Health benefits resulting from reductions of wood combustion and PM2.5 emissions in New York State

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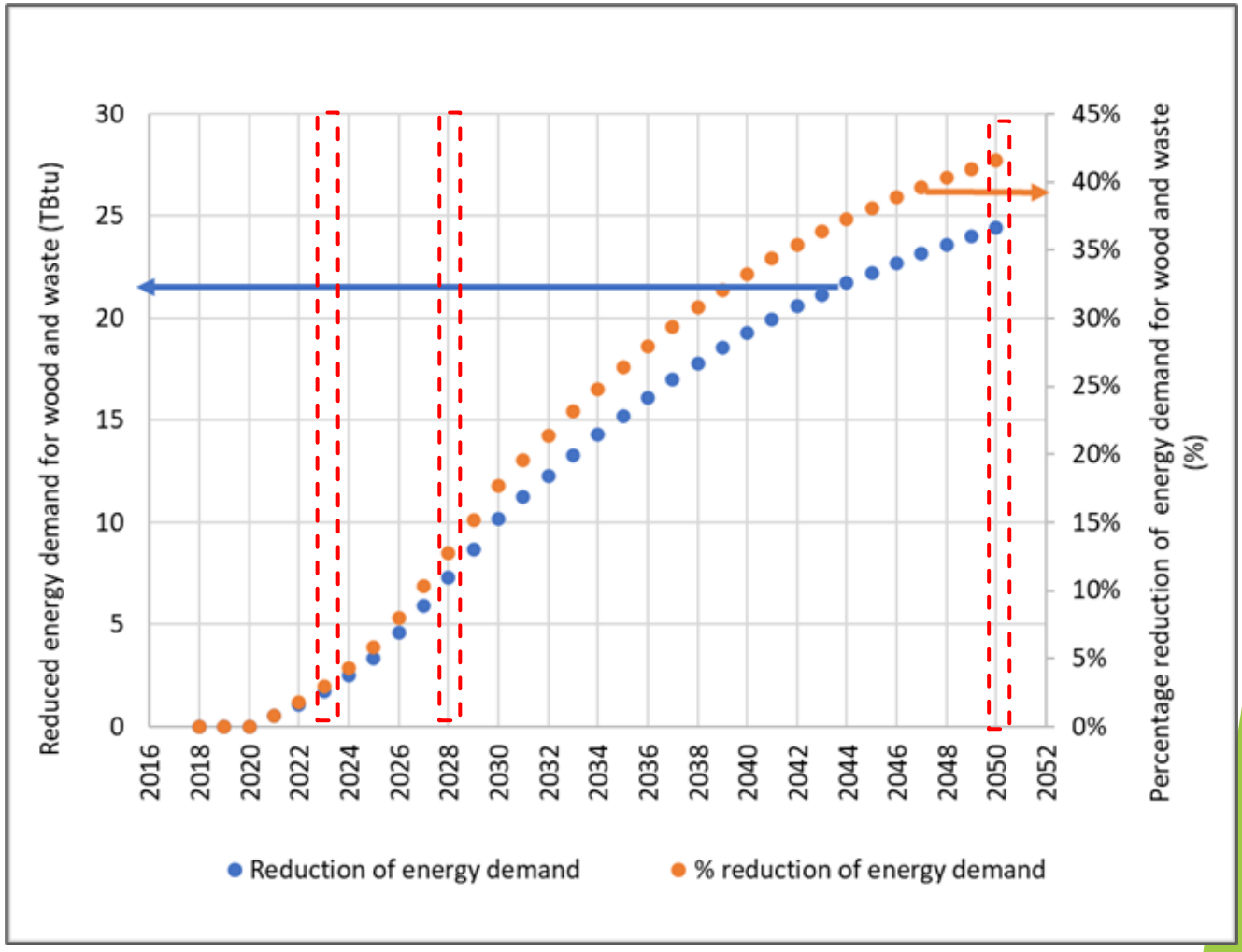
Interpolation and extrapolation of parameters

