Three–Model Pipeline: SSM –> CTM –> CDM

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

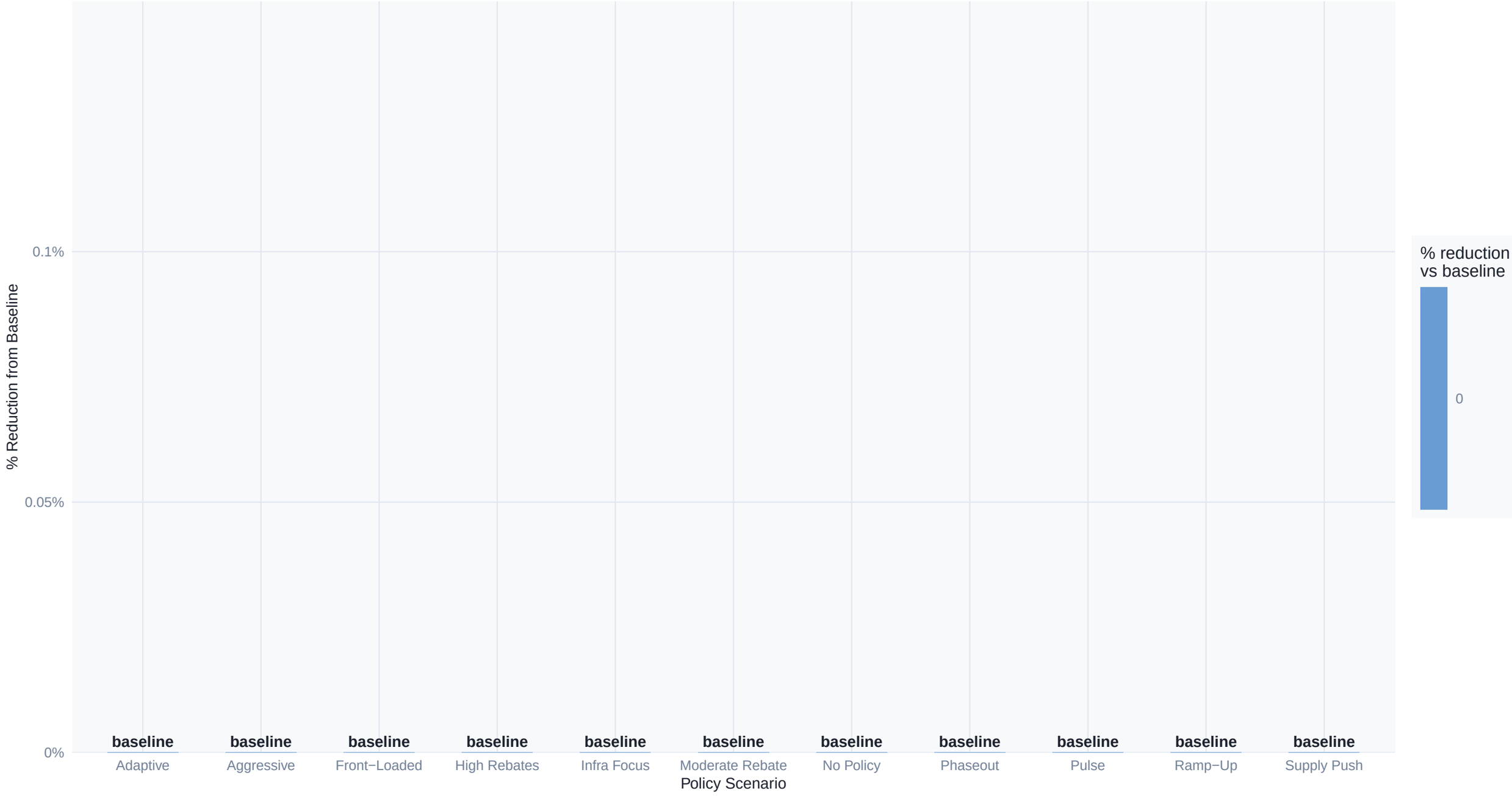
Each model feeds its key transfer variable into the next stage. SSM sets fleet composition,
CTM converts fleet to corridor–level flows, CDM solves the advection–diffusion PDE to yield spatially–resolved PM2.5.

PM2.5 AV Scenarios − Year 0

Policies: No Policy | High Rebates | Infra Focus | Aggressive | Moderate Rebate | Supply Push | Phaseout | Ramp−Up | Pulse | Adaptive | Front−Loaded

