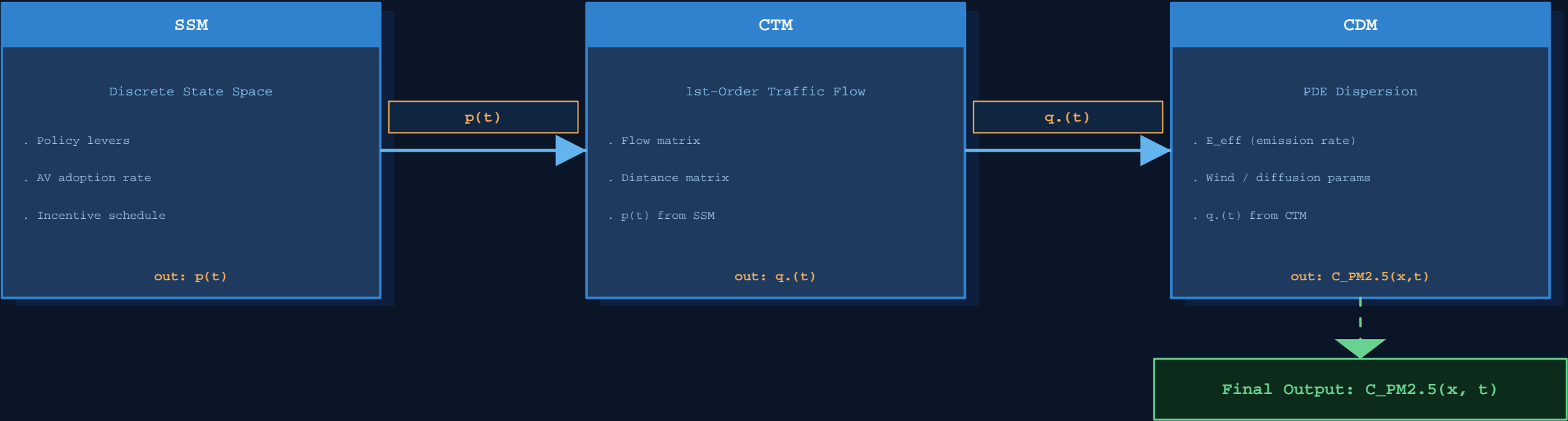


# Three-Model Pipeline: SSM -> CTM -> CDM

Discrete State Space · 1st-Order Traffic Flow · PDE Dispersion

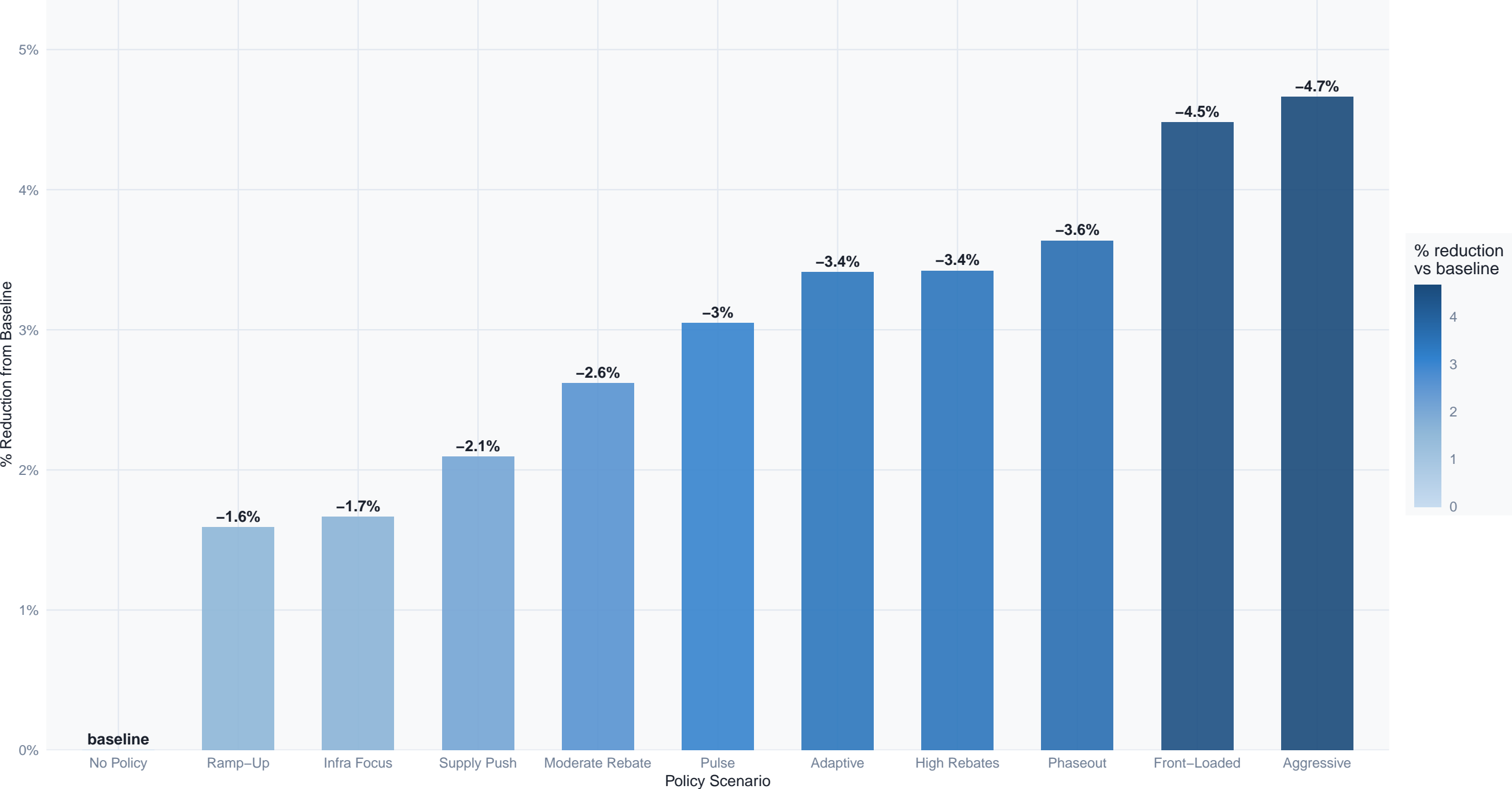


Each model feeds its key transfer variable into the next stage. SSM sets fleet composition, CTM converts fleet to corridor-level flows, CDM solves the advection-diffusion PDE to yield spatially-resolved PM2.5.

