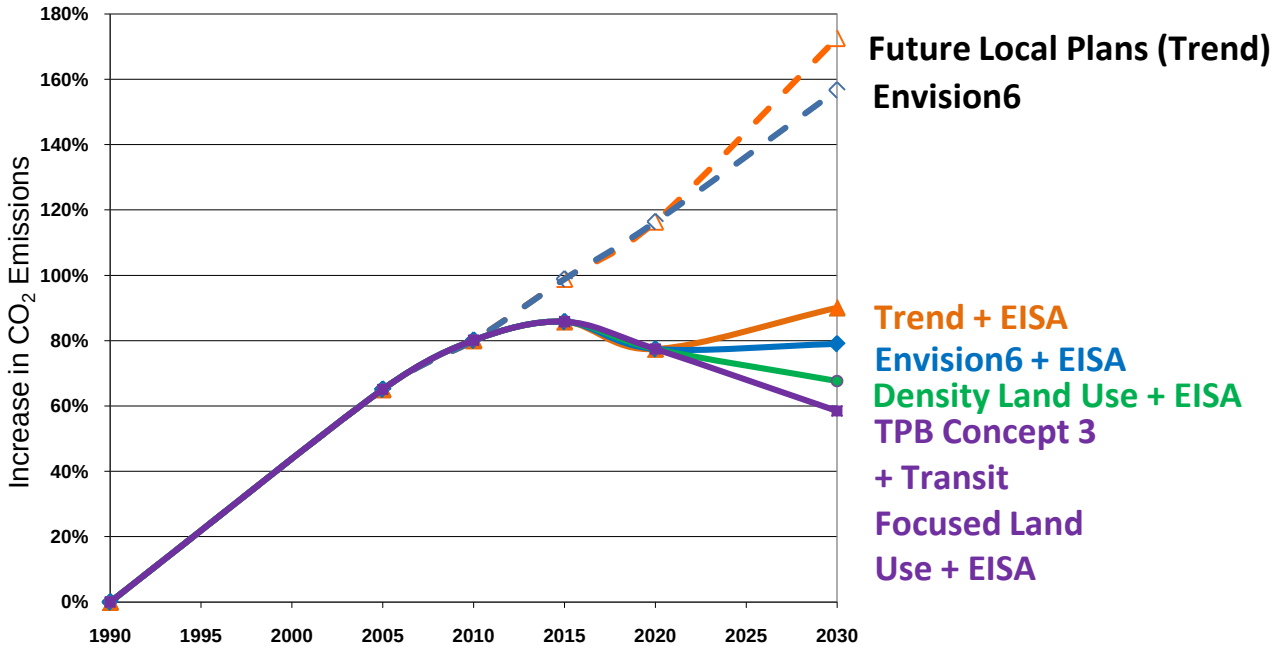
Appendix T-4: CO2 Emissions; Urban Heat Island and Relationship Between Fuel Costs and Travel

Estimating Future CO_2 Emissions

In an effort to better understand scenarios for future CO_2 emission ARC has assessed several packages of strategies including different land use patterns as well as the recent updated CAFE standard for fuel economy, called out in the Energy Independence and Security Act (EISA). These scenarios were analyzed to assess the impact of differing strategies on CO_2 emissions and compared to 1990 conditions. This information is presented in the context of the Regional Assessment to communicate the challenges ahead in addressing likely federal climate change legislation. The following scenarios were analyzed (results are shown in Figure 1 below):

1. Compilation of future local land use plans versus expected growth in the *Envision6* RTP
2. EISA mpg standard versus the current Atlanta mpg trend
3. Comparison of Future Local Plans, *Envision6*, Future Local Plans with EISA, and *Envision6* with EISA
4. *Envision6* versus Density Land Use
5. TPB Concept 3 plus transit/density focused land use. This scenario provided the biggest reduction in emissions, roughly 7% below 2005 levels.

