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ARC's Planning Work on Climate Change

ARC/FHWA Climate Resilience Peer Exchange

October 4, 2016

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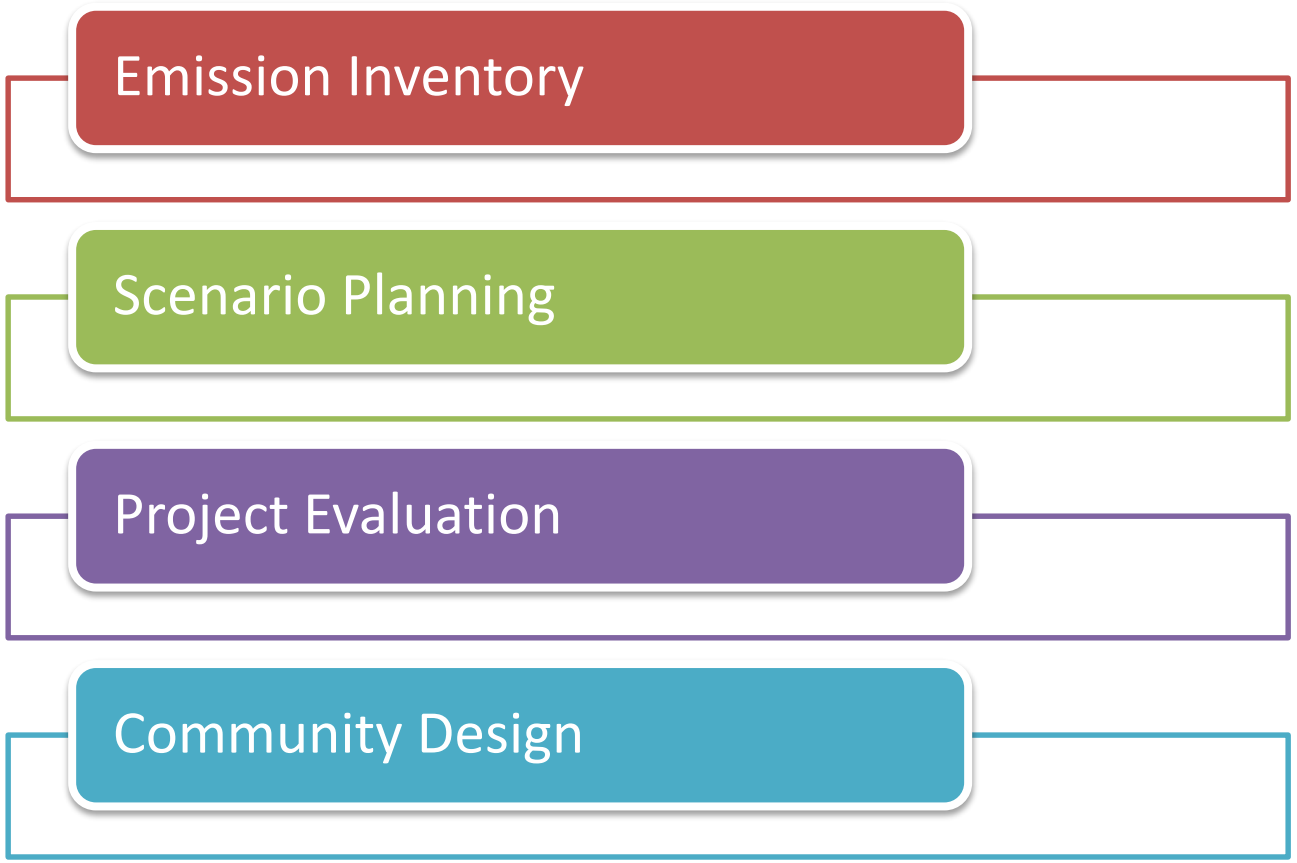
Outline