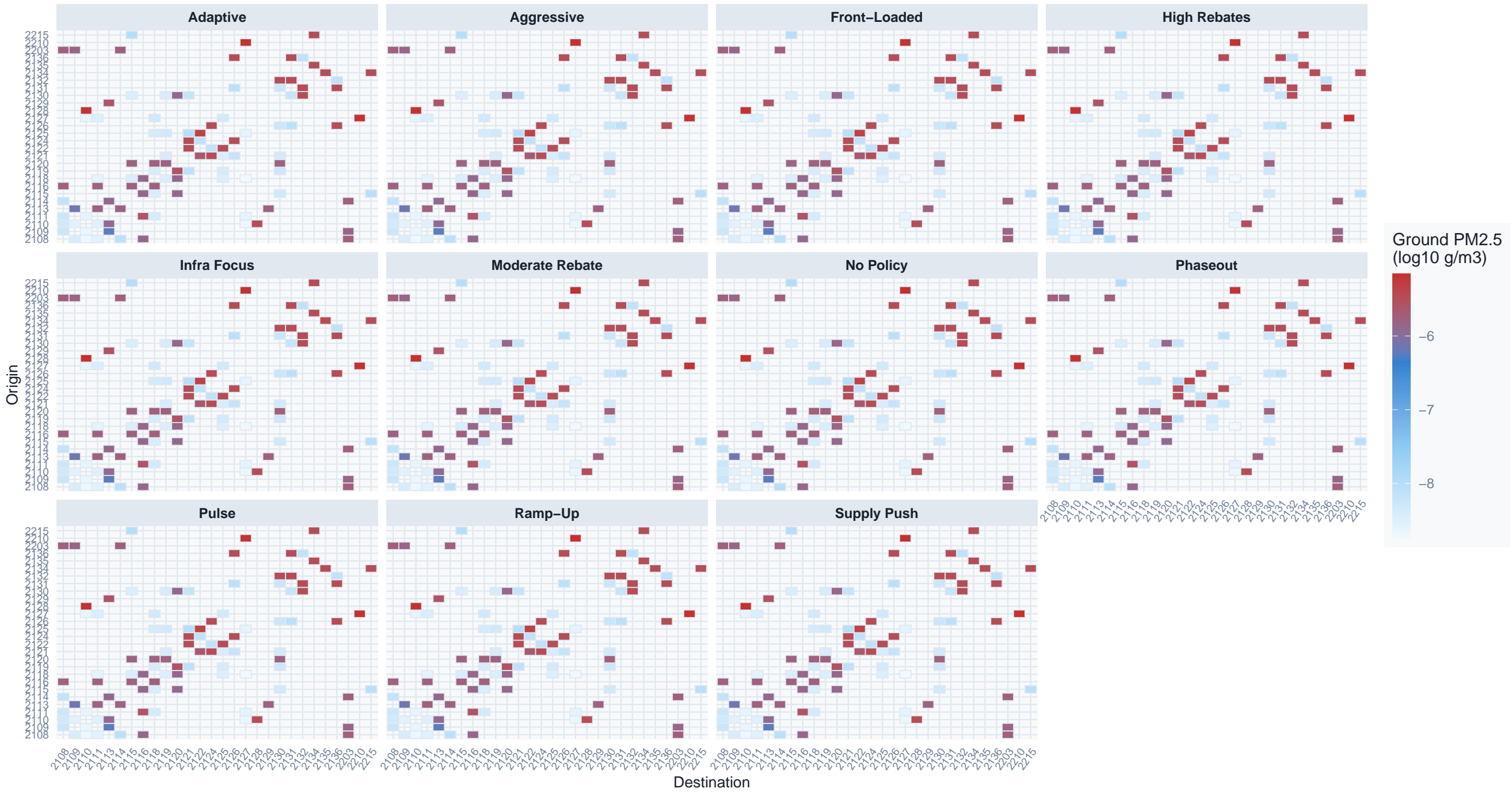
# PM2.5 AV Scenarios – Year 10

# Total Network Emission Rate by Policy Scenario

Sum of E\_eff across all active flow corridors; % reduction vs baseline scenario

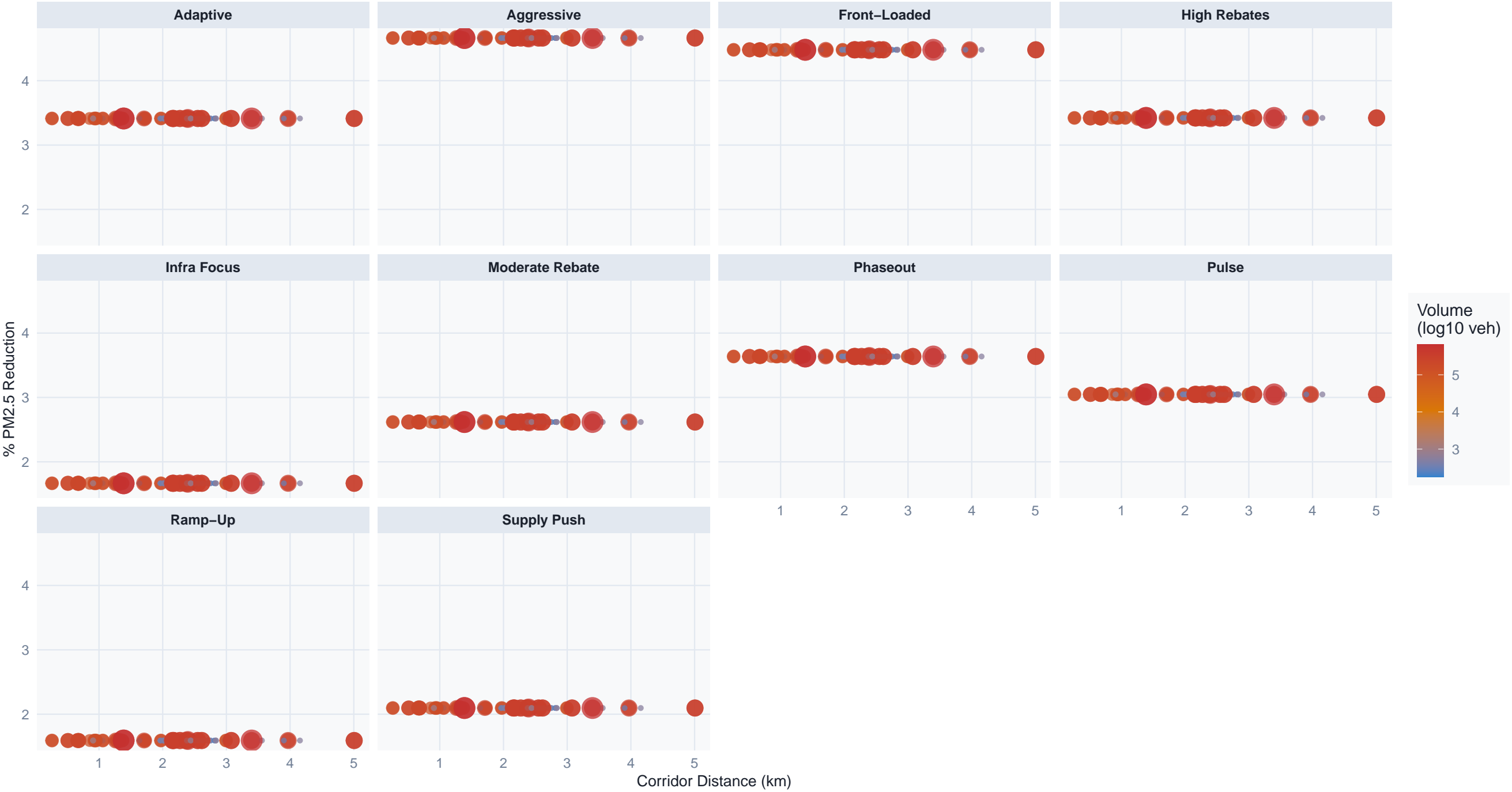


Each cell = one origin–destination corridor, color = peak ground concentration