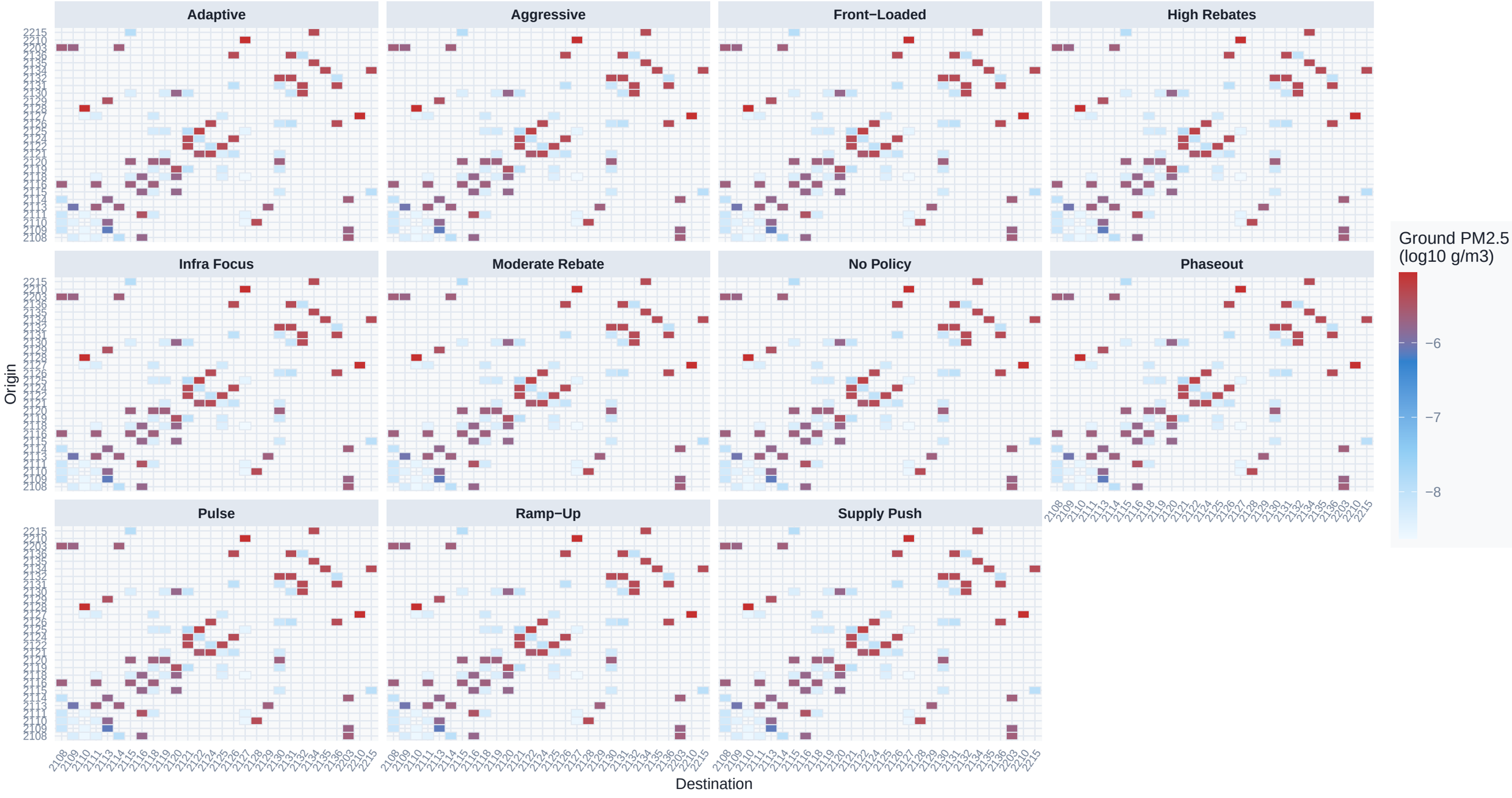
Total Network Emission Rate by Policy Scenario