- ARC's Past Work on Climate Change
- Expected Future Climate Stressors

Past Climate Change Work at ARC



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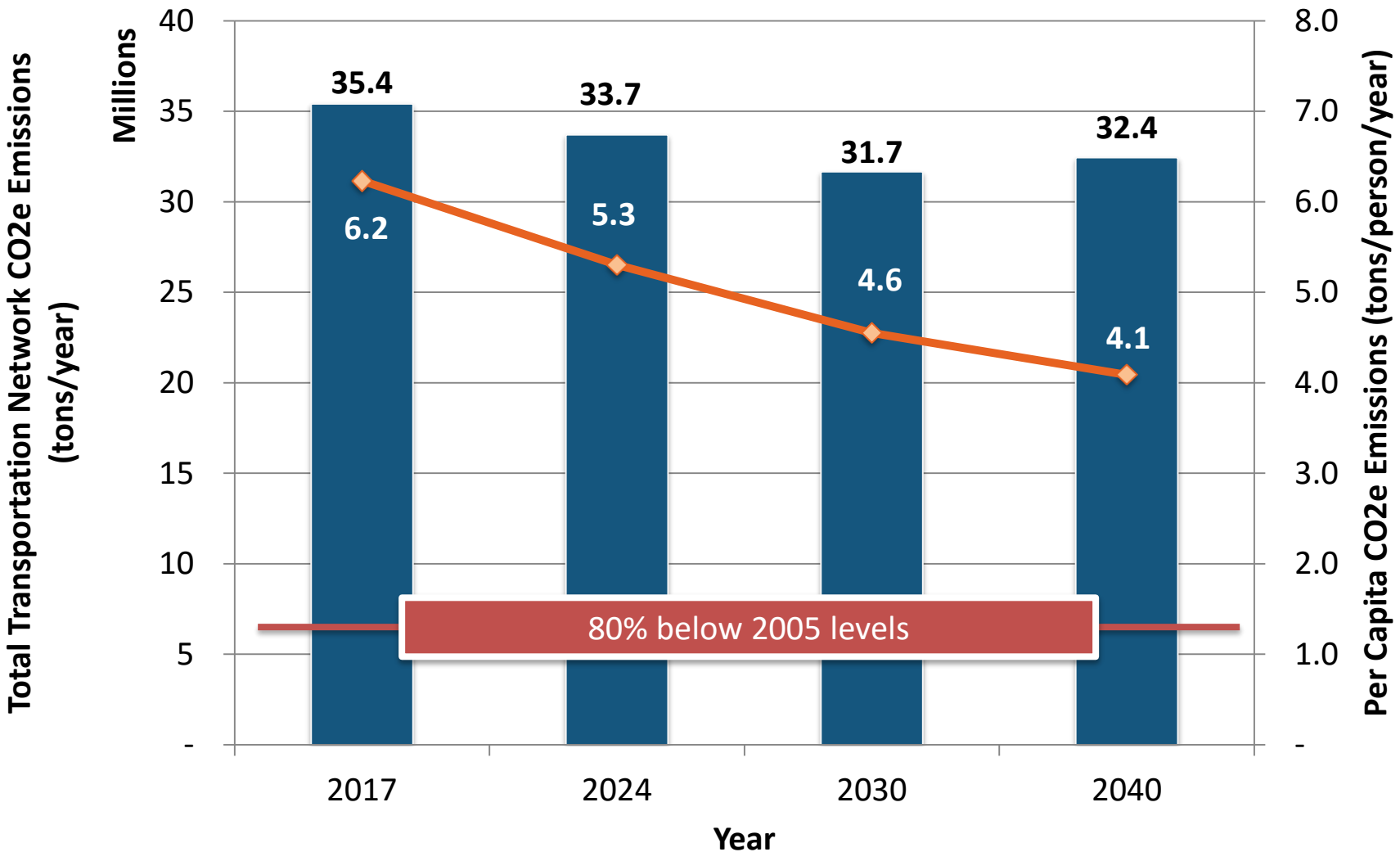
Past Climate Change Work at ARC