# PM2.5 Reduction by Corridor vs Baseline

Each point = one flow pair; x = distance, y = % reduction in ground-level PM2.5



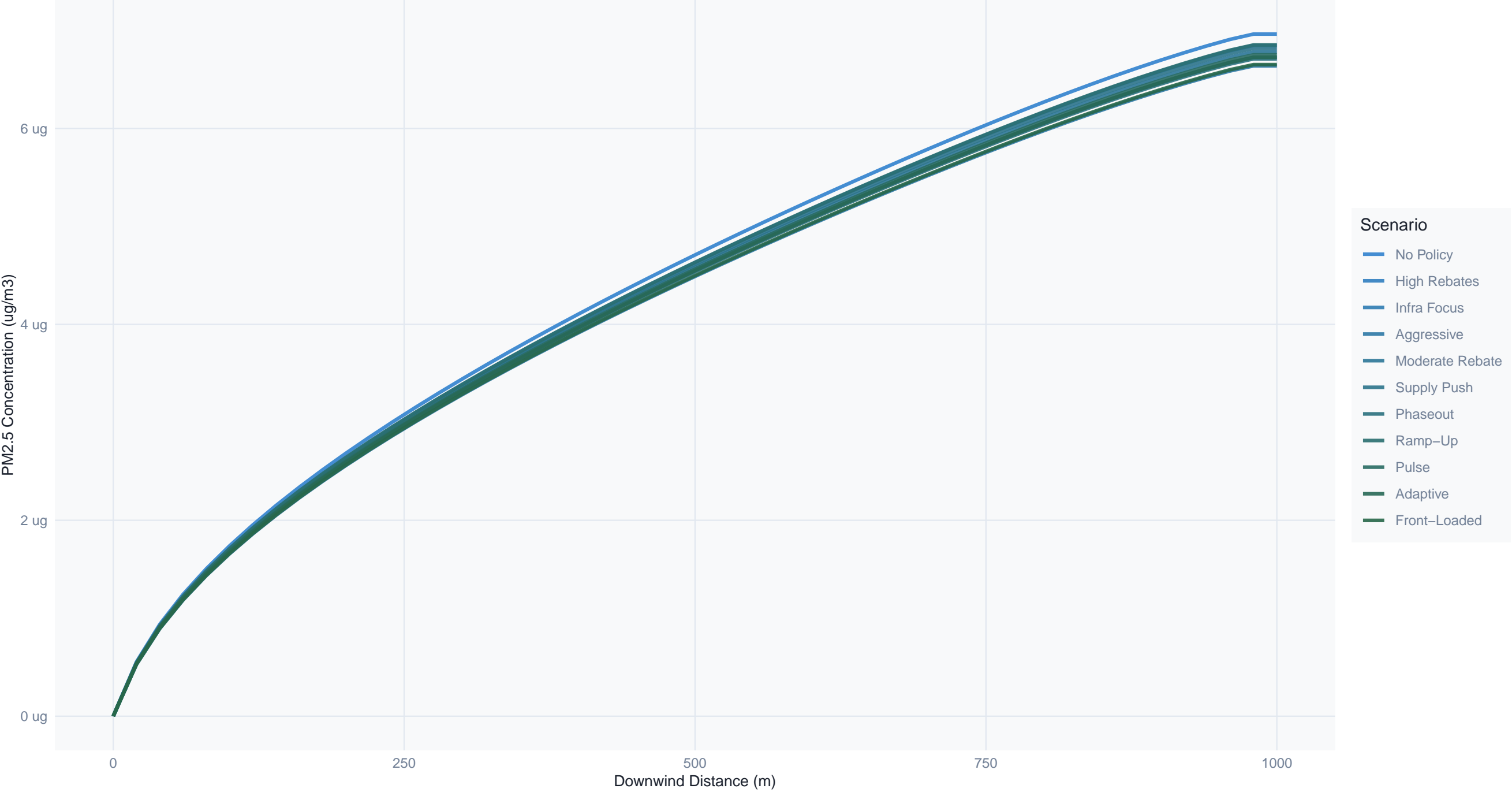
# PM2.5 Plume – Busiest Corridor (2127 – 2210)

659,690 vehicles/month, 1.4 km



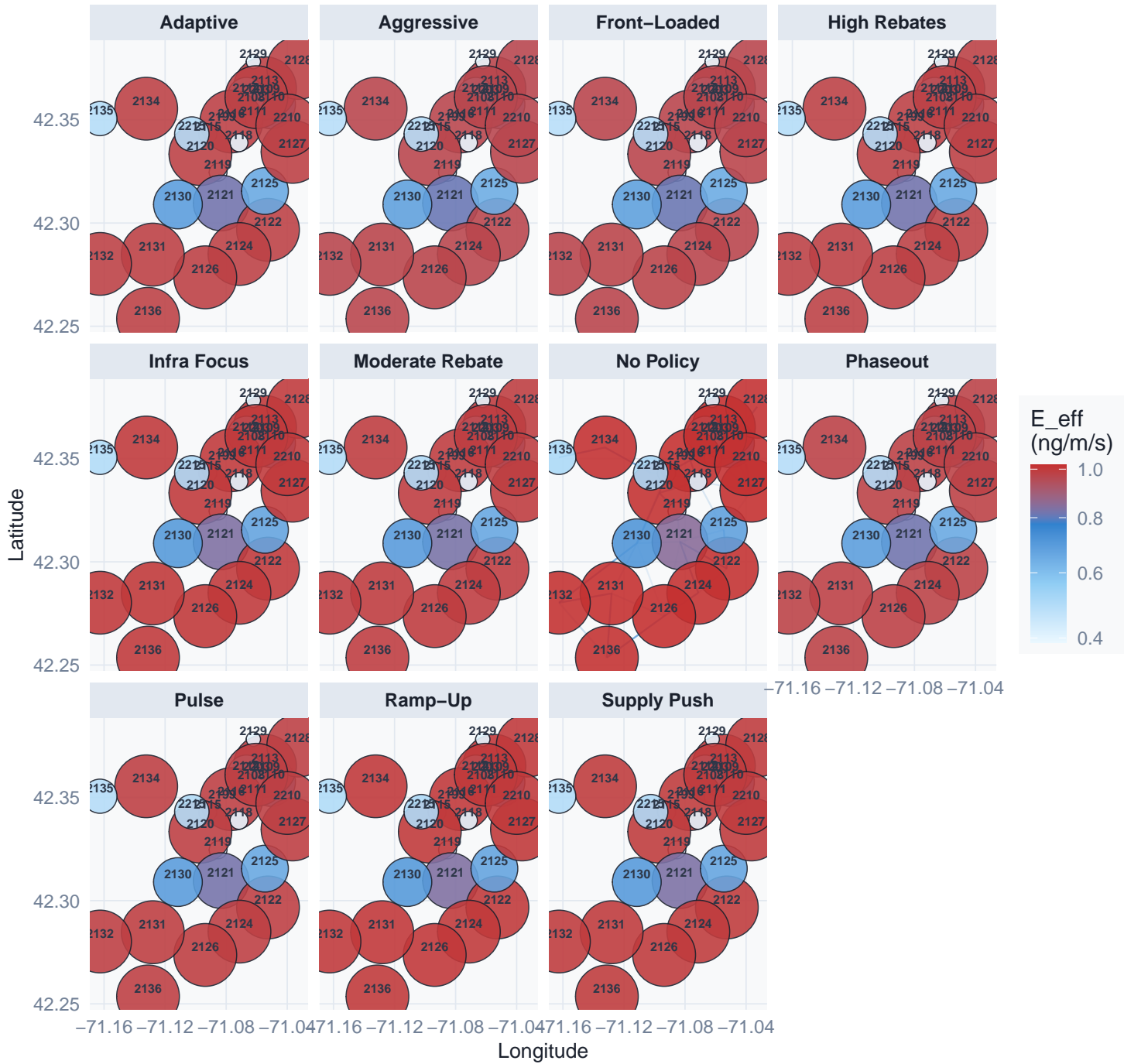
# Ground-Level PM2.5 Profile – 2127 – 2210