Sum of E_eff across all active flow corridors; % reduction vs baseline scenario



Ground−Level Peak PM2.5 by Flow Pair

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

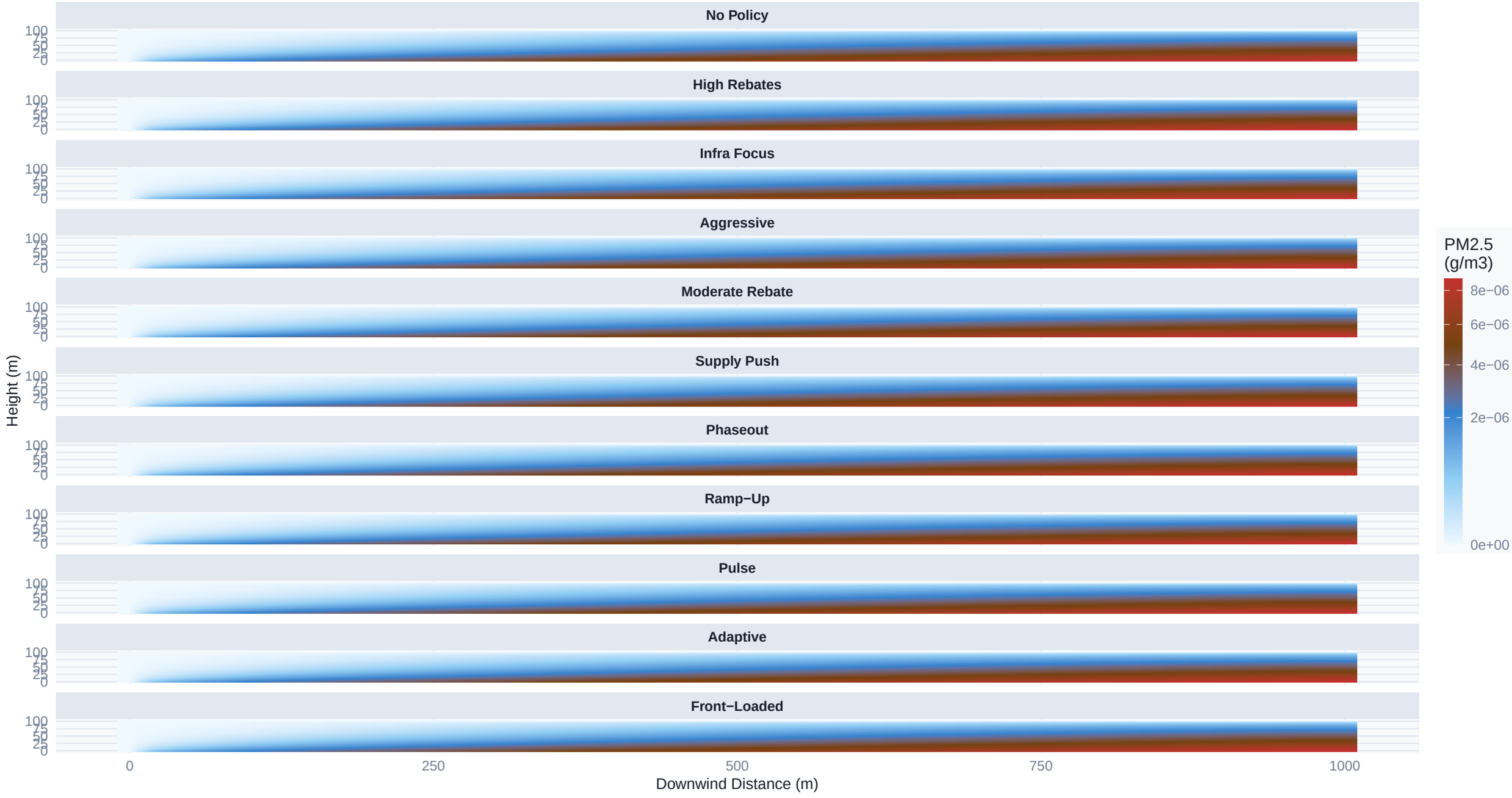


PM2.5 Reduction by Corridor vs Baseline

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

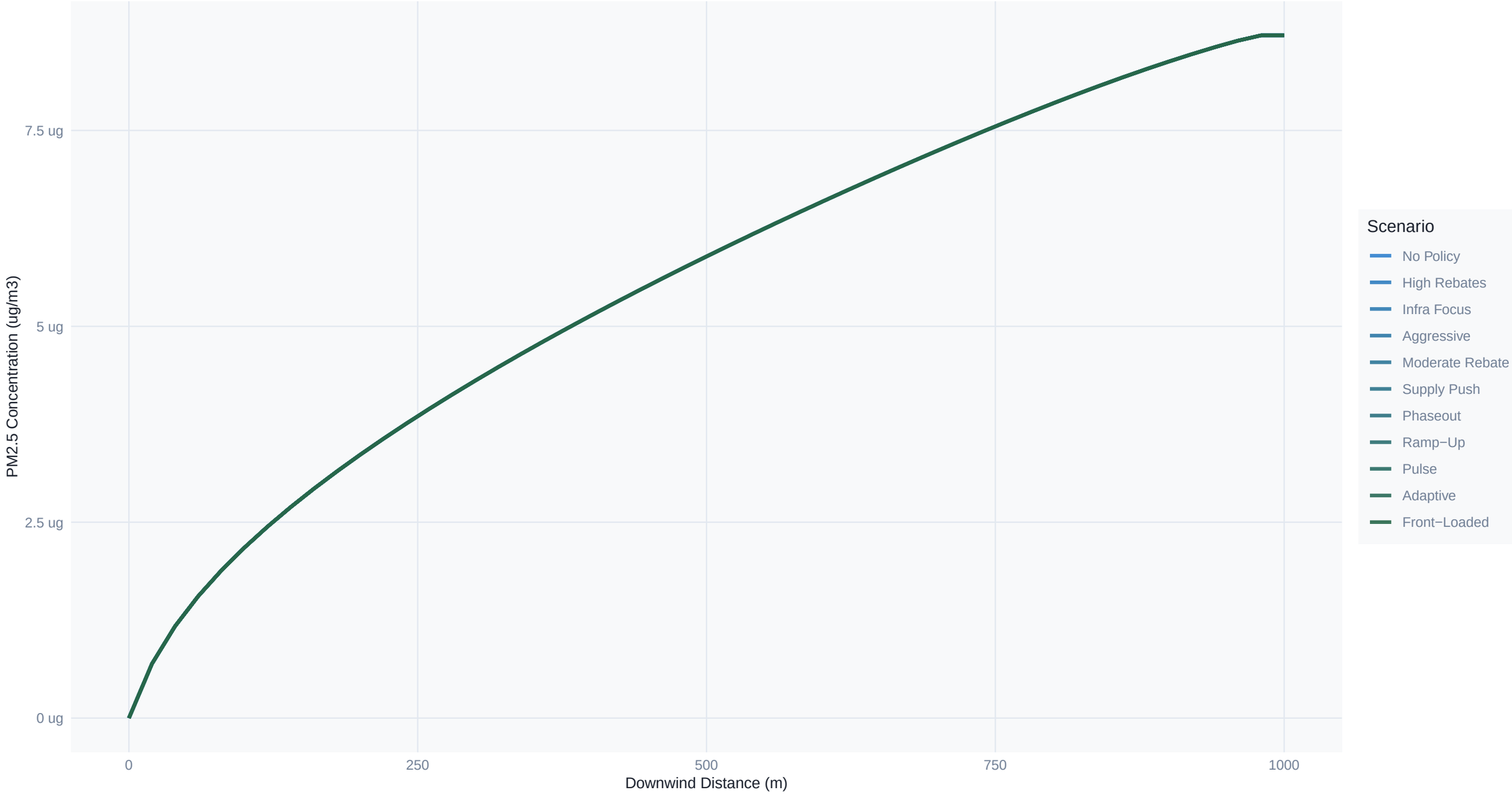
PM2.5 Plume − Busiest Corridor (2127 − 2210)