Parameters	2020	2021-2022	2023	2024-2027	2028	2029-2039	2040	2041-2049	2050
Energy demand projection of wood and waste (in Annual % change)									
Population									
Industrial: fuel consumption_wood/bark									
Residential: fuel combustion_Residential wood									
PM2.5 emissions & precursors % reduction									
Baseline PM in tons per year									
Scenario PM in tons per year									
Baseline PM concentration in ug/m³									
Scenario PM concentration in ug/m³									
Maximum annual average PM concentration reductions									
Delta Incidence (Avoided) for 2023 & 2028									
Delta Incidence (Avoided) for 2050									
Baseline incidence (# of premature deaths caused by PM)									
Unit value of mortality ($/premature death incidence)									
Health benefits									
Precentage of health benefits to other health endpoints									
Beta coefficient									

- Emissions tier in COBRA Tool: Fuel combustion in industrial wood/bark waste and residential wood
- Only colored cells represent the available data. Noncolored cells show the given values were obtained by interpolation and extrapolation.

Reduction of energy demand for wood and waste:

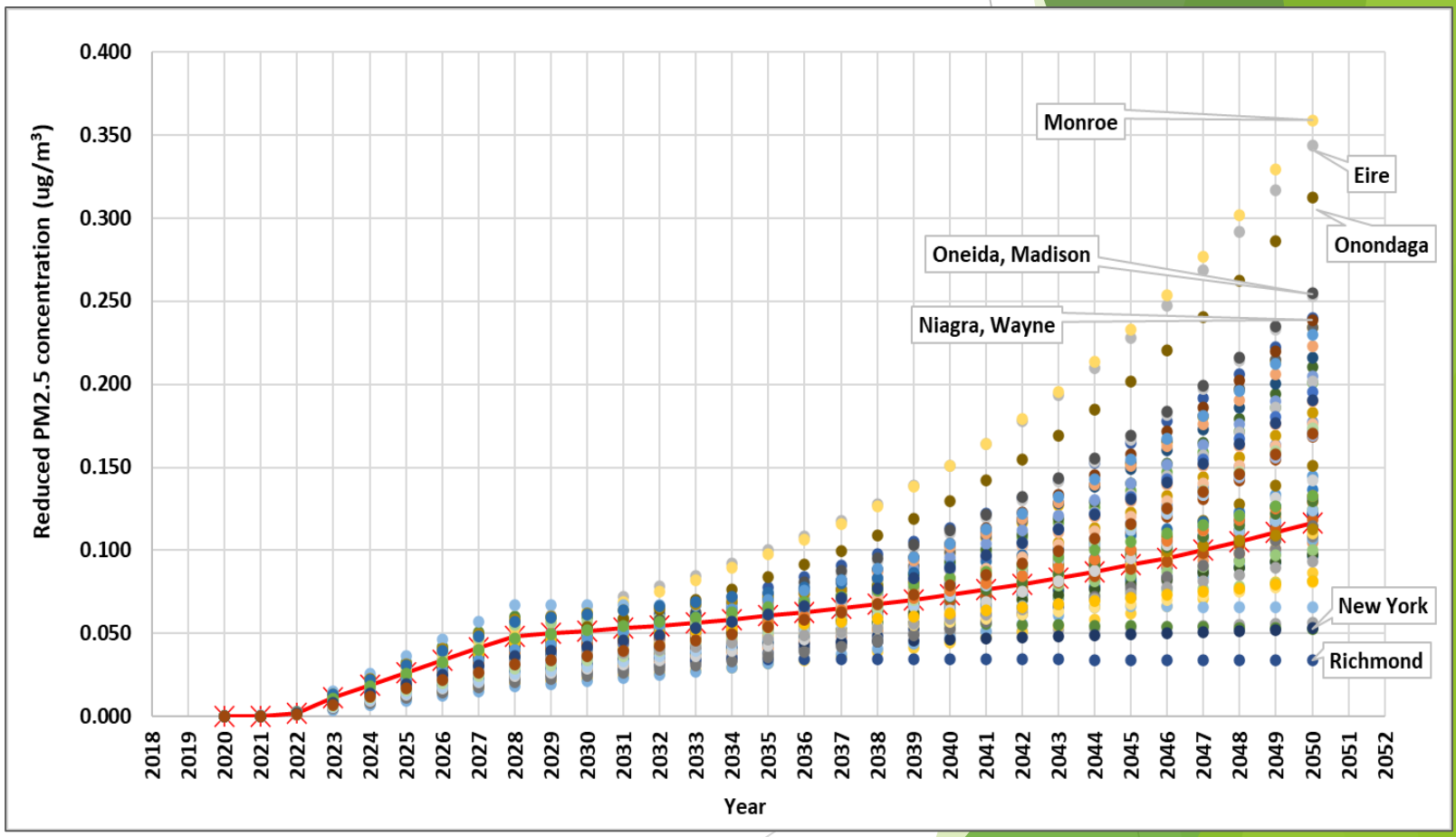
- Difference between Reference case and Strategic Use of Low Carbon Fuels
- Reduction of energy demand for wood and waste
  - ✓ in 2023 = 2.92%
  - ✓ In 2028 = 12.72%
  - ✓ In 2050 = 41.56%