Concentration along downwind axis at z = 0 (street level), converted to ug/m3



# Spatial Distribution of PM2.5 Emission Burden

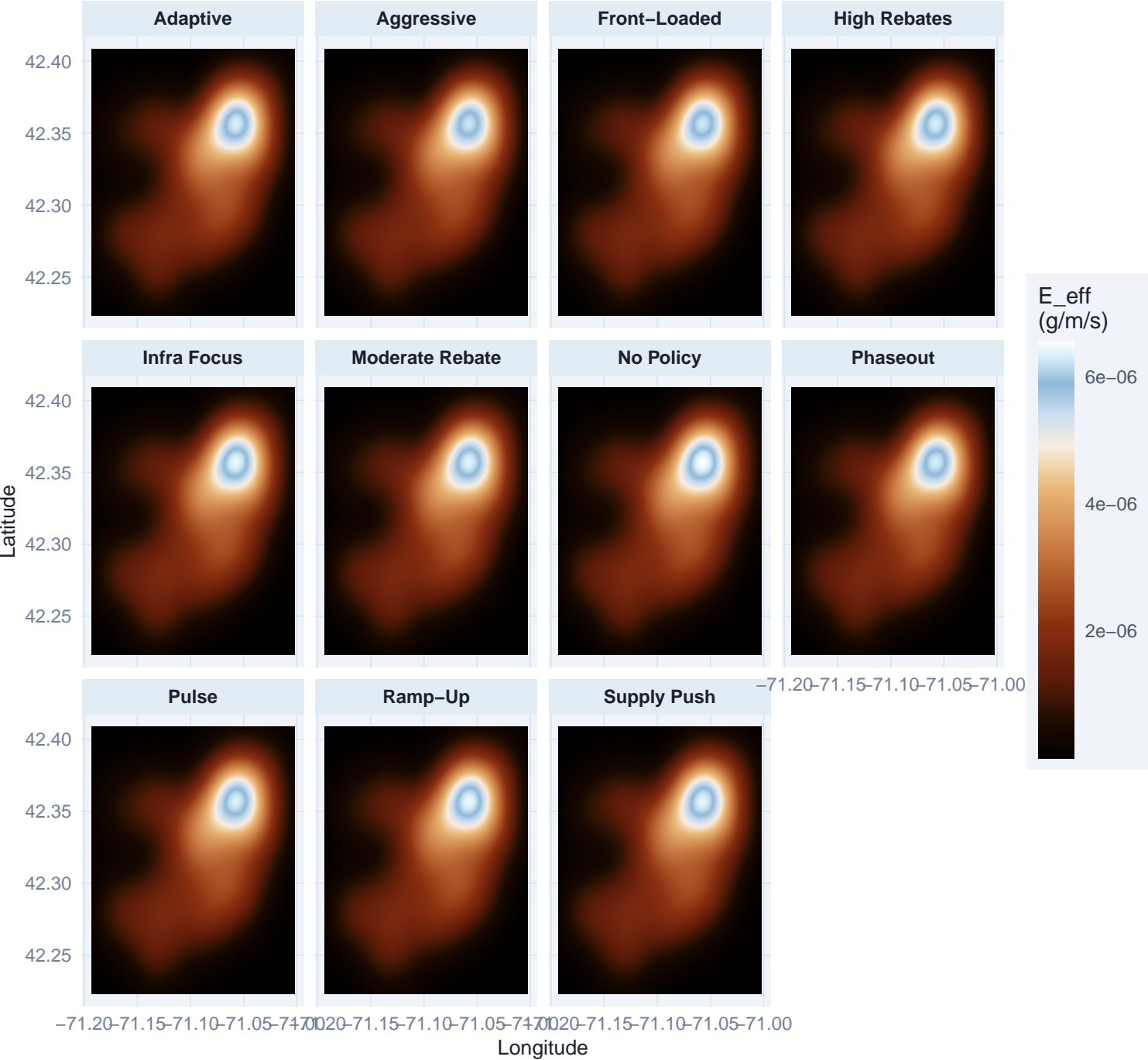
Node size = outbound vehicle volume, color = total emission rate





# Spatial Distribution of PM2.5 Emission Burden (Absolute)

Gaussian emission surface per zone, warmer color = more pollution



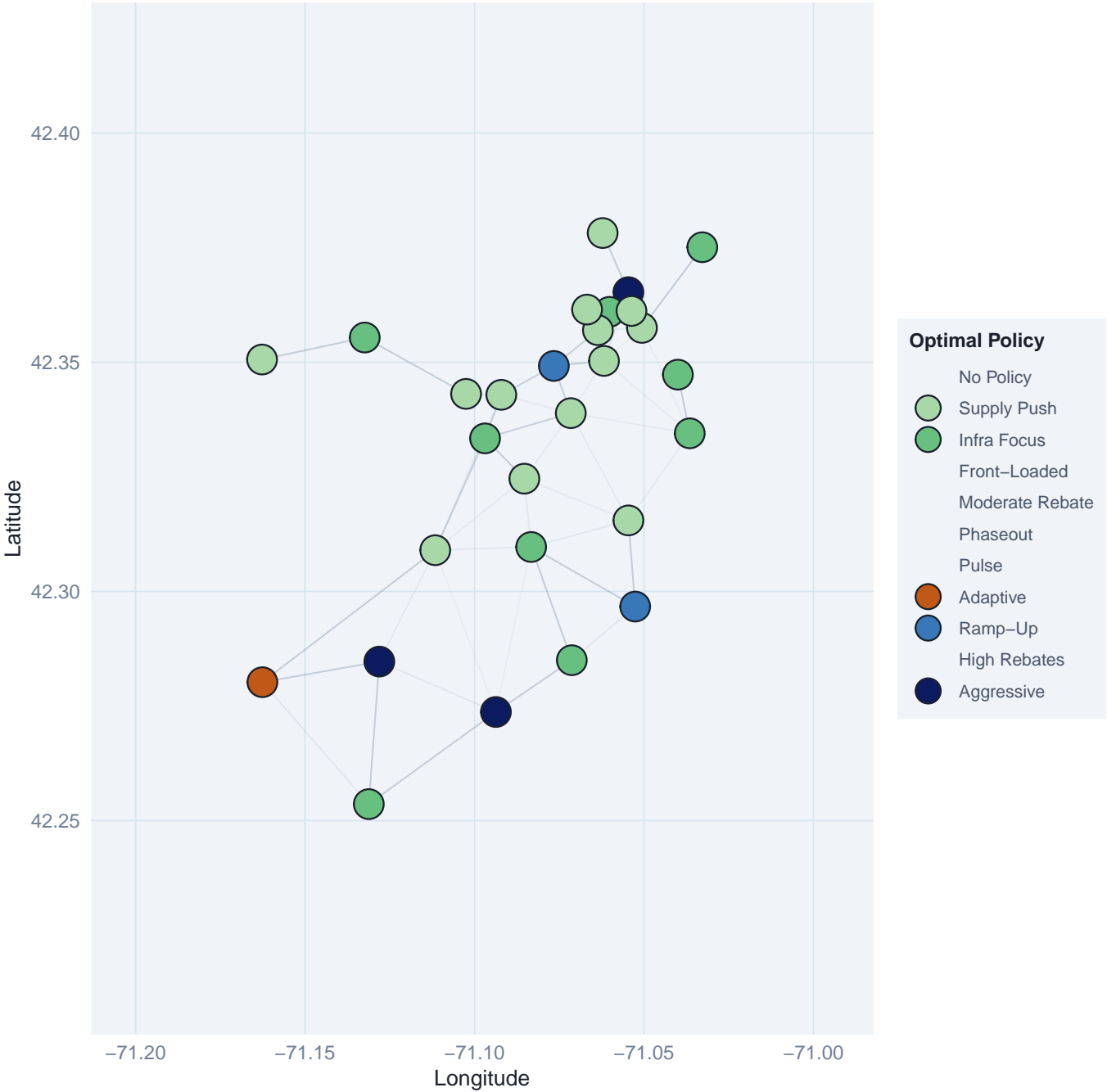
Budget–Optimal Policy per Node (\$5.0B cap)