Figure 1: CO2 Emissions Comparison under Varying Growth and Technology Scenarios



Source: ARC, 2009

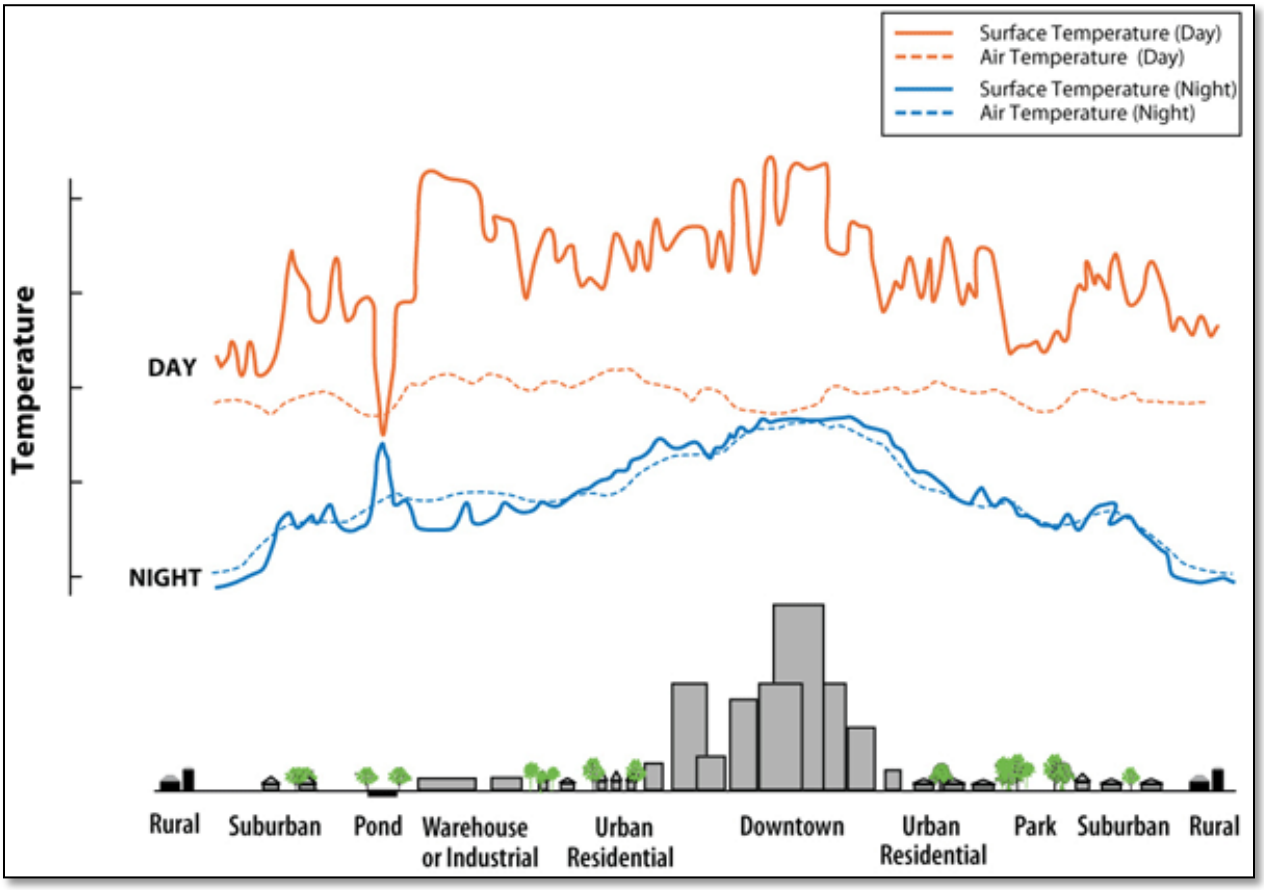
Regional land use policies focusing on significant expansion to the regional transit system results in the greatest benefit. However, these improvements result due to a significant cost and likely will take the longest to implement.

Regional Heat Islands Impacts on Air Quality

Atlanta's growth has affected the natural landscape. Roads, buildings, and other impervious surfaces have replaced open land and vegetation. These changes cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape.

Heat islands are metropolitan areas that are hotter than nearby rural areas. The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. In the evening, the difference can be as high as 22°F (12°C). Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality (US Environmental Protection Agency, 2009). As shown in Figure 2 heat island effect has an influence on the development of Ozone and its precursors.