*Tbtu = Trillion British thermal units

Reduced PM2.5 concentrations over time by county, 2020-2050

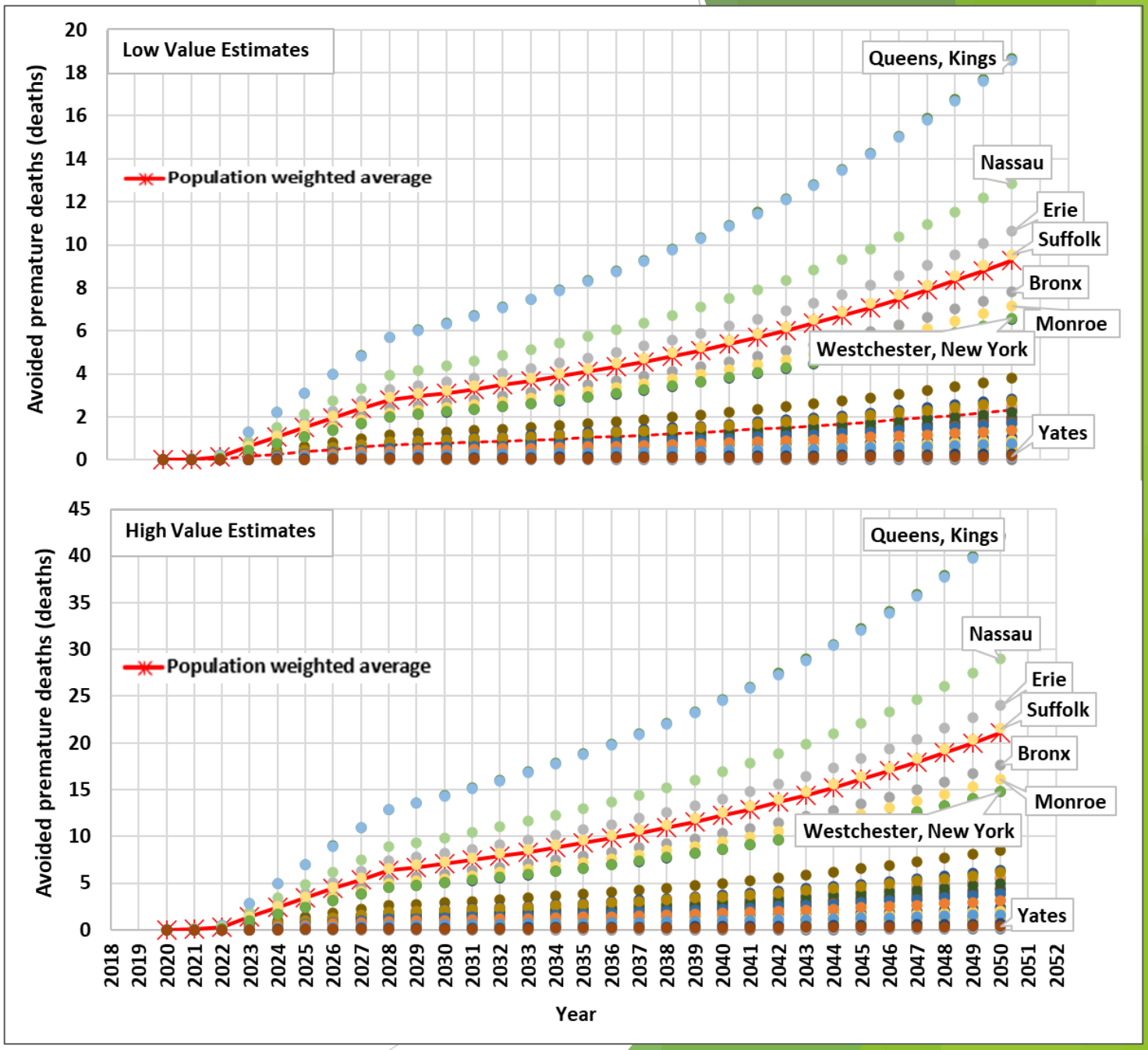
- Highly populated downstate counties: lower PM2.5 concentration reduction
- Relatively small use of wood as energy source
- However, higher avoided premature deaths (Kings, Queens, Nassau, Suffolk, Bronx, Westchester, New York, Richmond)