Budget: \$5.0B | Spent: \$4.97B (99.4%) | Remaining: \$0.03B | Policy intensity matched to node PM2.5 burden



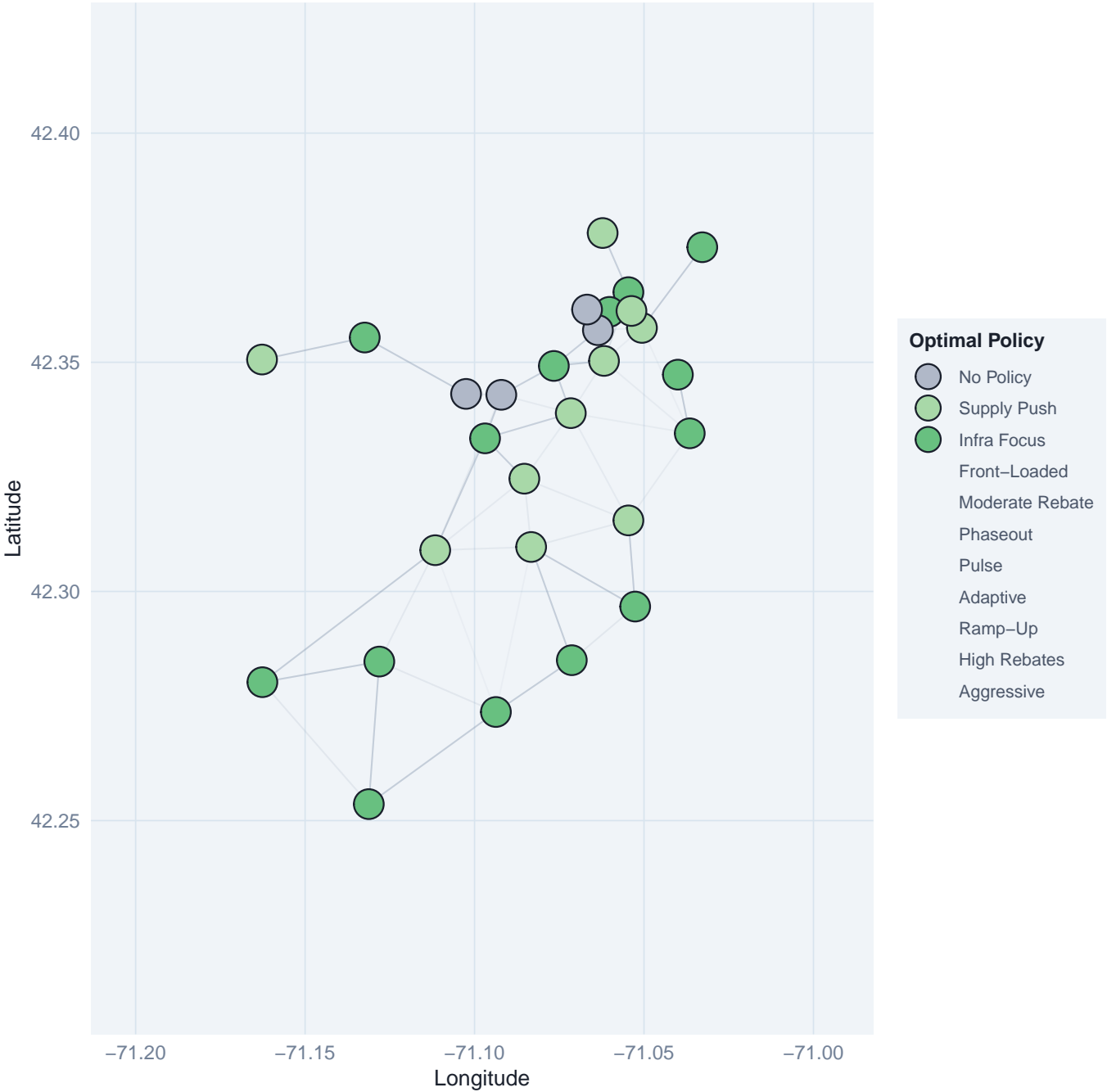
Budget–Optimal Policy per Node (\$2.5B cap)

Budget: \$2.5B | Spent: \$2.47B (98.7%) | Remaining: \$0.03B | Policy intensity matched to node PM2.5 burden



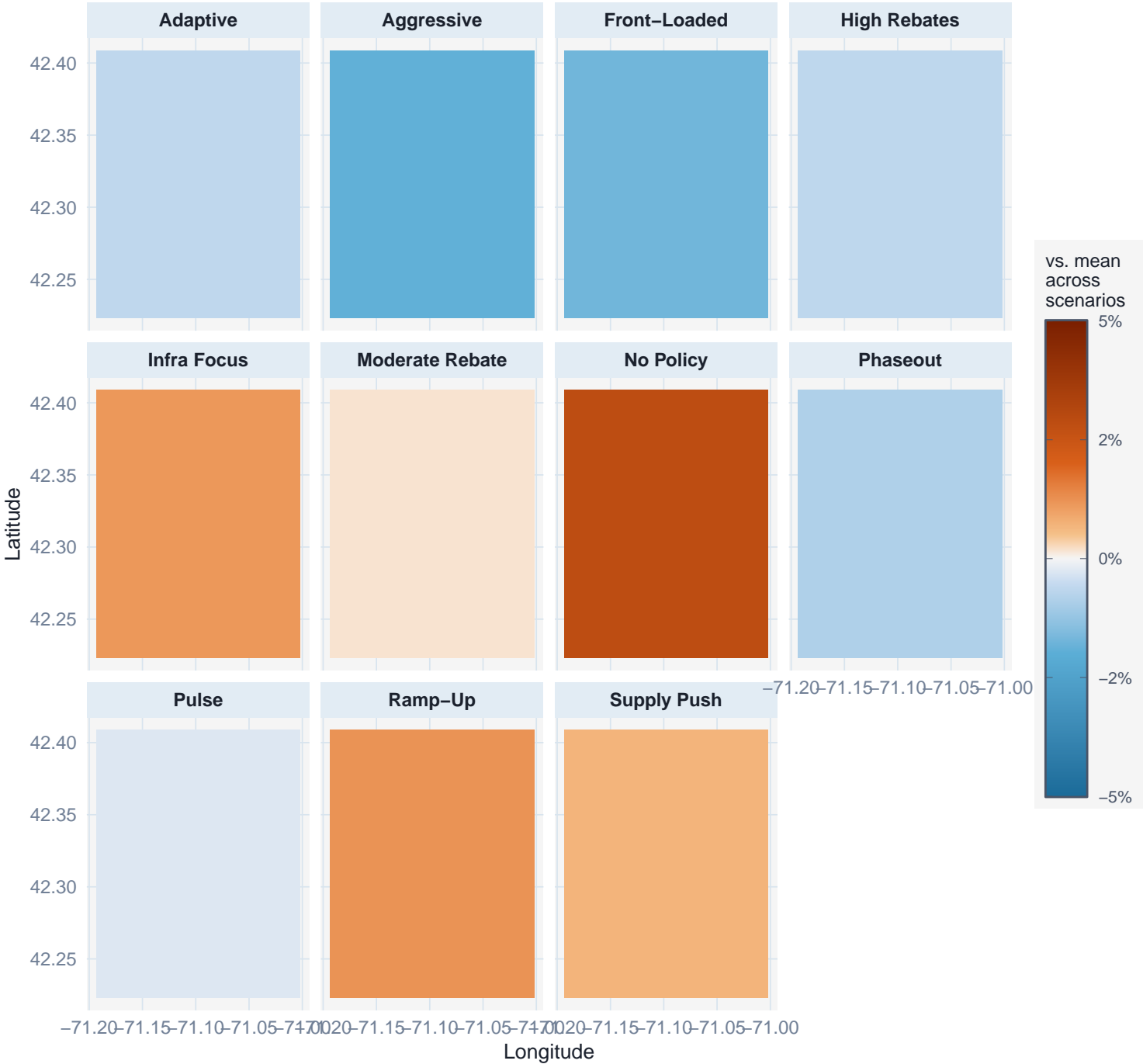
Budget–Optimal Policy per Node (\$1.0B cap)