Emission Inventory – Scenario Planning – Project Evaluation – Community Design

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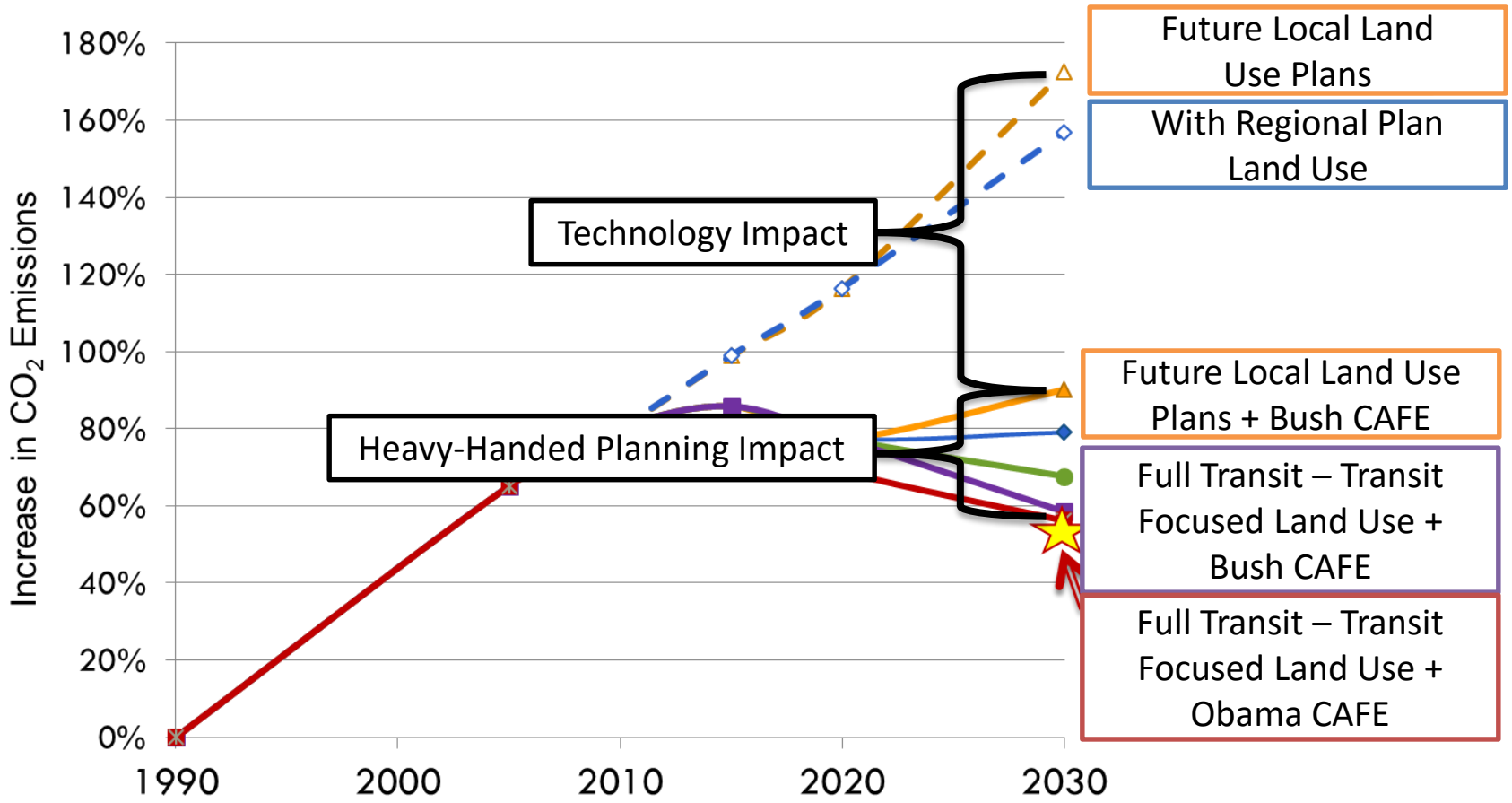
Past Climate Change Work at ARC



2009 Taking the Temperature White Paper
http://www.atlantaregional.com/climatechange

Emission Inventory – **Scenario Planning** – Project Evaluation – Community Design

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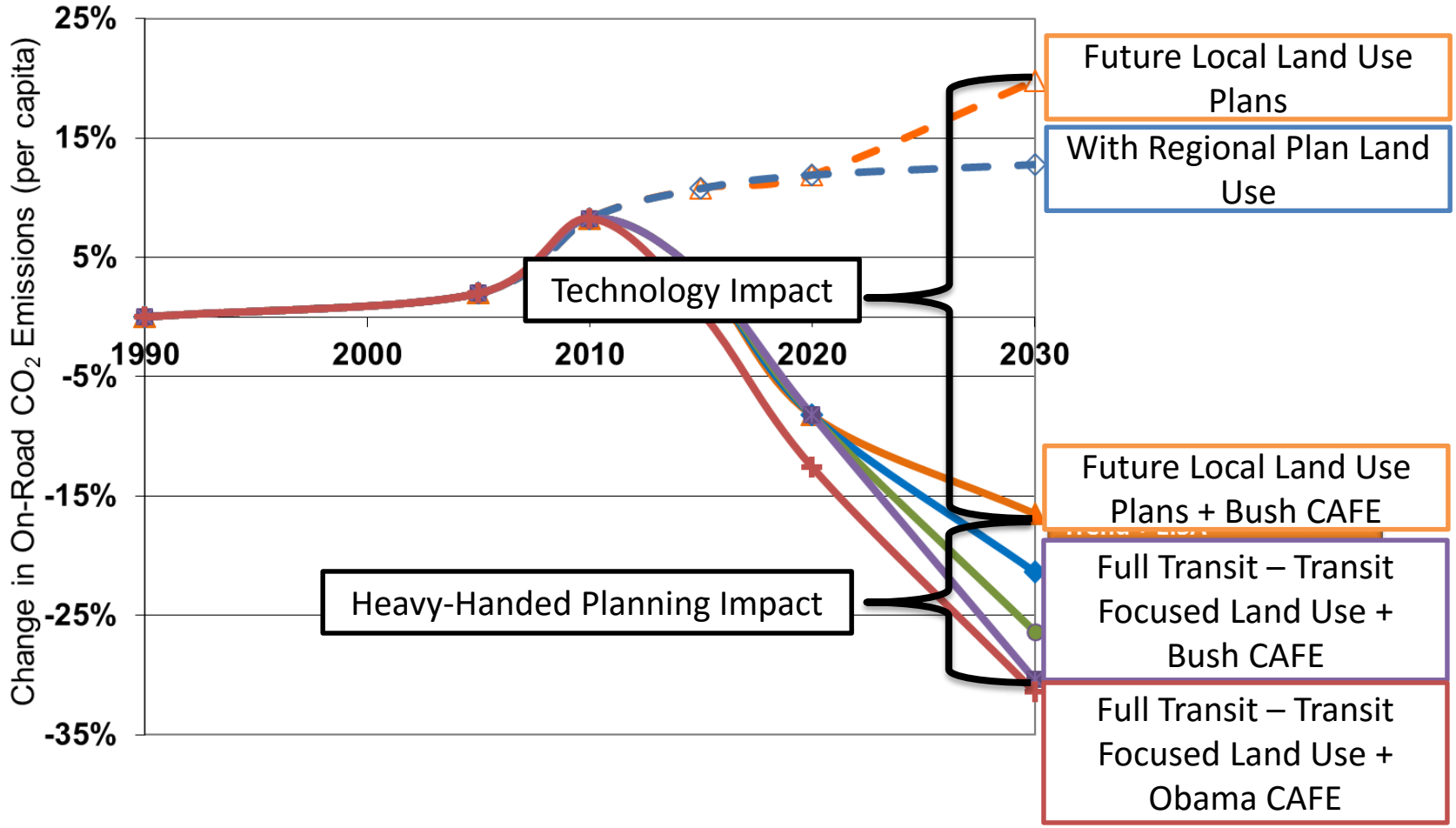
Past Climate Change Work at ARC