*μg/m³ = micrograms per cubic meter

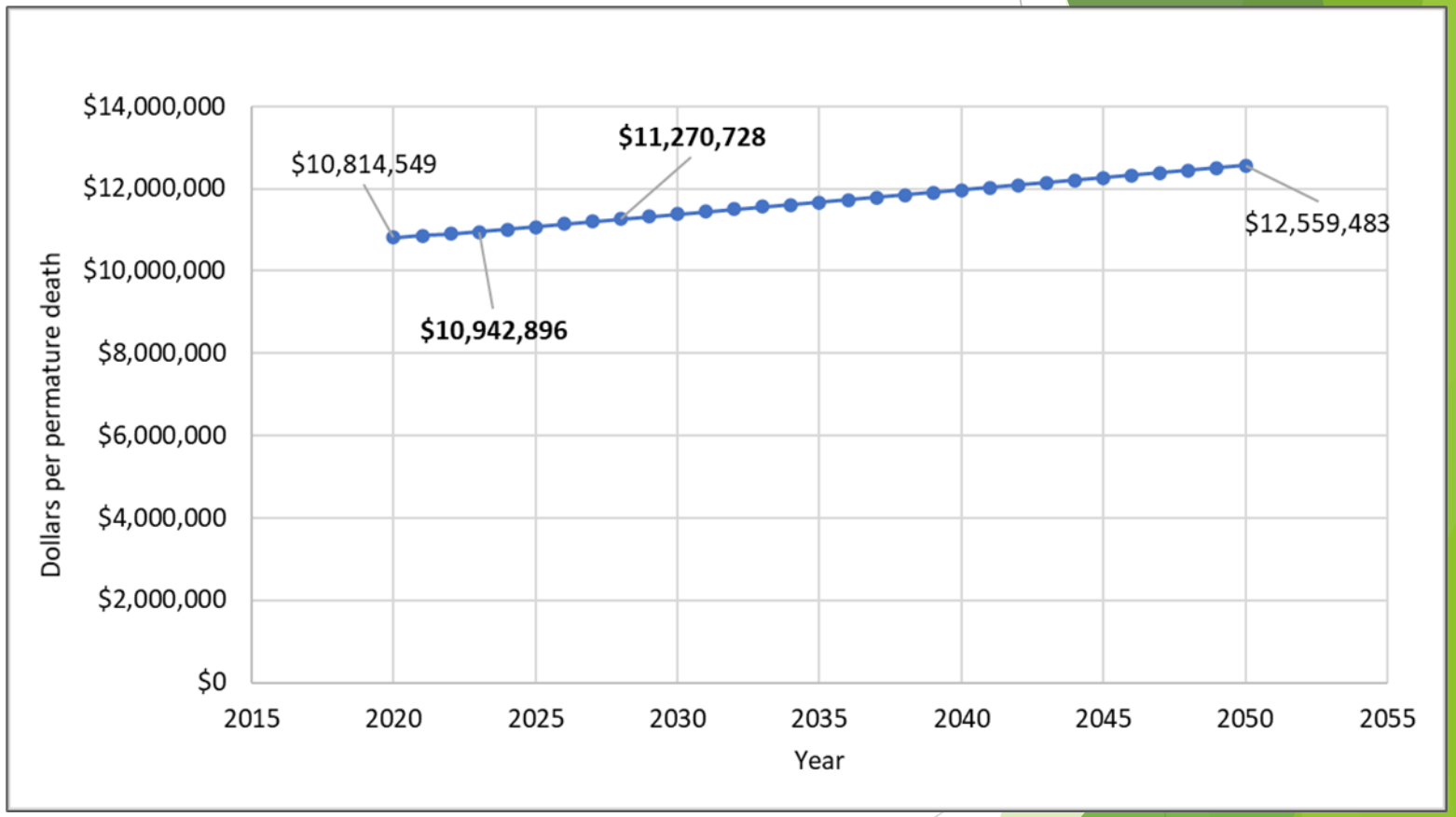
Avoided premature deaths attributed to reductions of PM2.5 emissions over year: Low Value and High Value Estimates