Budget: \$1.0B | Spent: \$0.97B (97.1%) | Remaining: \$0.03B | Policy intensity matched to node PM2.5 burden



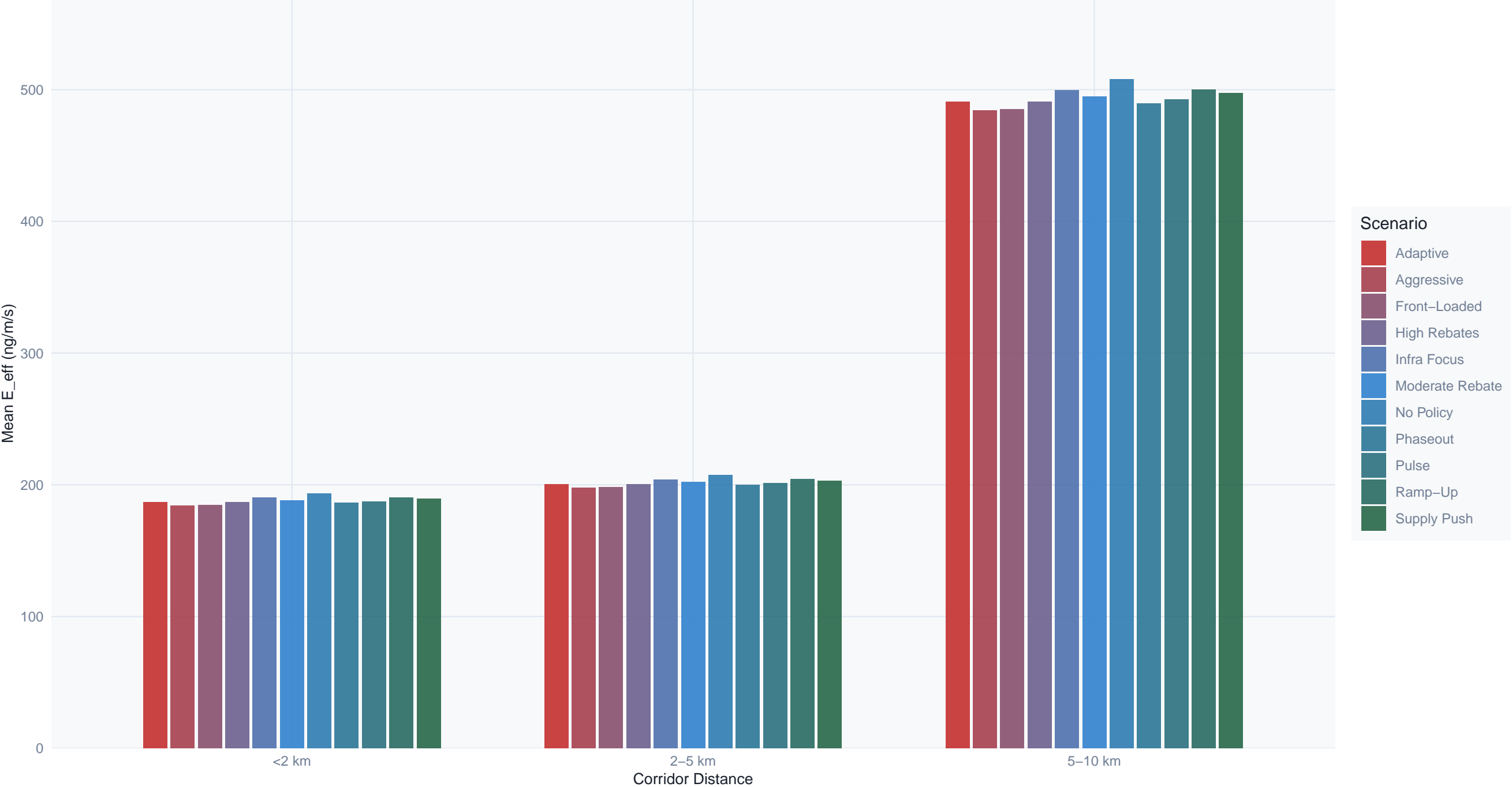
# Spatial PM2.5 Emission Burden: Deviation from Cross-Scenario Mean