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Past Climate Change Work at ARC

Price Carbon and Incorporate into Project B/C

Produce CO_2 Emissions as Part of CMAQ Project Selection

Pursue Programs/Policies to Reduce Vehicle Trips & Encourage Sustainable Development

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Emission Inventory – Scenario Planning – **Project Evaluation** – Community Design

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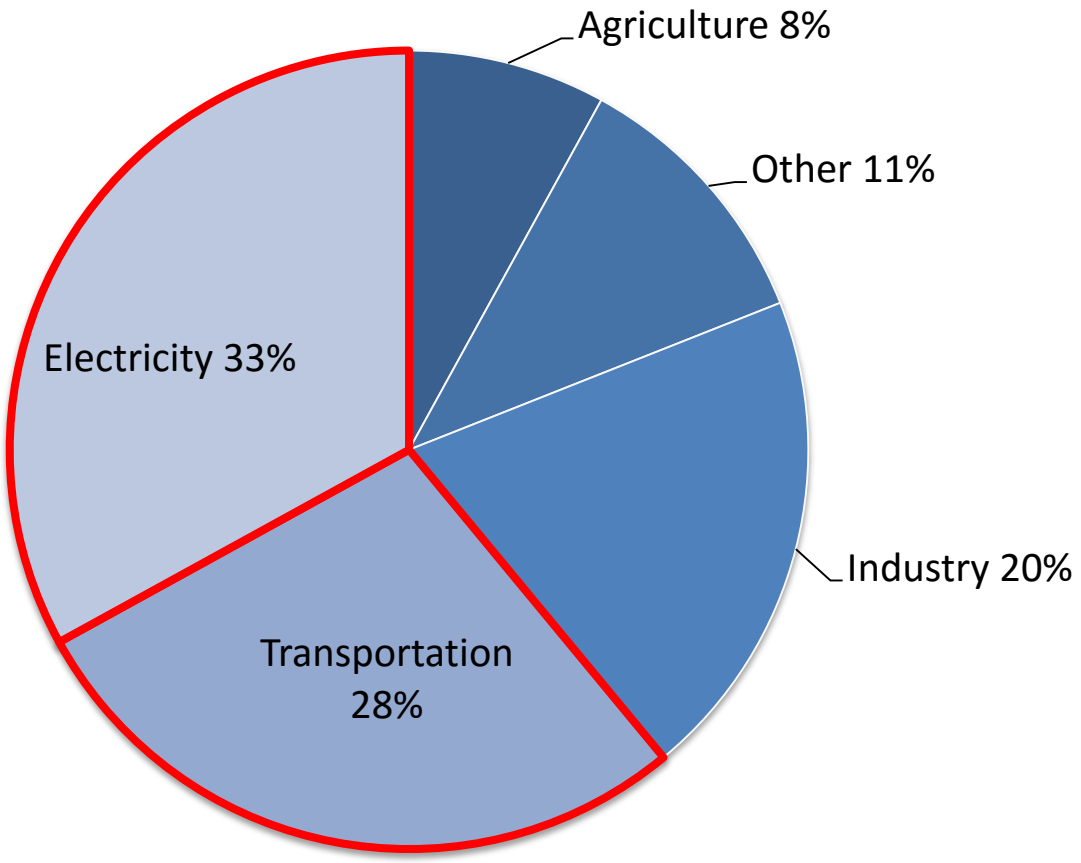
Transportation & Household Electricity Account for 61% of US GHG Emissions



Source: US EPA

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Recent Research…
Understanding Neighborhood Level Emissions

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Goals:

- Continue previous ARC work in transportation and emissions modeling to establish a neighborhood level inventory of CO_2 emissions
- Understand potential policies and programs that impact CO_2 emissions

Emission Inventory – Scenario Planning – Project Evaluation – **Community Design**

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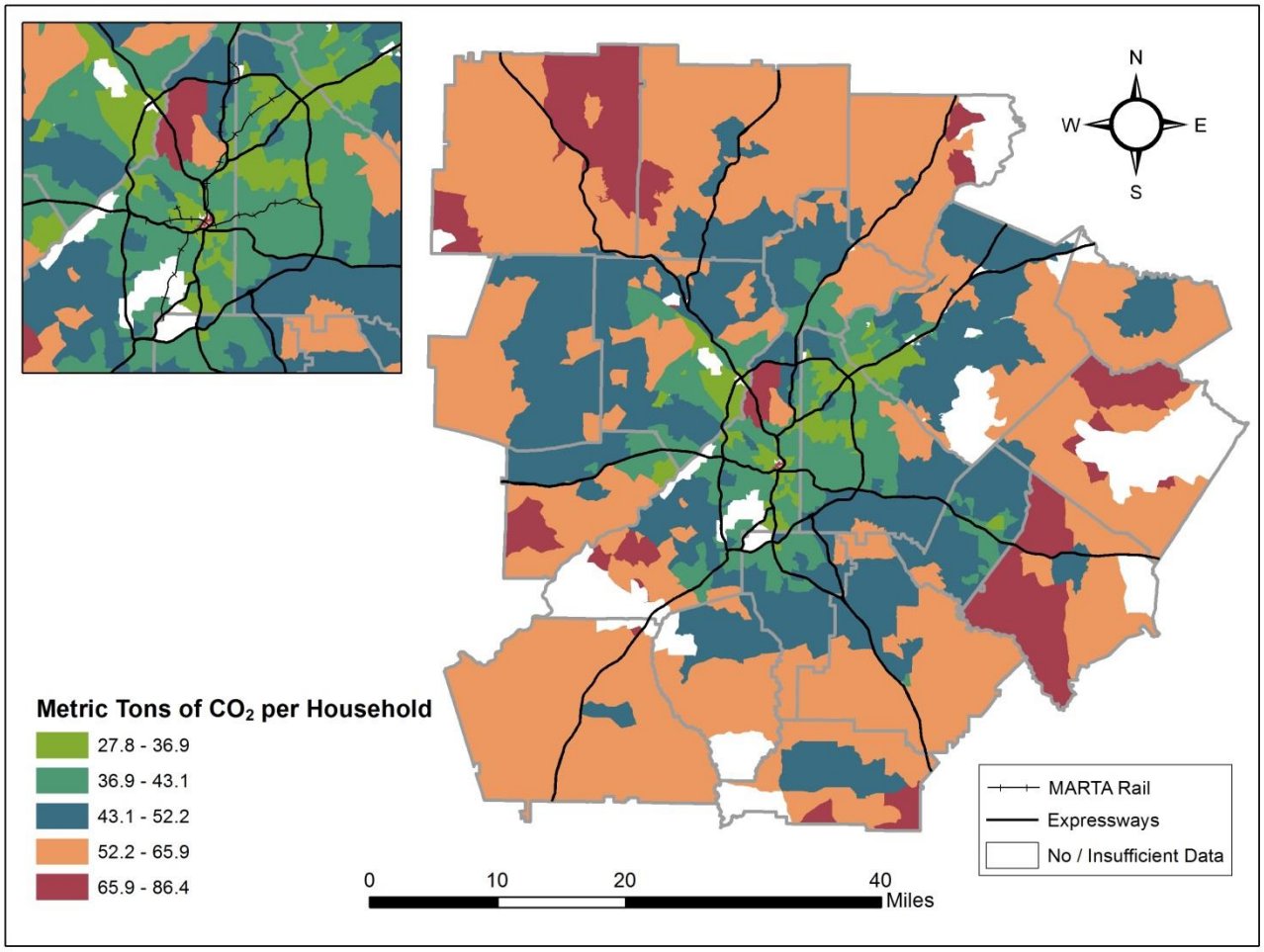
Impact of Community Design on Greenhouse Gas Emissions