- Annual avoided premature deaths: a function of reduced PM2.5 concentration and county population
- Downstate counties show higher avoided premature deaths
- High Value Estimates show approximately 2x as high as Low Value Estimate case



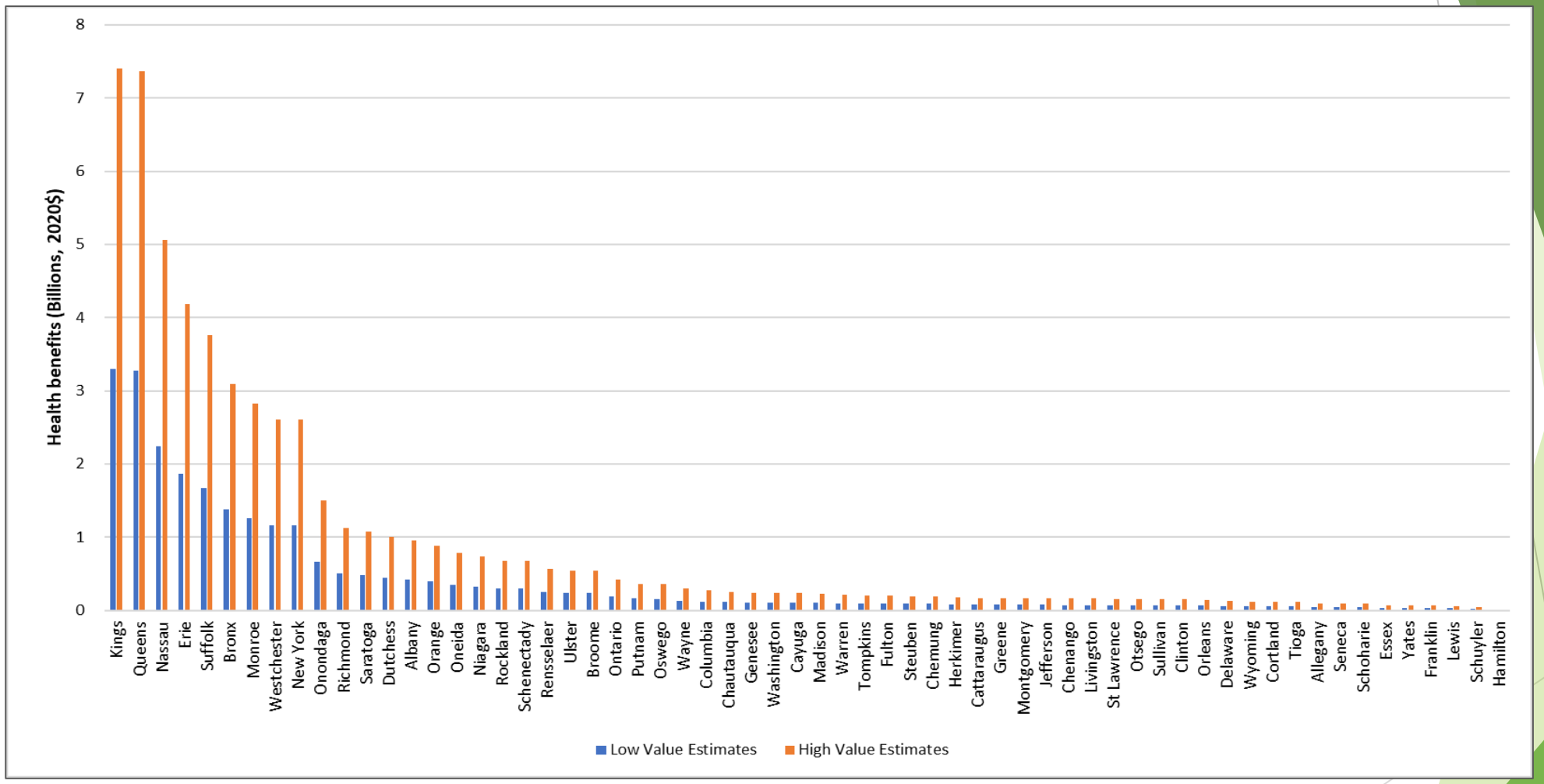
Calculated unit value of mortality