Orange/red = above average; blue = below average at each map cell



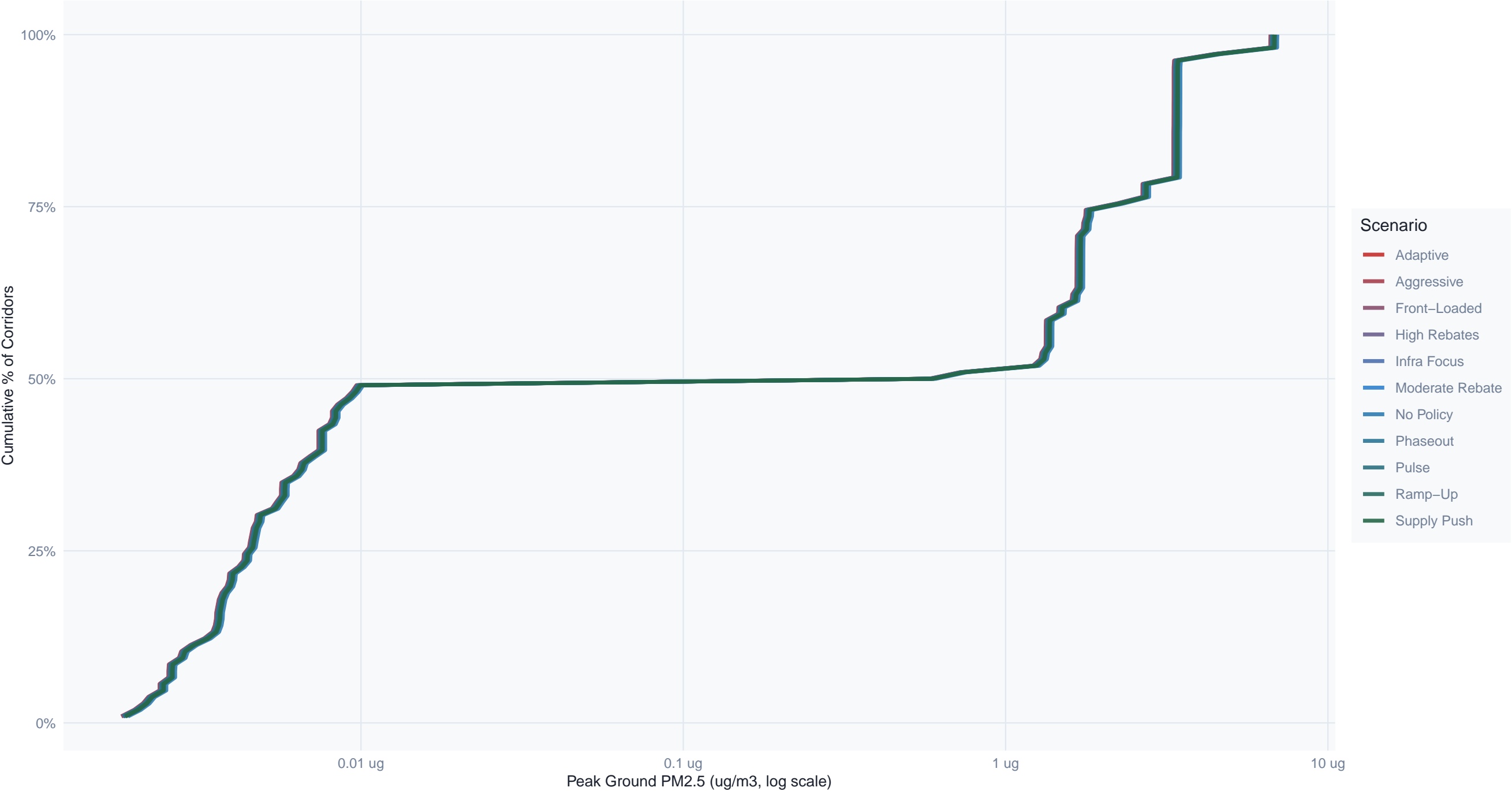
# Mean Emission Rate by Corridor Distance Band