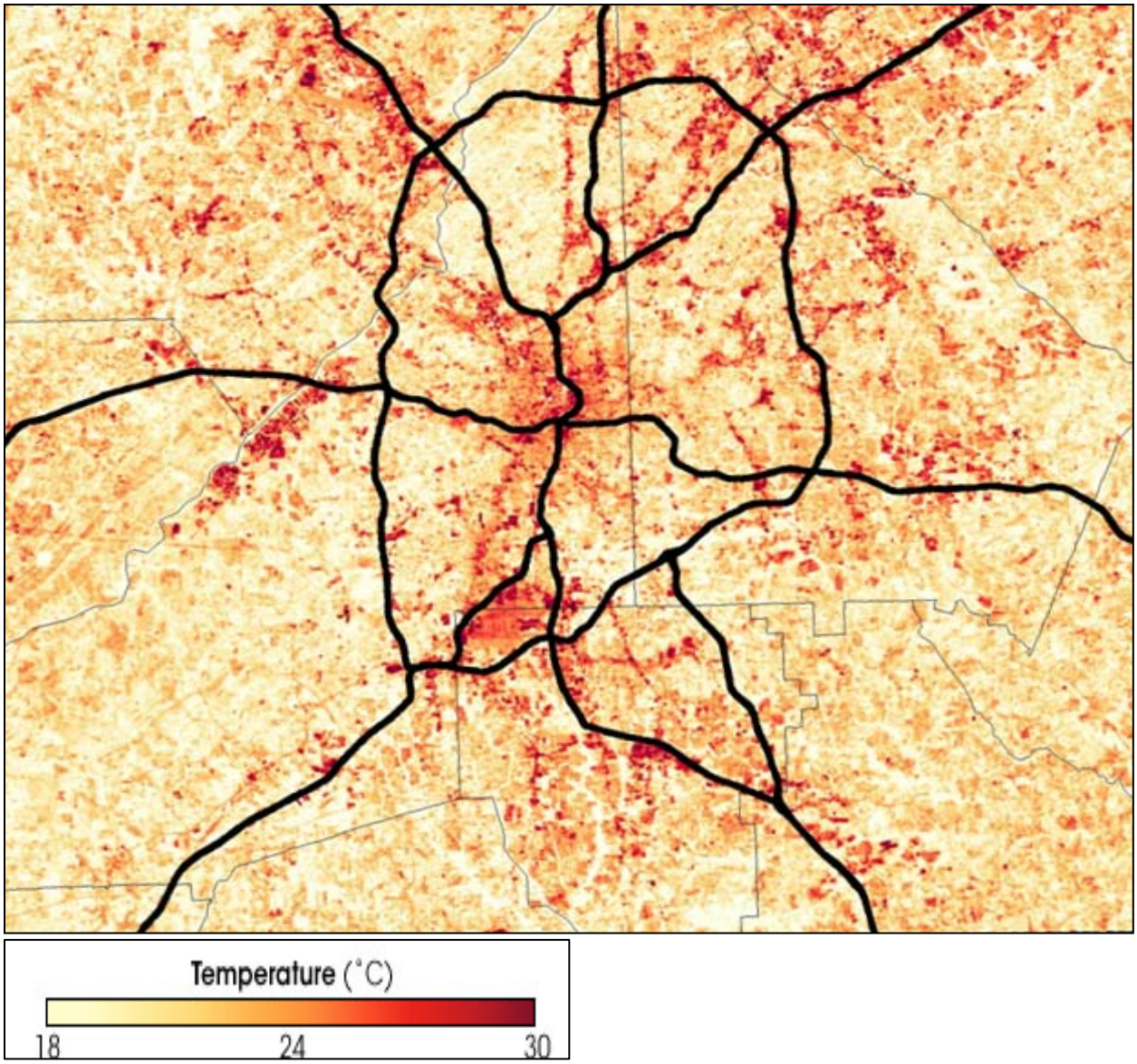
Figure 2: Variations of Surface and Atmospheric Temperatures



Source: ARC, 2009

Transportation and land use decisions have an impact on local surface temperatures. Figure 3 below demonstrates the degree to which major activity centers and transportation routes are warmer than other areas in the region.