- Value of statistical life (VSL) in $ per premature death
- Average annual growth rate = 0.5%



*USEPA Technical Support Document:
Estimating the Benefit per Ton of Reducing Directly-Emitted PM2.5, PM2.5 Precursors and Ozone Precursors from 21 Sectors

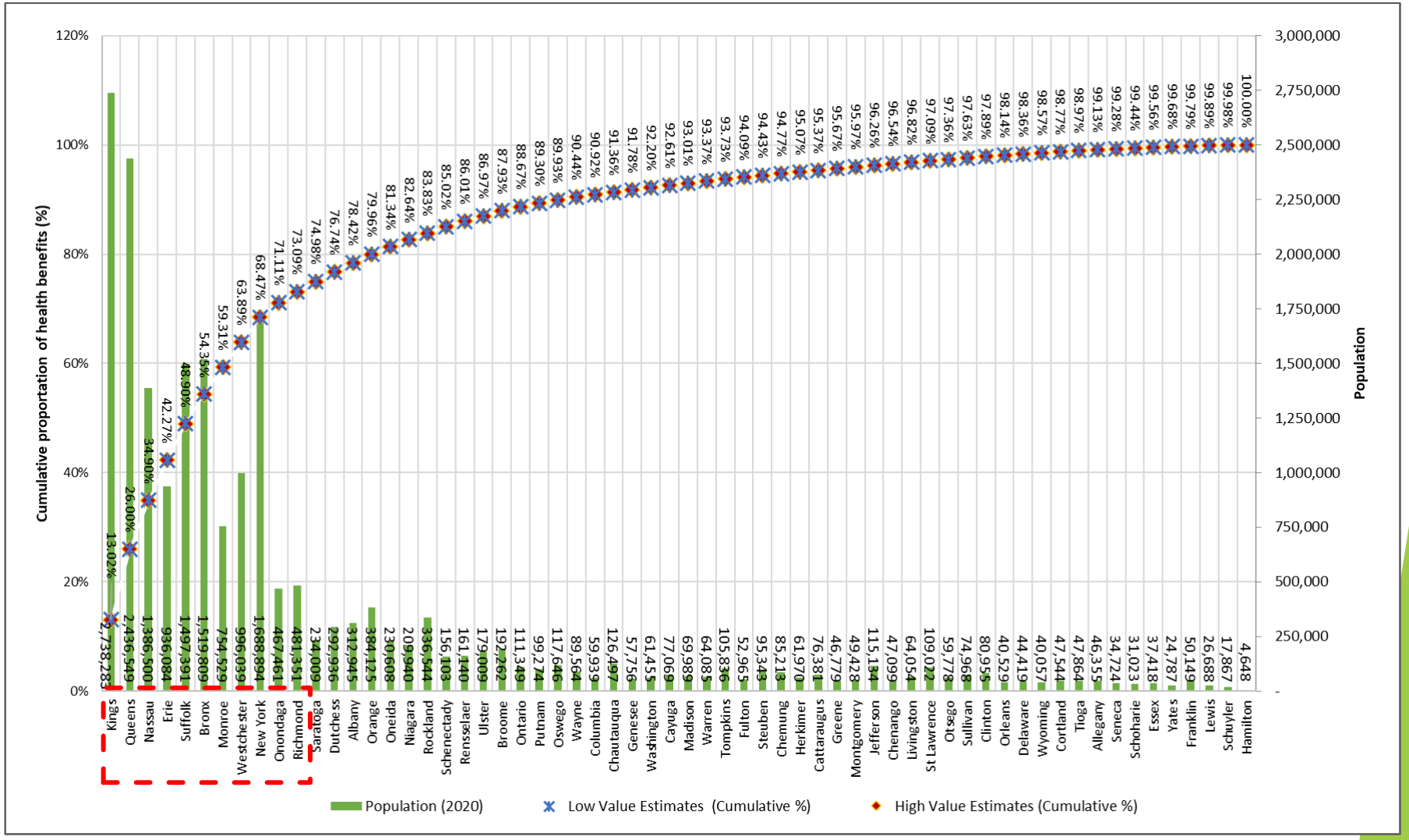
Total health benefits by county (2020-2050)