659,690 vehicles/month, 1.4 km



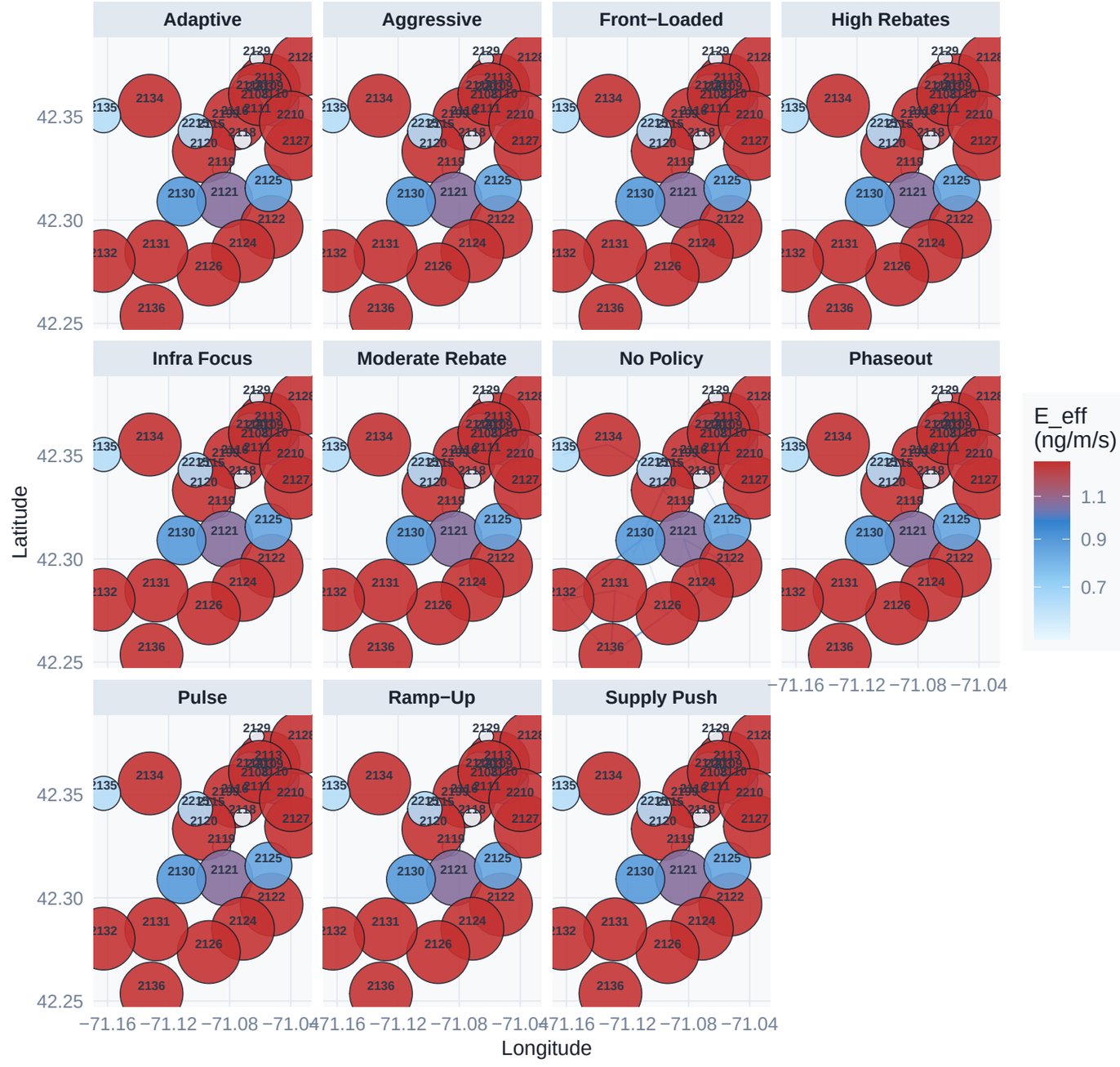
Ground−Level PM2.5 Profile − 2127 − 2210

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



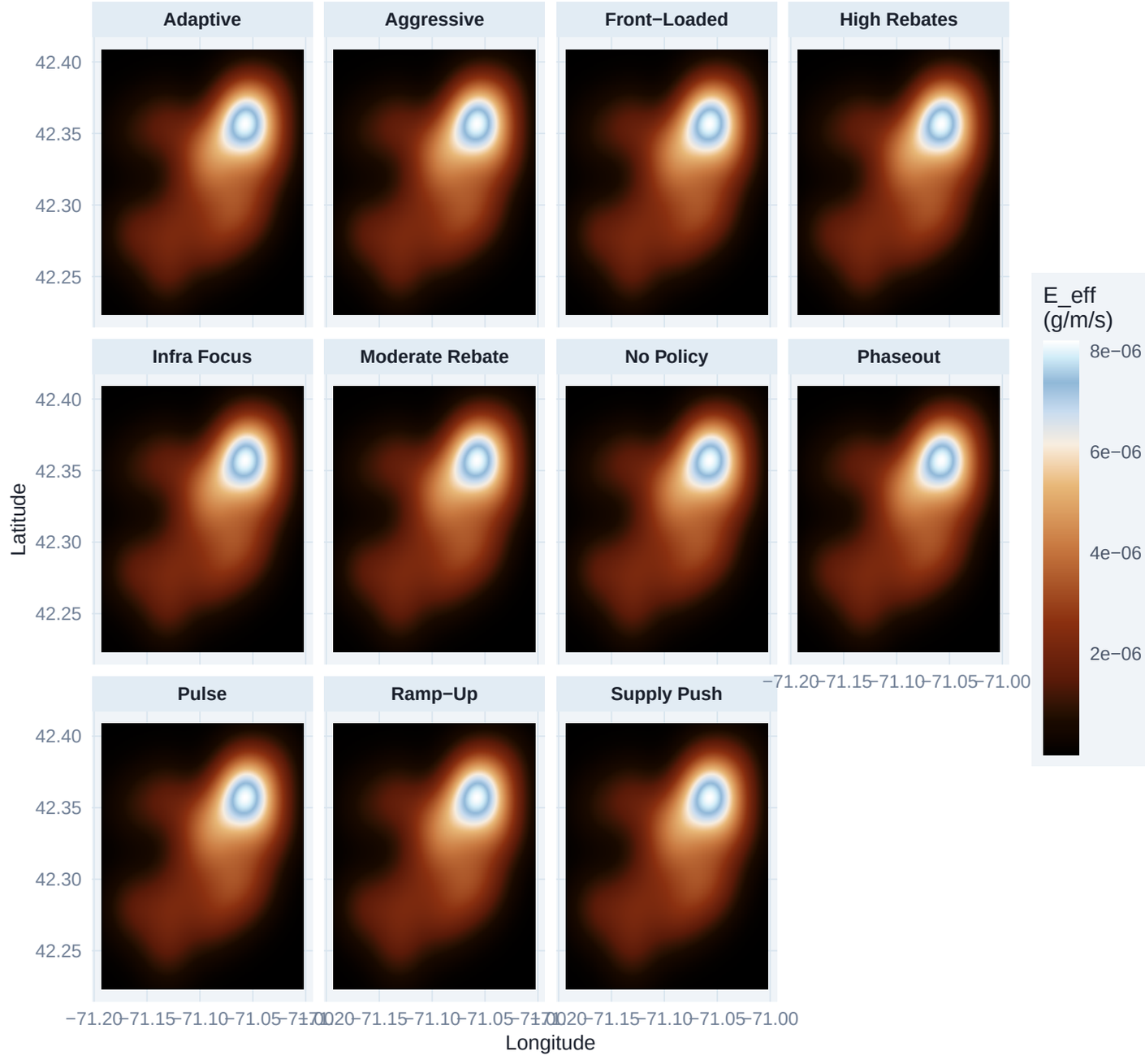
Spatial Distribution of PM2.5 Emission Burden