Average E\_eff per corridor length category

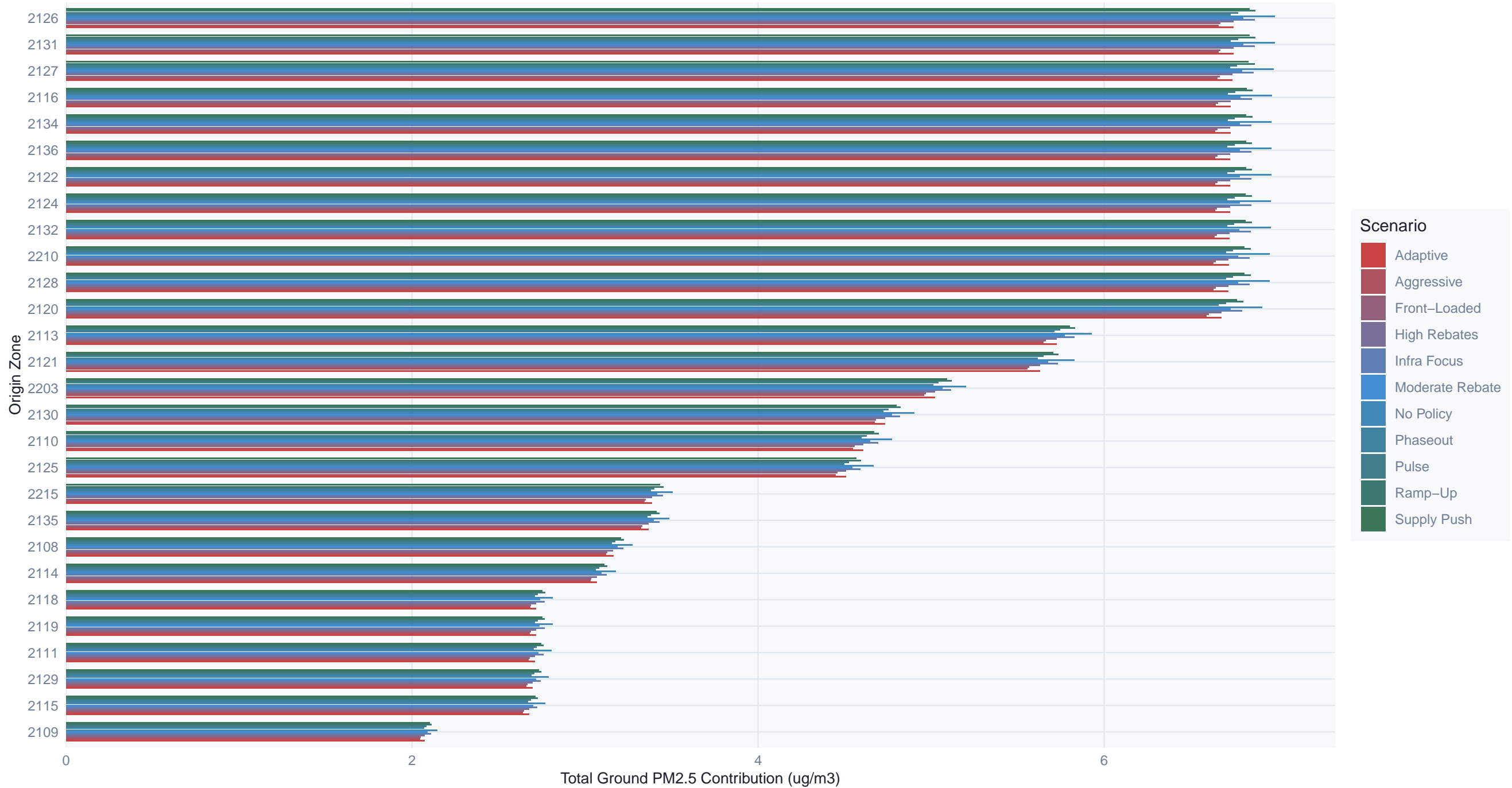


# Cumulative Distribution of Peak Ground-Level PM2.5

Each point = one corridor, rightward shift = worse air quality



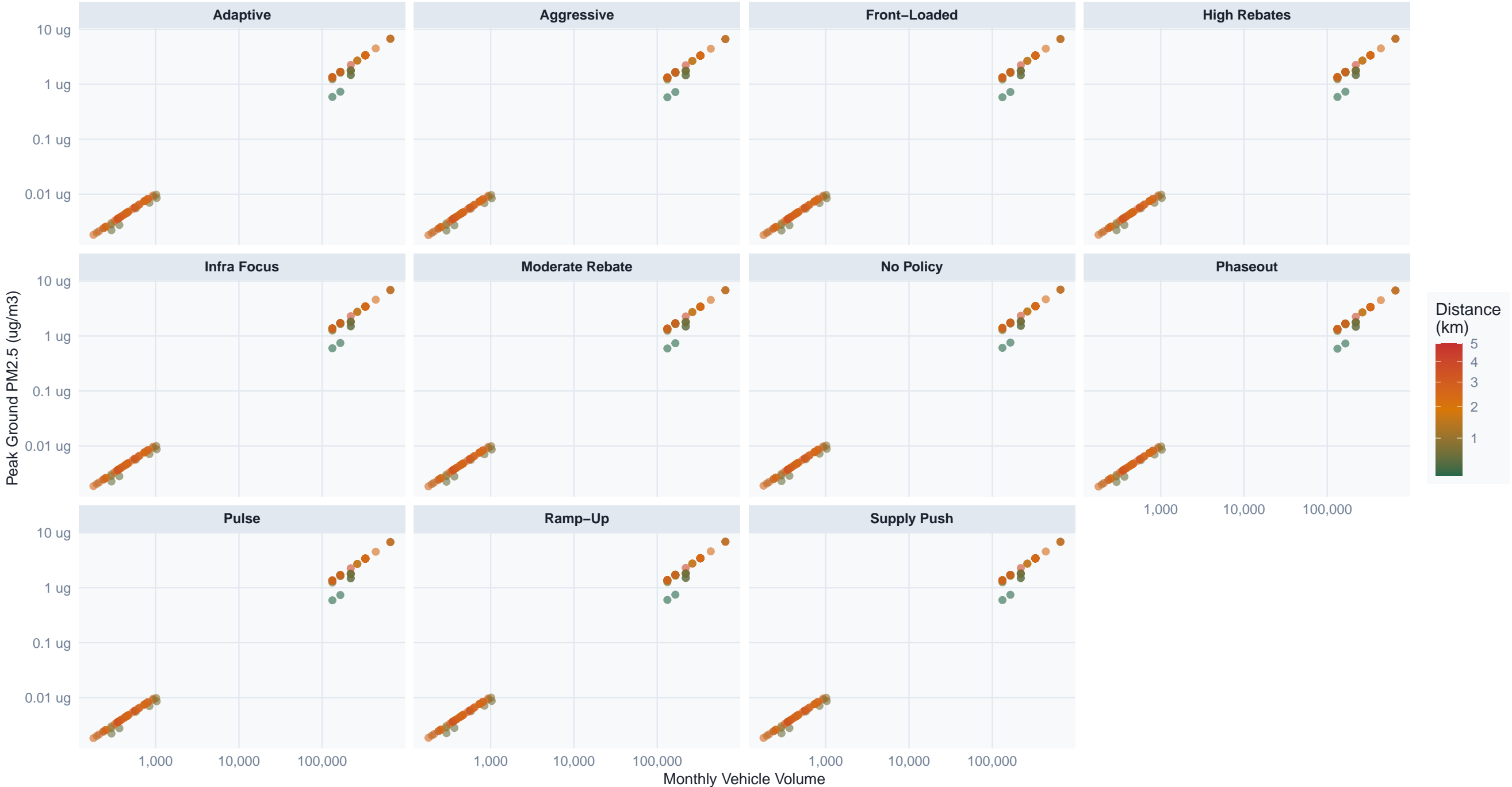
## Sum of peak ground concentrations across all outbound corridors per zone





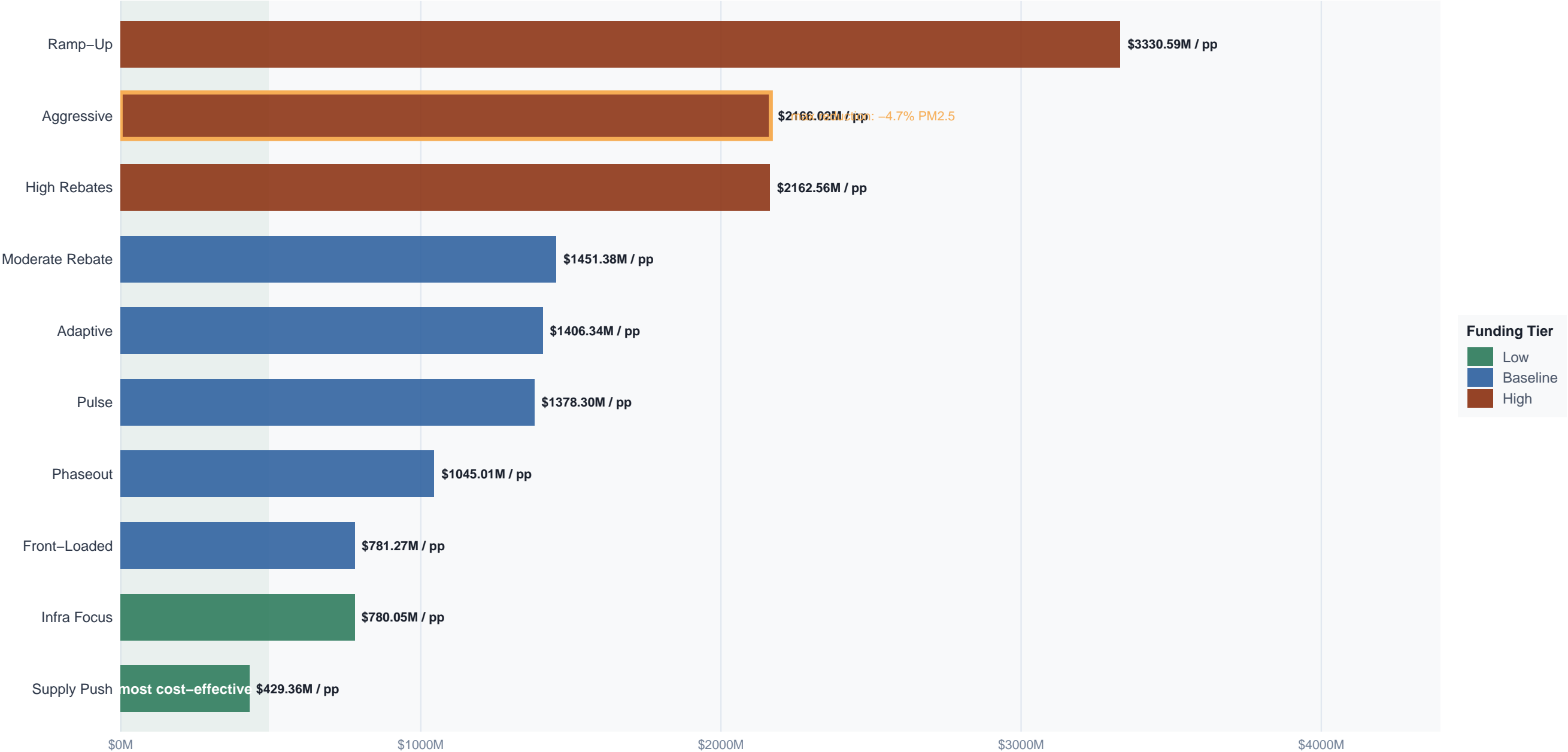
# Vehicle Volume vs. Peak Ground PM2.5 by Corridor

Both axes log scale, color = corridor distance



# Cost-Effectiveness by Policy Scenario

Cost per percentage-point PM2.5 reduction (lower = more cost-effective per dollar spent)  
Derived from simulated E\_eff reduction vs scenario total cost. Orange border = Aggressive scenario.



Cost per Percentage-Point PM2.5 Reduction (USD millions)

Green shading = most cost-effective zone · Low Funding scenarios dominate on a per-dollar basis · Cost data from policy catalogue