- Higher incidence rate for High Value estimates
  - ✓ Higher relative risk of PM2.5-attributable premature deaths
- Various health benefits across counties = Urban counties tend to have substantially high health benefits from PM2.5 reduction

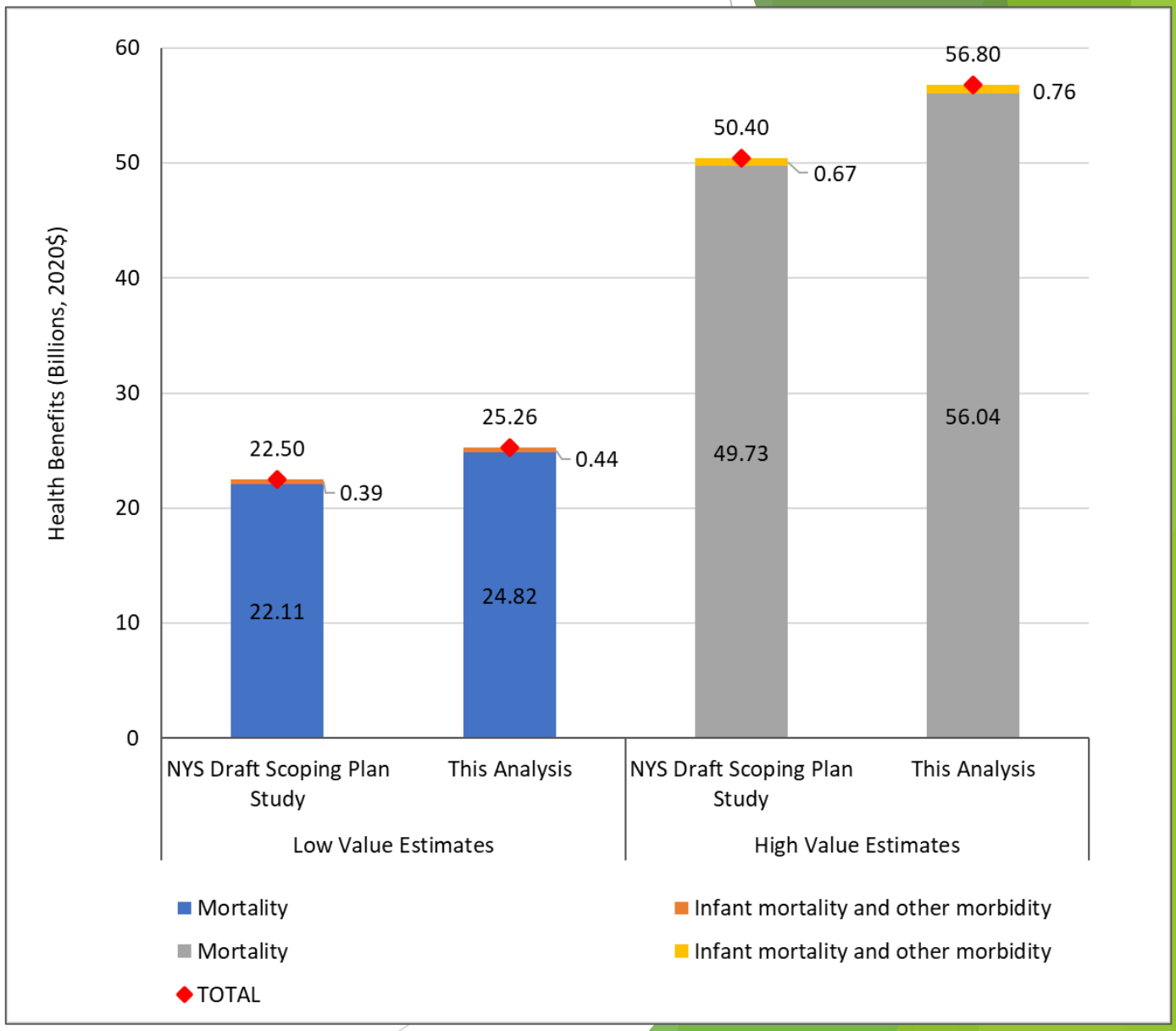
Percentage of cumulative health benefits by county (2020-2050)