Figure 3: Thermal Image of Surface Urban Heat Islands in the Atlanta Region



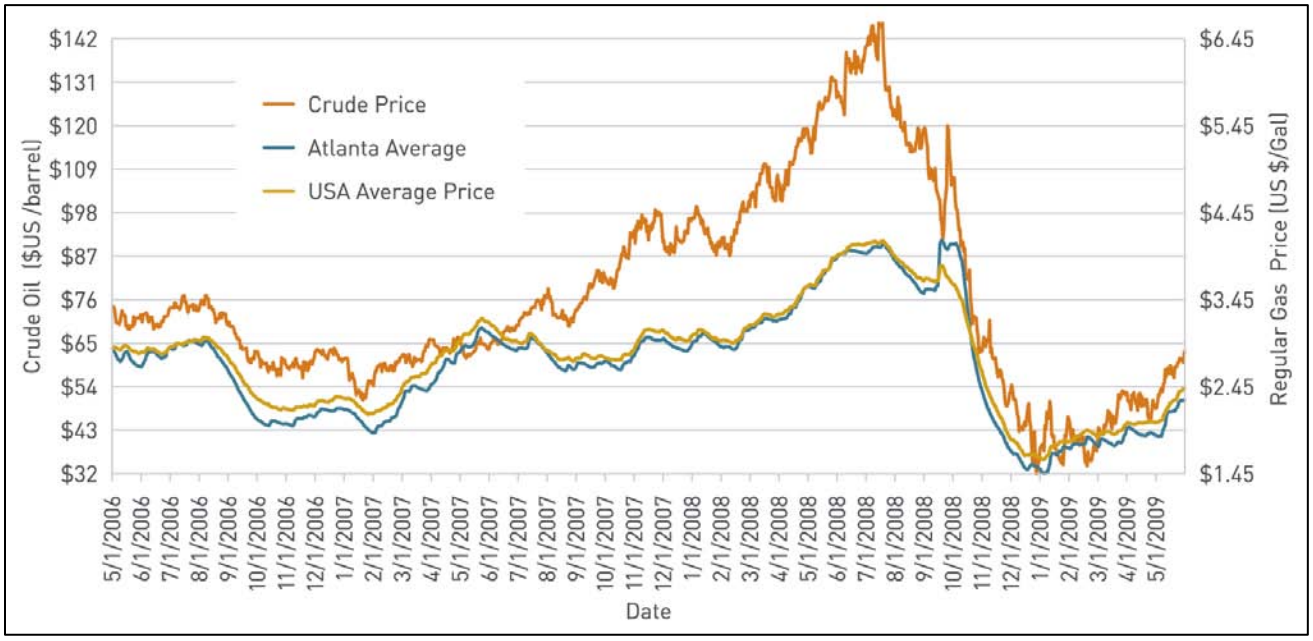
Source: ARC, 2009

Relationship between Motor Fuel Costs and Vehicular Travel

Understanding the relationship between regional vehicular travel and motor fuel costs is important in the context of the assessing the long-term issues facing travel in the Atlanta region. As future energy prices are expected to continue to be volatile, it is likely that the recent cost swings in gasoline prices may impact the types of travel options that are demanded.

The figure below illustrates the gas price fluctuations from 2006 to present, comparing the overall USA average to the Atlanta average. Typically, VMT trends dissociate with fluctuations in gas prices. As Figure 4 shows gas prices increase, VMT typically decreases.

Figure 4: 36-month Average Retail Gas/Crude Oil Price

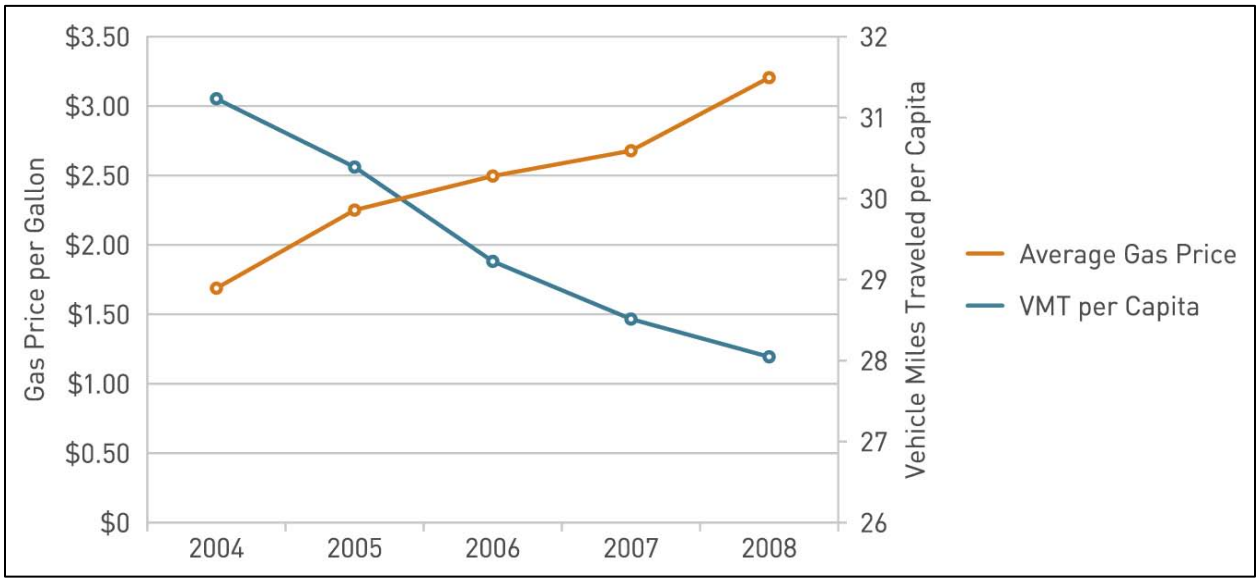


Source: GasBuddy.com

While the previous graph displays gas price per gallon fluctuations per month, VMT data is not available per month. Figures 5 and 6 below compare VMT per capita trends by year to the yearly trends of average gas price per gallon and transit ridership.

- As gas price per gallon increases, VMT per capita decreases.
- As gas price per gallon increases, transit ridership increases.
- Therefore, as gas price per gallon increases and more people find less costly commuting options, such as transit, VMT per capita decreases.

Figure 5: VMT per Capita vs. Average Gas Price



Source: GasBuddy.com; GDOT 445 Series Report; U.S. Census Bureau Population Division

Figure 6: Transit Ridership vs. Average Gas Price

Source: GasBuddy.com; Regional Major Transit Providers