Total CO_2 Emissions per Household

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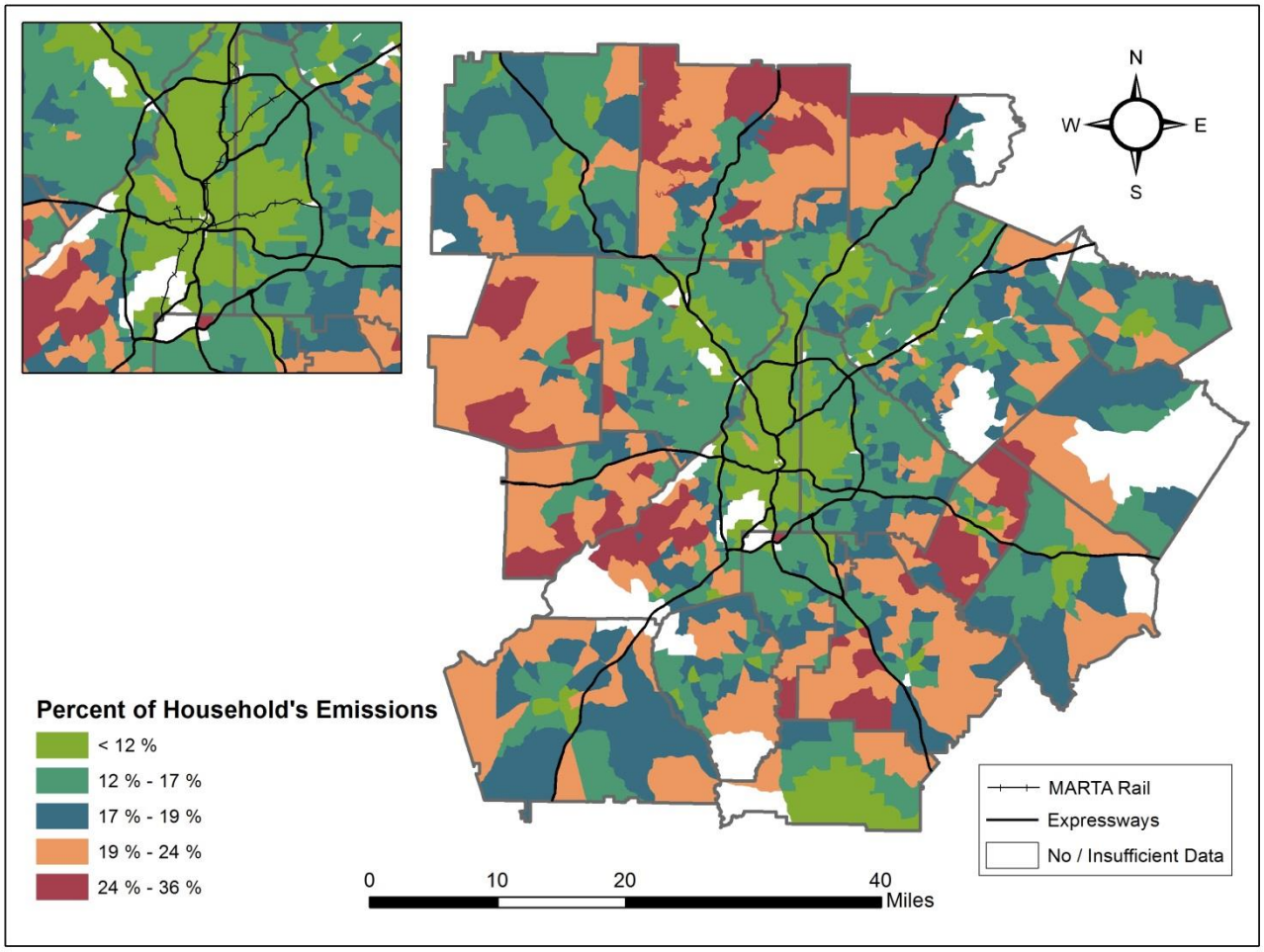
Impact of Community Design on Greenhouse Gas Emissions



Percent of CO_2 Emissions from Transportation

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Impact of Community Design on Greenhouse Gas Emissions

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- Multimodal accessibility
- Transit share
- Distance to regional activity centers
- Population density
- Neighborhood walkability

Transportation Indicators

Residential Indicators

- Presence of multifamily housing
- Size of the residences
- Density of housing
- Number of people per household

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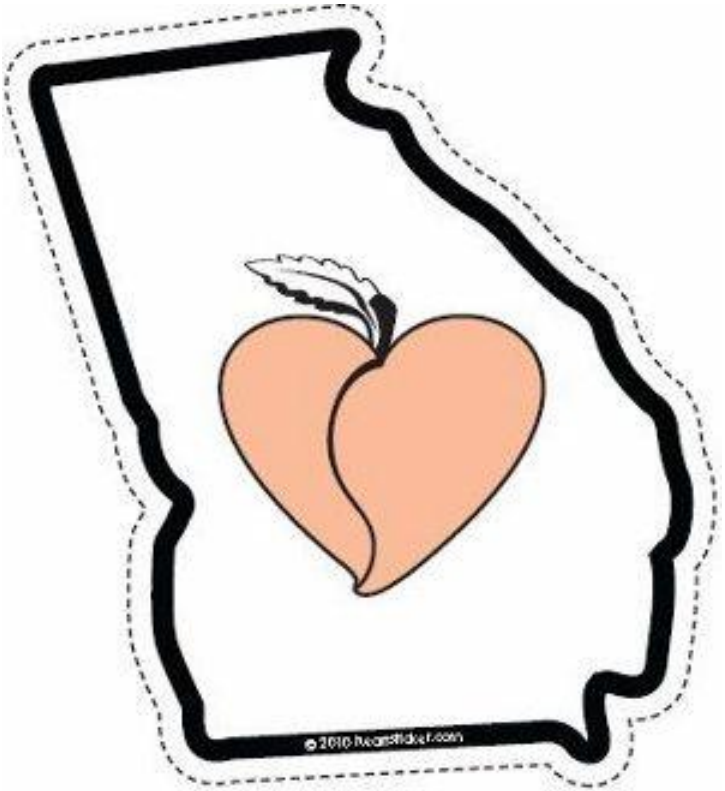
What We've Learned to Date at ARC