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



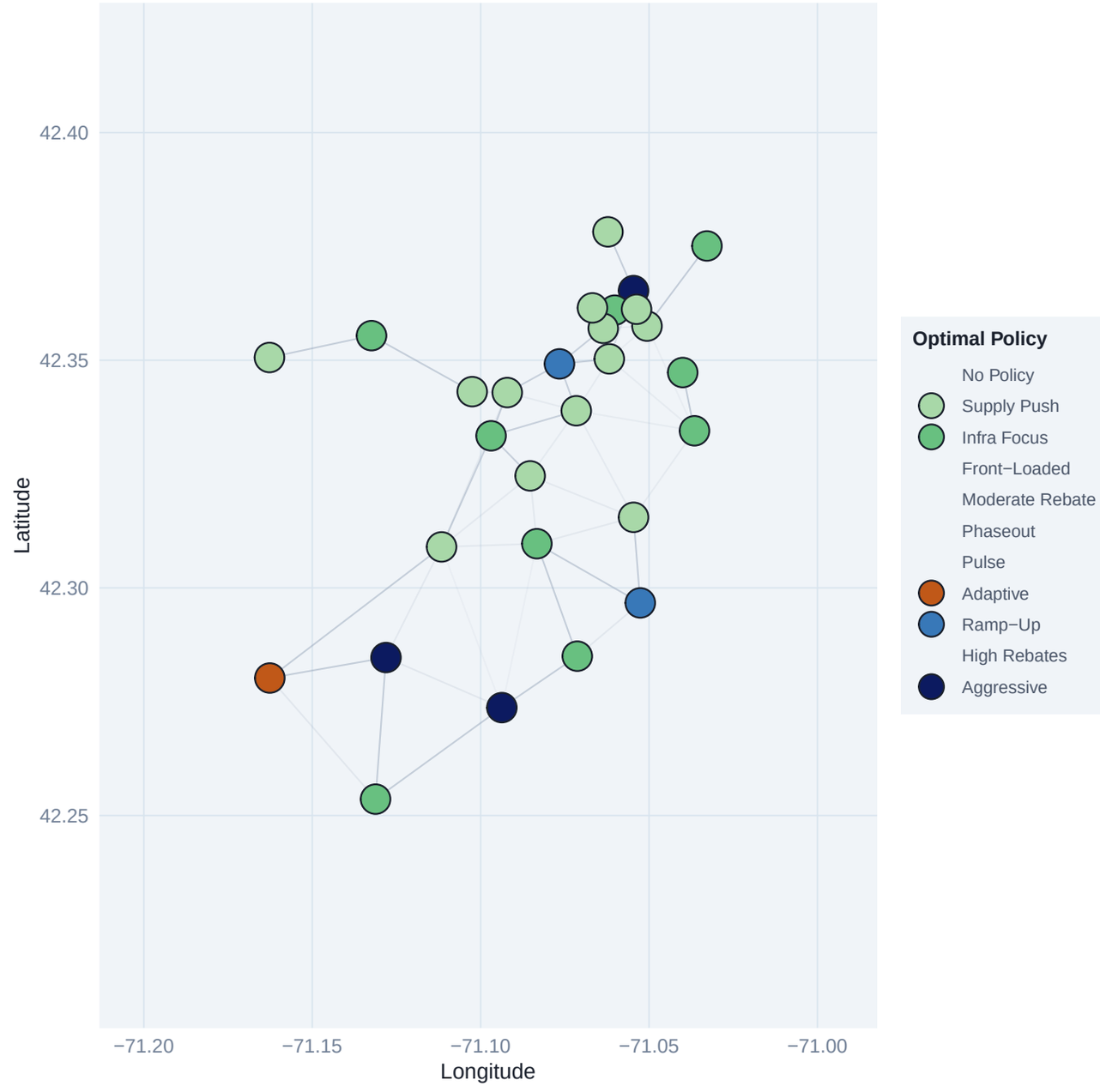
Budget−Optimal Policy per Node ($5.0B cap)

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

Green = low−cost · Blue = moderate · Navy = high−investment · Grey = no policy (budget exhausted)

Budget−Optimal Policy per Node ($2.5B cap)