- Eight downstate counites = 58% of total health benefits
- The eight downstate counties with three upstate urban counties, Erie, Monroe, and Onondaga = 73%
- Rural counties show small portion of health benefits



Total health benefits: Strategic Use of Low Carbon Fuels

- The benefits of this analysis is 12-13% greater than those of NYS Draft Scoping Plan Study.
- Health benefits of mortality shares 98% of total benefits resulting from wood combustion reduction.



Sensitivity Analysis (Low Value and High Value Estimates)

Parameters	Low Value Estimates				High Value estimates			
	SA1	SA2	SA3	SA4	SA1	SA2	SA3	SA4
Population (age 30-85+)	2.7%	-2.7%	29.6%	-29.6%	2.4%	-2.4%	29.7%	-29.7%
PM concentration changes/reductions	**-100.2%**	**100.2%**	**-3017.5%**	**2985.8%**	**-100.2%**	**100.1%**	**-3037.1%**	**2965.8%**
Mortality beta coefficient	16.5%	-16.5%	30.0%	-30.0%	25.5%	-25.5%	30.0%	-30.0%
Baseline incidence (mortality)	24.6%	-24.6%	29.9%	-29.9%	24.7%	-24.7%	29.8%	-29.8%
Unit value of mortality	4.3%	-4.3%	29.2%	-29.2%	4.3%	-4.3%	29.2%	-29.2%
Health benefits of other health endpoints other than mortality	0.4%	-0.4%	29.9%	-29.9%	0.3%	-0.3%	29.9%	-29.9%

Sensitivity analysis criteria (SA)	Description
SA1	Positive one standard deviation change
SA2	Negative one standard deviation change
SA3	+30% change from average
SA4	-30% change from average

*SA1 and SA2 for mortality beta coefficient used one standard error change for sensitivity analysis due to no standard deviation data found.

Findings

- Eight downstate counties share 58% of total health benefits
  - ✓ $14.68 billions for Low Value Estimates
  - ✓ $33.07 billions for High Value Estimates
- PM2.5 concentration reductions: a highly sensitive parameter
- The PM2.5-attributable health benefits of this analysis is 12-13% greater than those of the NYS draft scoping plan study.

Thank you!

Questions