- Technology drives emissions
- Planning has a small – but important role to play
- Good community design can reduce emissions without asking people to change behavior



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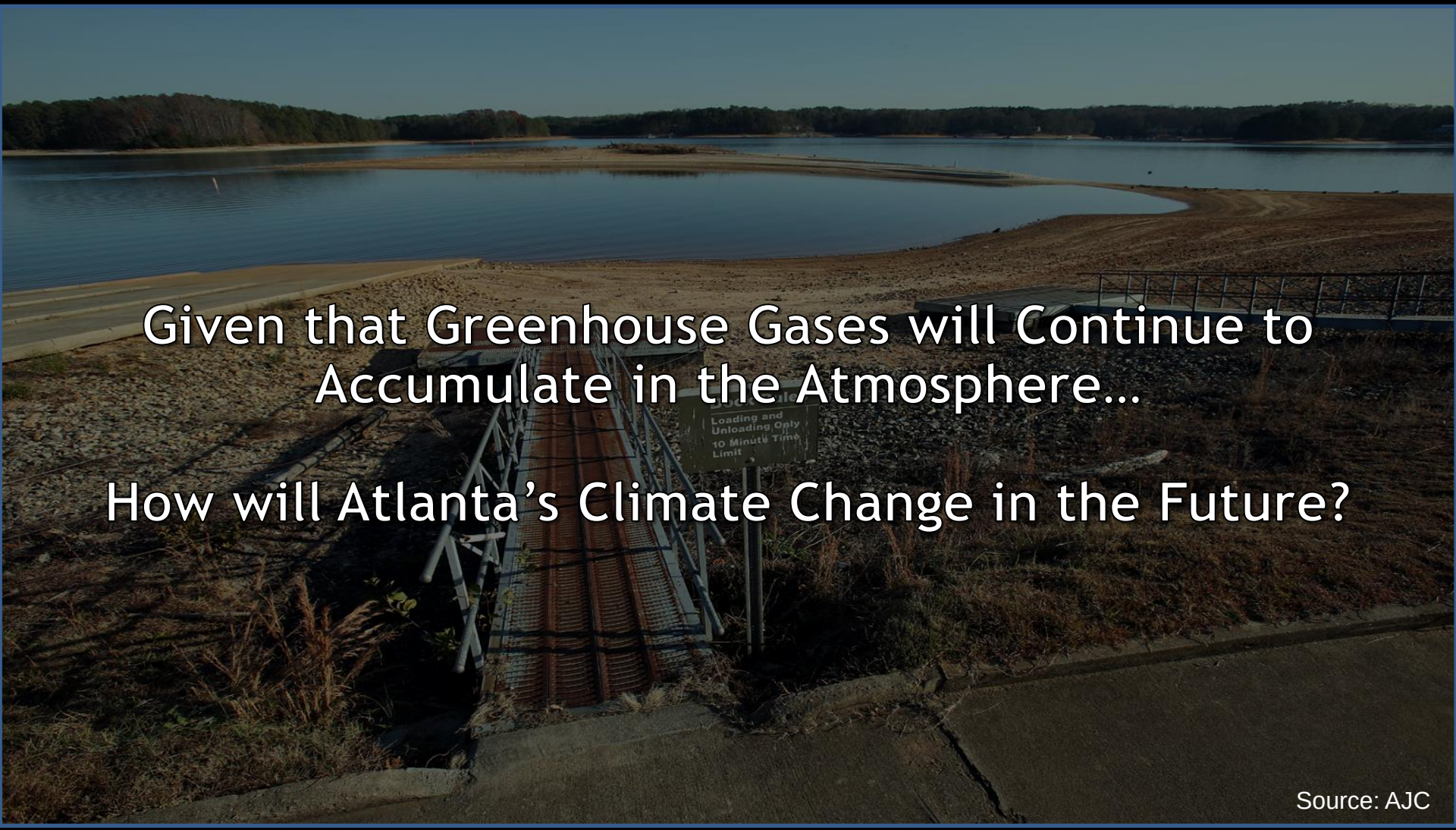