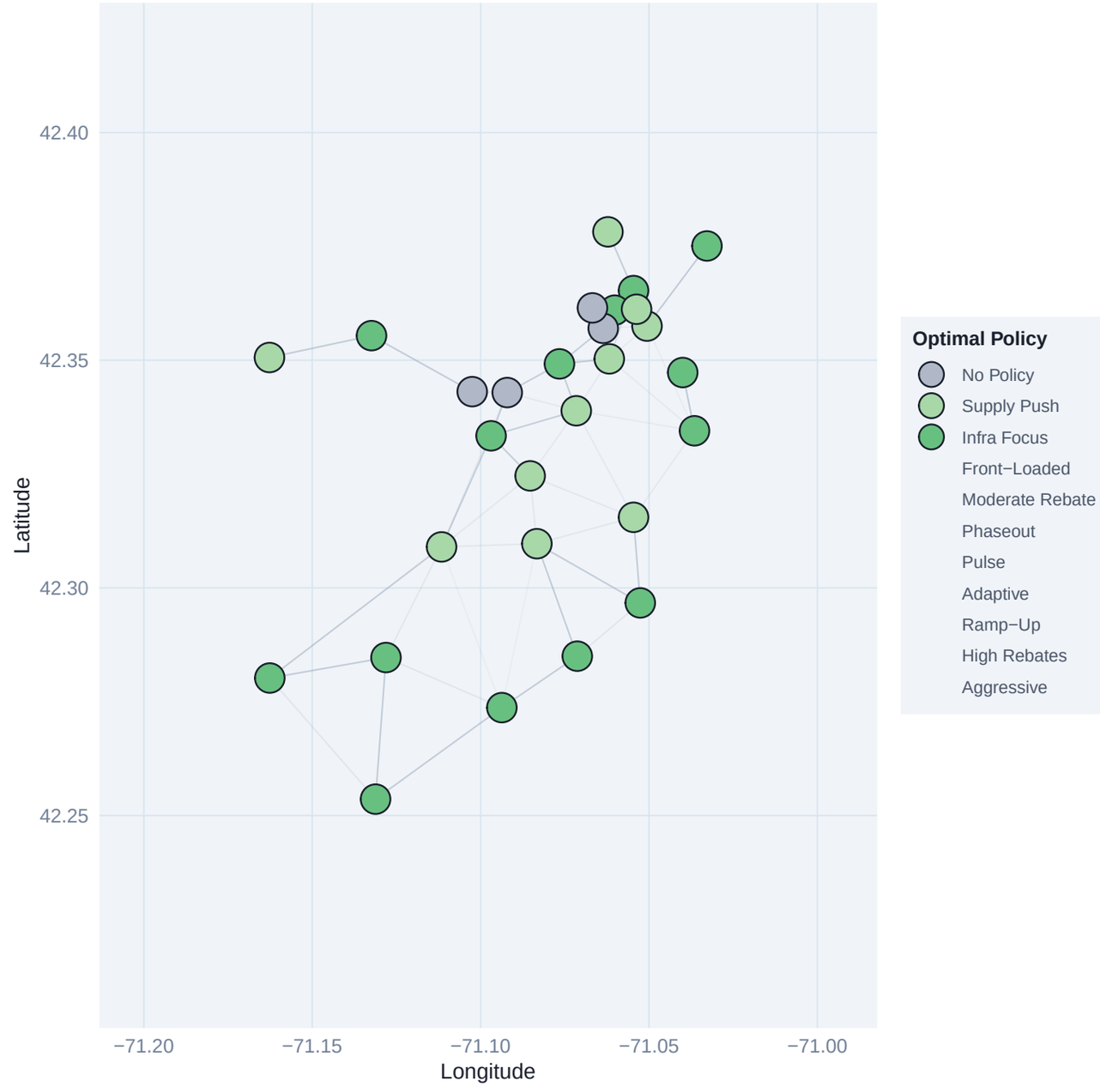
Budget: $2.5B | Spent: $2.47B (98.7%) | Remaining: $0.03B | Policy intensity matched to node PM2.5 burden



Green = low−cost · Blue = moderate · Navy = high−investment · Grey = no policy (budget exhausted)

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



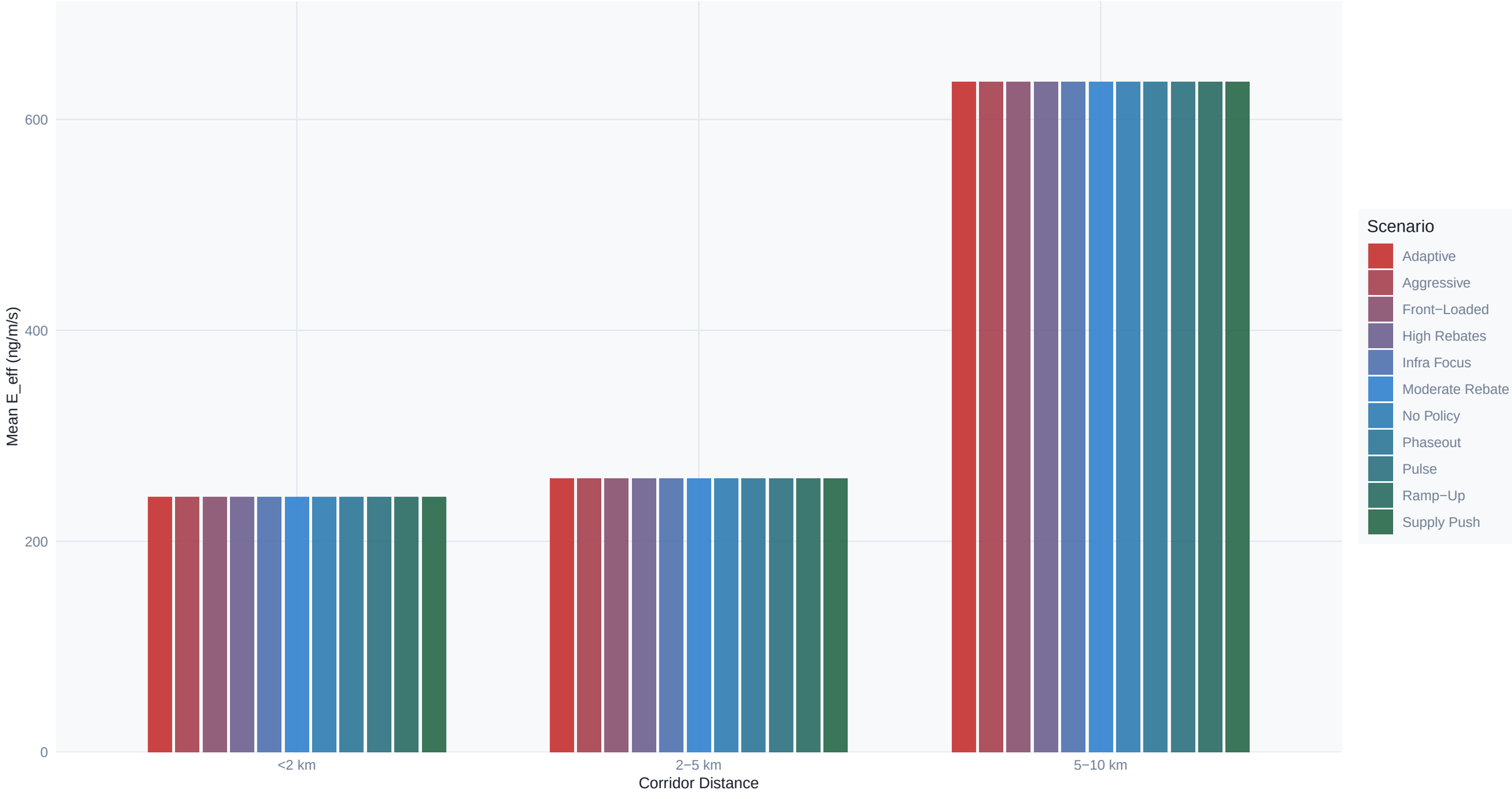
Green = low−cost · Blue = moderate · Navy = high−investment · Grey = no policy (budget exhausted)

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

Not shown: all scenarios have identical AV fractions at this year − no variation to display.

