

# Appendix A: RapidFire Inputs and Outputs Catalog

## RapidFire Model Output Metrics and Input Assumptions

### Summary of Output Metrics

<p><i>Land Consumption</i></p> <ul style="list-style-type: none"> <li>Land Consumed (square miles)</li> </ul>	<p><i>Fiscal Impacts</i></p> <ul style="list-style-type: none"> <li>Capital Costs for local infrastructure to serve new development (\$)</li> <li>Operations and Maintenance Costs to provide ongoing services for new development (\$)</li> <li>Revenues associated with new residential and commercial development (\$)</li> </ul>
<p><i>Transportation System Impacts and Emissions</i></p> <ul style="list-style-type: none"> <li>Vehicle Miles Traveled (VMT) (miles)</li> <li>Fuel Consumed (gal)</li> <li>Fuel Cost (\$)</li> <li>Transportation Electricity Consumed* (kWh)</li> <li>Transportation Electricity Cost* (\$)</li> <li>Transportation Electricity CO<sub>2</sub>e Emissions* (MMT)</li> <li>ICE Fuel Combustion CO<sub>2</sub>e Emissions (MMT)</li> <li>ICE Full Fuel Lifecycle CO<sub>2</sub>e Emissions* (MMT)</li> <li>Criteria Pollutant Emissions (tons)</li> </ul> <p><i>Public Health Impacts Related to Transportation Emissions</i></p> <ul style="list-style-type: none"> <li>Respiratory and Cardiovascular Health Incidences (#)</li> <li>Health Costs associated with Health Incidences (\$)</li> </ul>	<p><i>Building Energy, Cost, and Emissions</i></p> <ul style="list-style-type: none"> <li>Residential Energy Consumed (Btu)</li> <li>Commercial Energy Consumed (Btu)</li> <li>Total Energy Consumed (Btu)</li> <li>Residential Building CO<sub>2</sub>e Emissions (MMT)</li> <li>Commercial Building CO<sub>2</sub>e Emissions (MMT)</li> <li>Residential Energy Cost (\$)</li> <li>Building Water Use, Cost, and Emissions</li> <li>Water Consumed (AF)</li> <li>Water Cost (\$)</li> </ul>

### Summary of Input Assumptions

<p><i>Demographics</i></p> <ul style="list-style-type: none"> <li>Baseline population and population growth</li> <li>Baseline households and household growth</li> <li>Baseline housing units and housing unit growth</li> <li>Baseline non-farm jobs and job growth</li> </ul>	<p><i>Scenarios</i></p> <ul style="list-style-type: none"> <li>Place type proportions for each scenario and time period</li> <li>Housing unit composition for each place type</li> </ul>
<p><i>Fiscal Impacts</i></p> <ul style="list-style-type: none"> <li>Per-unit capital cost assumptions to provide local roads, sewer, and water facilities for new development, by building type and place type</li> <li>Per-unit operations and maintenance cost assumptions to provide ongoing services to new development, by building type and place type</li> </ul>	<p><i>Land Consumption</i></p> <ul style="list-style-type: none"> <li>Percent greenfield vs. infill/greyfield/brownfield growth for each place type and scenario</li> <li>Residential and employment densities by building type, place type, and scenario</li> </ul>

## Summary of Input Assumptions [continued]

<p><i>Vehicle Miles Traveled (VMT)</i></p> <ul style="list-style-type: none"> <li>• Baseline Per Capita Light Duty Vehicle (LDV) VMT</li> <li>• VMT adjustment factors by place type and scenario for growth increment population</li> <li>• VMT escalation and deceleration rates for the baseline environment population</li> <li>• Elasticity of VMT with respect to driving costs per mile*</li> </ul>	<p><i>Vehicle Fuel Economy and Cost</i></p> <ul style="list-style-type: none"> <li>• Baseline fuel economy for total fleet, internal combustion engine vehicles alone*, and alternative/electric vehicles alone*</li> <li>• Fuel economy in horizon years for total fleet, internal combustion engine vehicles alone*, and alternative/electric vehicles alone*</li> <li>• Elasticity of fuel economy with respect to fuel cost*</li> </ul>
<p><i>Transportation Emissions</i></p> <ul style="list-style-type: none"> <li>• Baseline fuel emissions, combustion (tank-to-wheel) for total fleet, internal combustion engine vehicles alone*, and alternative/electric vehicles alone*</li> <li>• Baseline fuel emissions, full lifecycle (well-to-wheel)* for total fleet, internal combustion engine vehicles alone, and alternative/electric vehicles alone</li> <li>• Percent gasoline vs. diesel in liquid fuel mix*</li> <li>• Composition of gasoline and diesel fuel mix*</li> <li>• Criteria pollutant emissions per mile traveled</li> </ul>	<p><i>Public Health Impacts Related to Transportation Emissions</i></p> <ul style="list-style-type: none"> <li>• Health incidences per ton of pollutant</li> <li>• Health costs per ton of pollutant</li> </ul> <p><i>Building Energy Emissions</i></p> <ul style="list-style-type: none"> <li>• Electricity generation emissions (lbs/kWh)</li> <li>• Natural gas combustion emissions (lbs/therm)</li> <li>• Electricity generation emissions in horizon years (lbs/kWh)</li> <li>• Natural gas combustion emissions in horizon years (lbs/therm)</li> </ul>
<p><i>Residential Building Energy Use &amp; Price</i></p> <ul style="list-style-type: none"> <li>• Baseline average annual energy use per unit for base/existing population</li> <li>• Annual energy use by building type</li> <li>• New efficiency factor for new units of the growth increment</li> <li>• Upgrade efficiency factor for base/existing housing stock</li> <li>• Baseline residential electricity and natural gas prices</li> <li>• Residential electricity and natural gas prices in horizon years</li> <li>• Residential gas price in horizon years</li> </ul>	<p><i>Commercial Building Energy Use &amp; Price</i></p> <ul style="list-style-type: none"> <li>• Non-farm job proportion by floorspace-type category</li> <li>• Floorspace per employee by category for each place type</li> <li>• Baseline average annual energy use per square foot for base/existing commercial space</li> <li>• Annual baseline energy use for new commercial space</li> <li>• New efficiency factor for new floorspace of the growth increment</li> <li>• Upgrade efficiency factor for base/existing commercial space</li> <li>• Baseline commercial electricity and natural gas prices</li> <li>• Commercial electricity and natural gas prices in horizon years</li> </ul>
<p><i>Residential Building Water Use</i></p> <ul style="list-style-type: none"> <li>• Baseline per capita indoor water demand by building type</li> <li>• Baseline per-unit outdoor water demand by building type</li> <li>• New residential water efficiency (% reduction from baseline)</li> <li>• Upgrade efficiency factor for base/existing housing stock</li> <li>• Baseline water price (\$/acre foot)</li> <li>• Water price in horizon years (\$/acre foot)</li> </ul>	<p><i>Residential Water-Related Energy Use and Emissions</i></p> <ul style="list-style-type: none"> <li>• Average water energy proxy (electricity required per million gallons water used)*</li> </ul>

\* RapidFire input or output not applied or analyzed as part of this process.