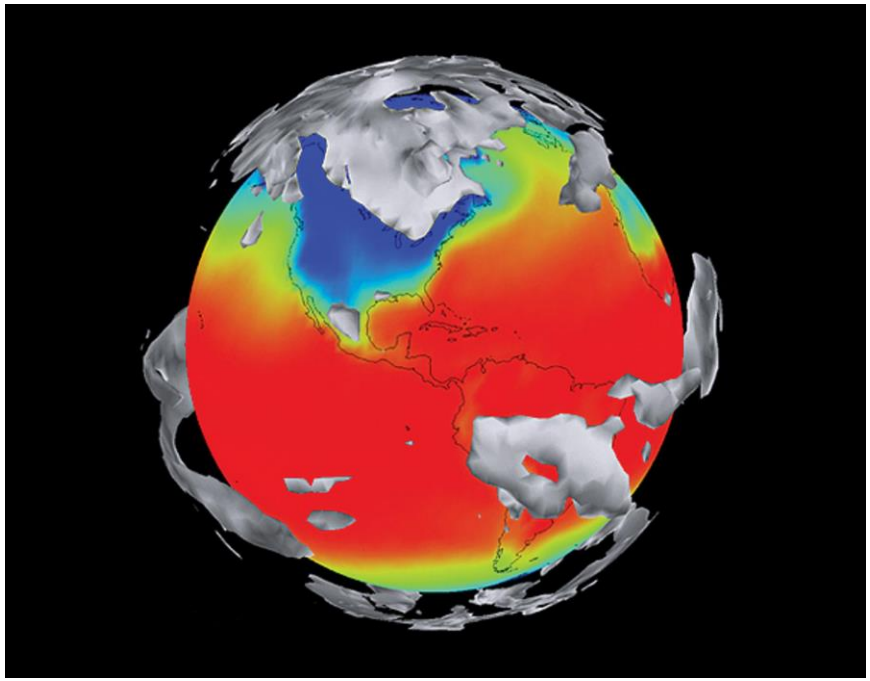
Given that Greenhouse Gases will Continue to Accumulate in the Atmosphere…

How will Atlanta's Climate Change in the Future?

Source: AJC

Coupled Model Intercomparison Project (CMIP5)

- Models help us understand changes in temperature and precipitation
- Methodology and summary tool developed by USDOT for climate resilience planning
- Downscales global climate models to local geography
- Analyzed 3 time periods
  - Early-Mid Century (2020-2050)
  - Mid-Century (2040-2070)
  - End-Century (2070-2100)



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Global Emission Scenarios

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Scenario Name	Description	Concentration of CO_2 in 2100*	Global Surface Temperature Change by 2100	
Low	Substantial Emission Reduction	475 ppm	0.5 – 3 °F (0.3 - 1.7 °C)	
Med-Low	Stabilization – Low	630 ppm	2 – 5 °F (1.1 - 2.6 °C)	← **"1.5°C to Stay Alive"**
Med-High	Stabilization – High	800 ppm	2.5 – 5.5 °F (1.4 - 3.1 °C)	← **Paris Climate Agreement**
High	Current Trend	1313 ppm	4.7 – 8.6 °F (2.6 - 4.8 °C)	← **trend**

* Current global CO_2 concentrations are around 404 ppm

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What do Climate Models Say about Future Temperatures in the Atlanta Region?

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Timeline	Days Above 92 °F	Consecutive Days above 92 °F
Baseline – Historic	18	7
2020-2050	51	19
2040-2070	64	31
2070-2099	84	50

Factoids - Warmth

- In the 2010s Atlanta's seen an average of 40.4 days/year above 92°F (69 days in 2016 alone)
- 2007 GA Drought saw August with 28 days above 90°F
- By the end of the century our summer climate could be more like Houston, TX

Timeline	5th Percentile Temperature	Avg. Number of Days Below Freezing
Baseline – Historic	24°F	61
2020-2050	25°F	49
2040-2070	26°F	43
2070-2099	29°F	33

Factoids - Cold

- Less extreme cold will impact the plants that grow in our region - Atlanta region's hardiness zone has increased by 1 since 1990 (from 7 to 8)
- Days per year with a freeze will drop by half by the end of the century to around 33 (similar to Tallahassee, Florida)

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What do Climate Models Say about Future Precipitation in the Atlanta Region?

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Timeline	Avg. Total Annual Precipitation	Very Heavy Precipitation Events per Year
Baseline – Historic	52”	10.6
2020-2050	54”	11.9
2040-2070	54”	11.9
2070-2099	54”	12.1

Factoids - Precipitation

- In general, all emission pathways think our region will tend to be wetter
- More large winter rainfall storm totals (1.5 times baseline)
- 10-20% more very heavy precipitation events annually
- About 50% more extreme precipitation events annually

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What We Hope to Learn

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- How do we prepare our communities and infrastructure for future weather conditions?
- How do we incorporate best practices in climate resilience into ARC's planning process?
- What sort of investments in infrastructure are necessary today to ensure their operation in tomorrow's climate?

Road Conditions during the 2014 snow storm
Red triangles indicate all lanes blocked

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