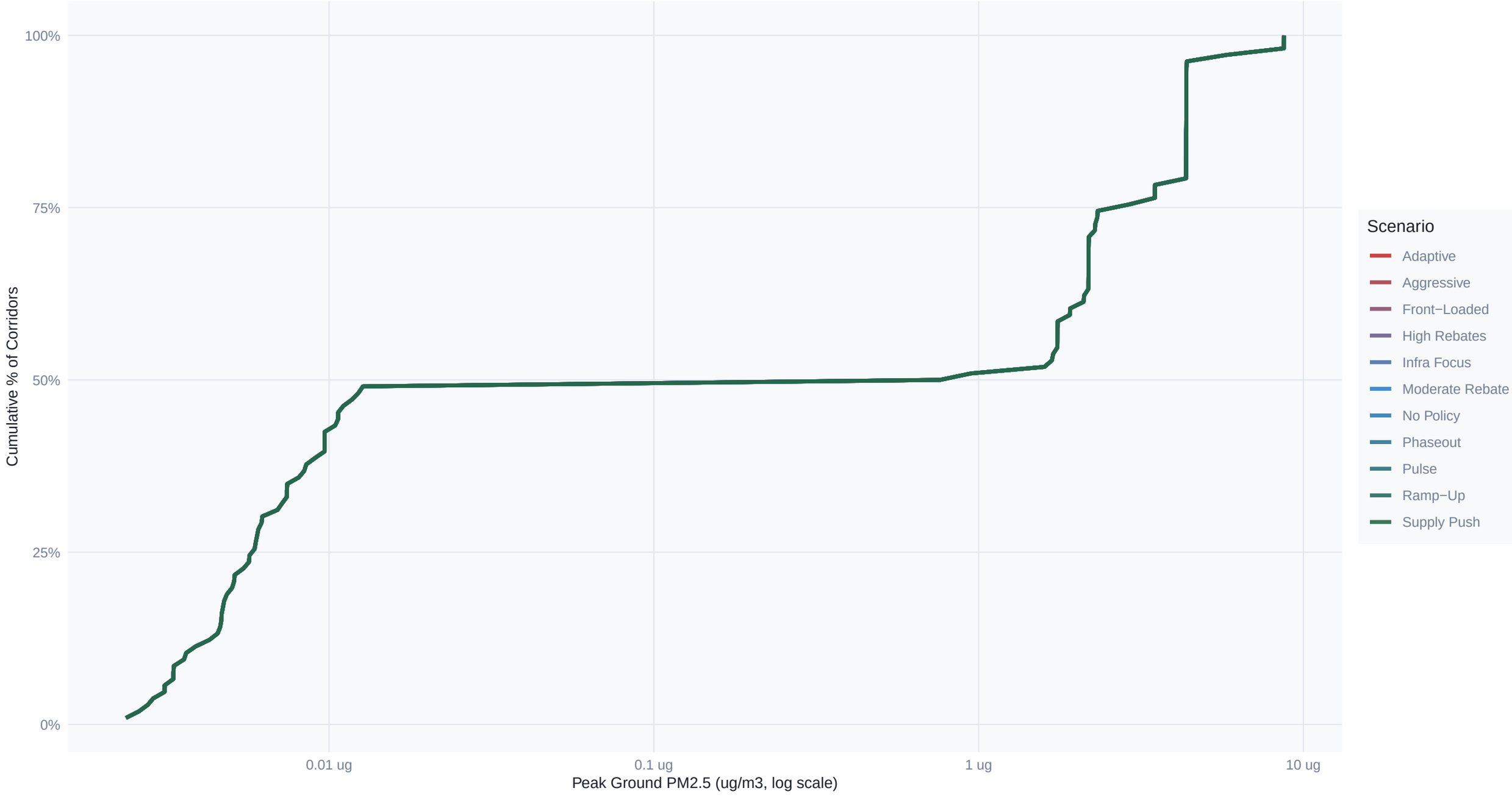
Mean Emission Rate by Corridor Distance Band

Average E_eff per corridor length category



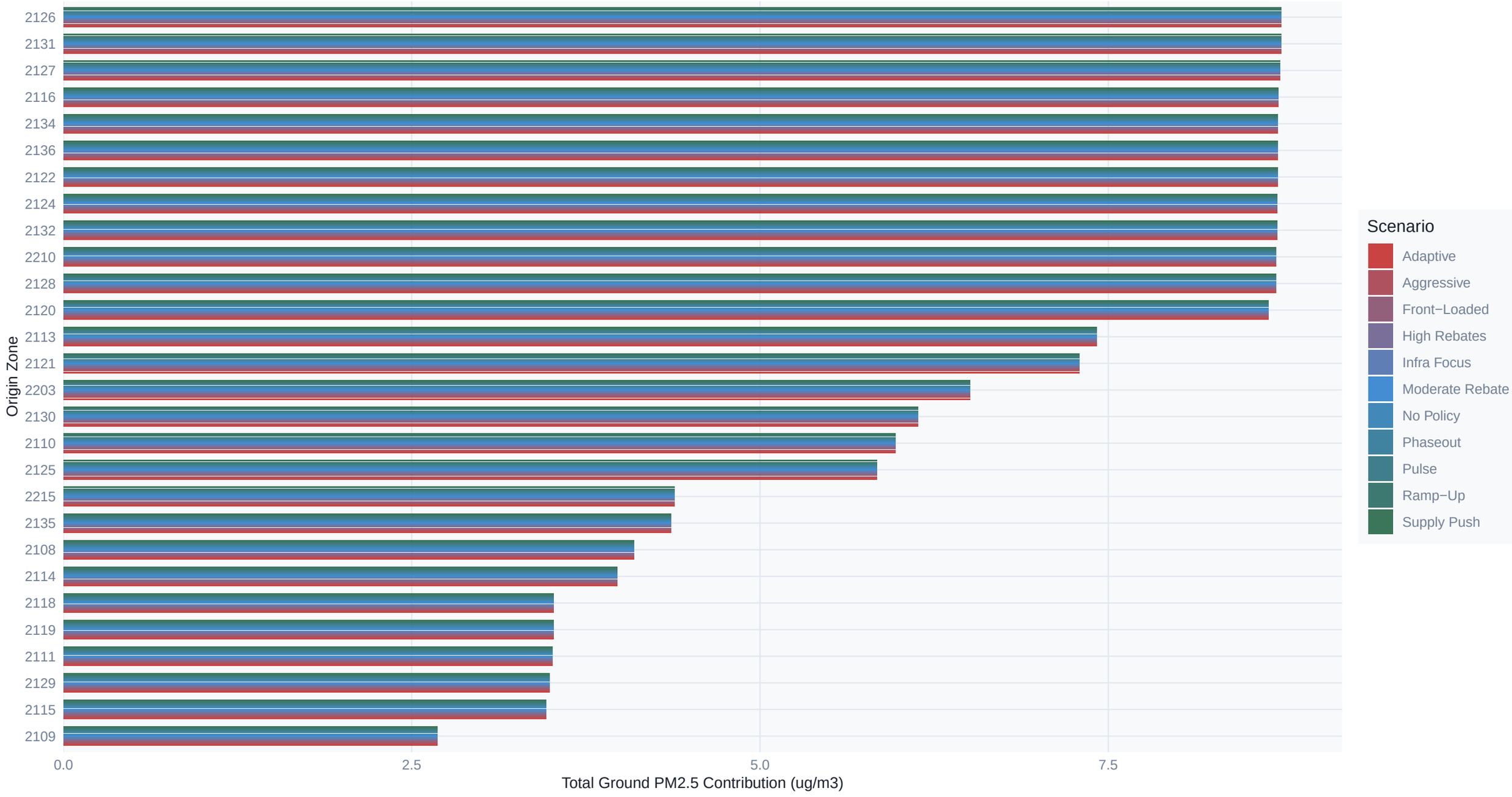
Cumulative Distribution of Peak Ground−Level PM2.5

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



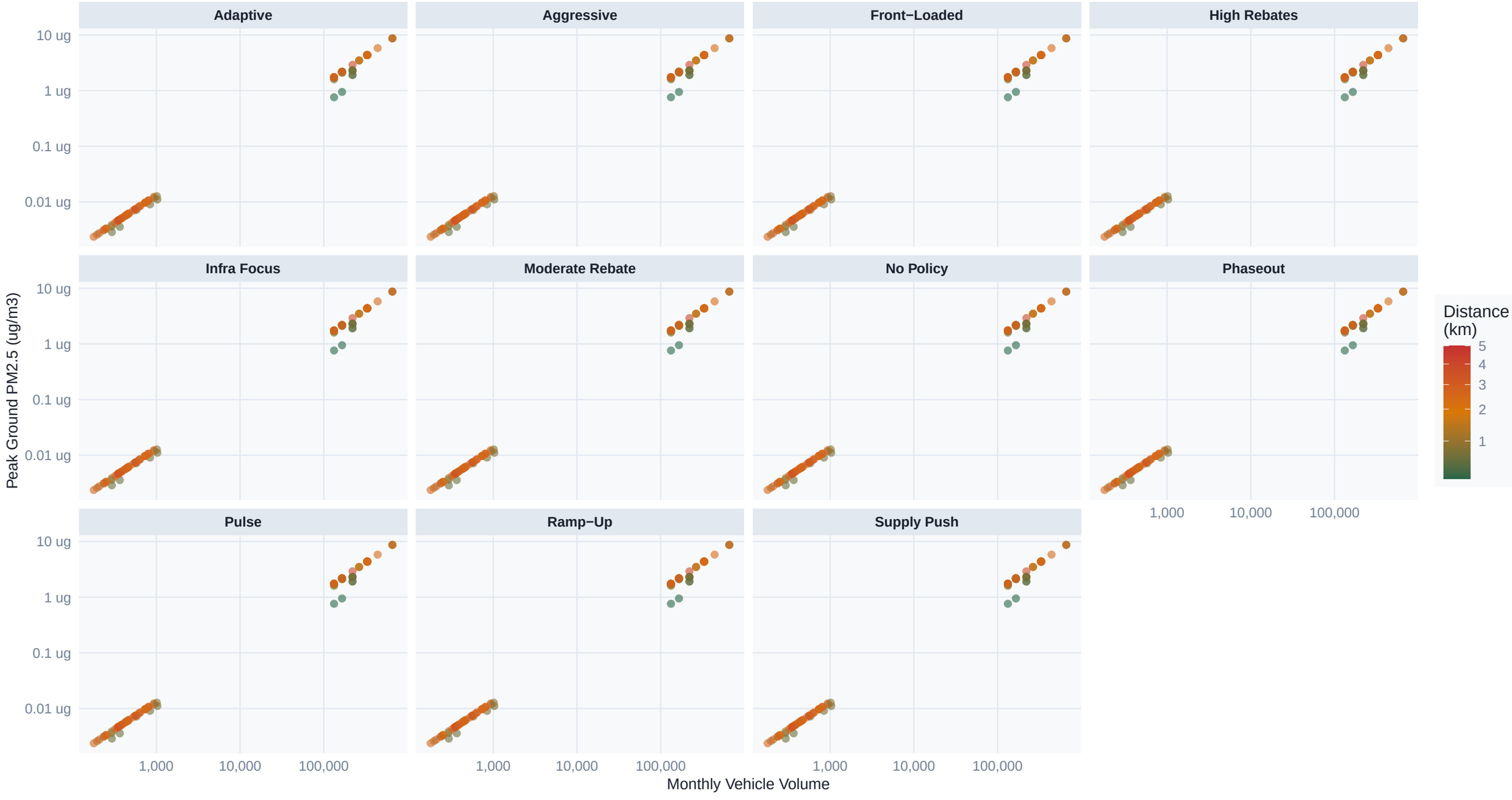
PM2.5 Burden by Origin Zone

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