Young Researchers Seminar 2013

Lyon, France , June 5-7 2013

Laboratoire d'Economie des Transports
Unité Mixte de Recherche du CNRS n° 5593
Université Lumière Lyon 2 - ENTPE

Measuring air pollution using a mobile, bicycle-based platform

Implications for cyclists' and pedestrians' exposure to particulate urban air pollution

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ECTRI
European Conference of Transport Research Institutes

FERSI
Road Safety Research

Issue/objective: Health impacts of neighborhoods

High-walkability



Low-walkability



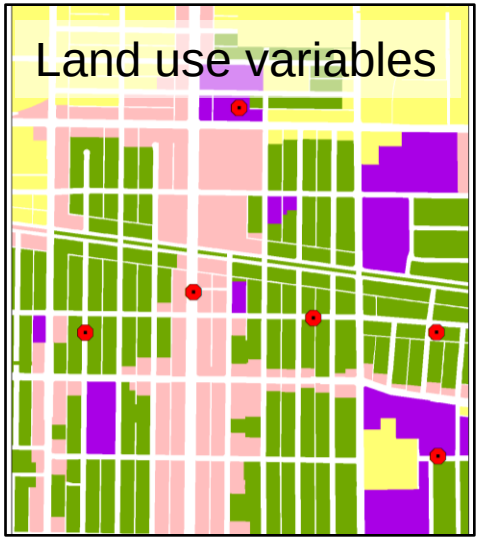
↑ **Physical activity** ↓

↑ **Air pollution** ↓

Approach: Mobile, bicycle-based sampling

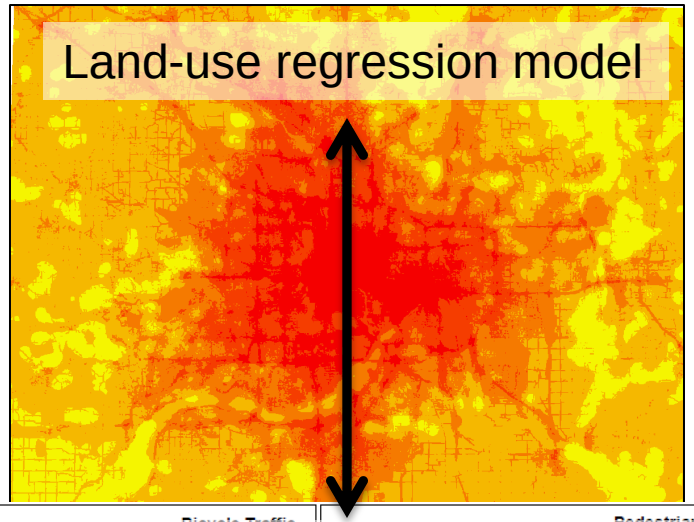


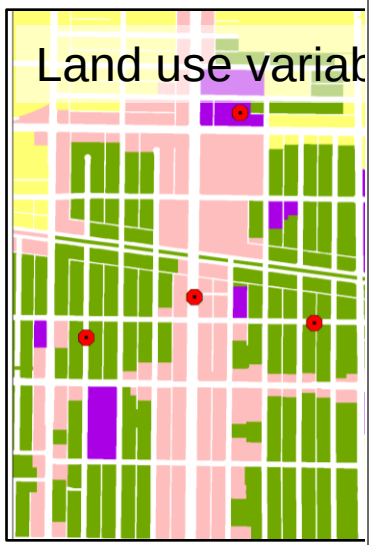


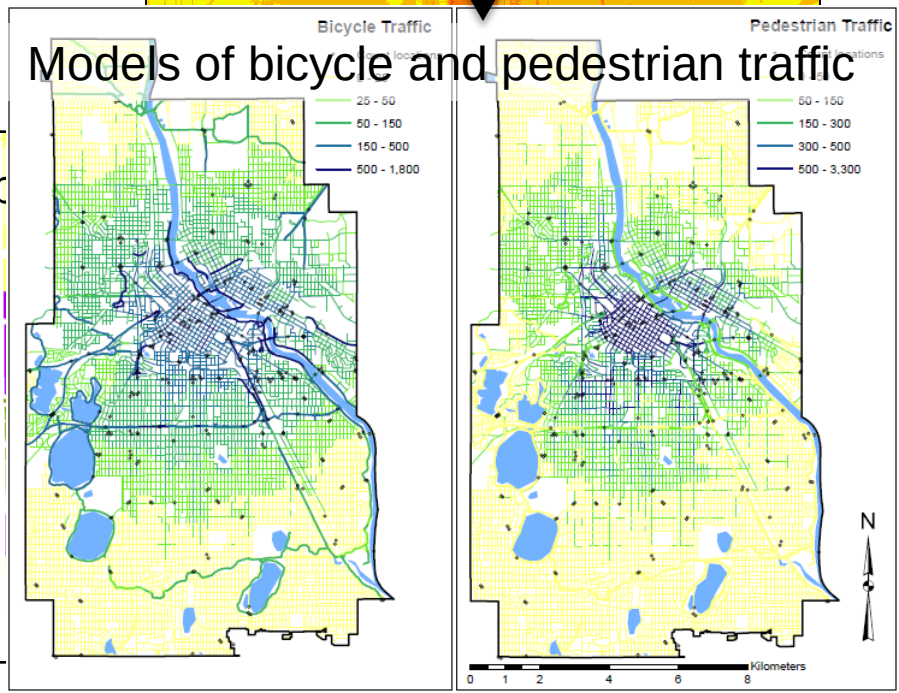


Approach: Mobile, bicycle-based sampling





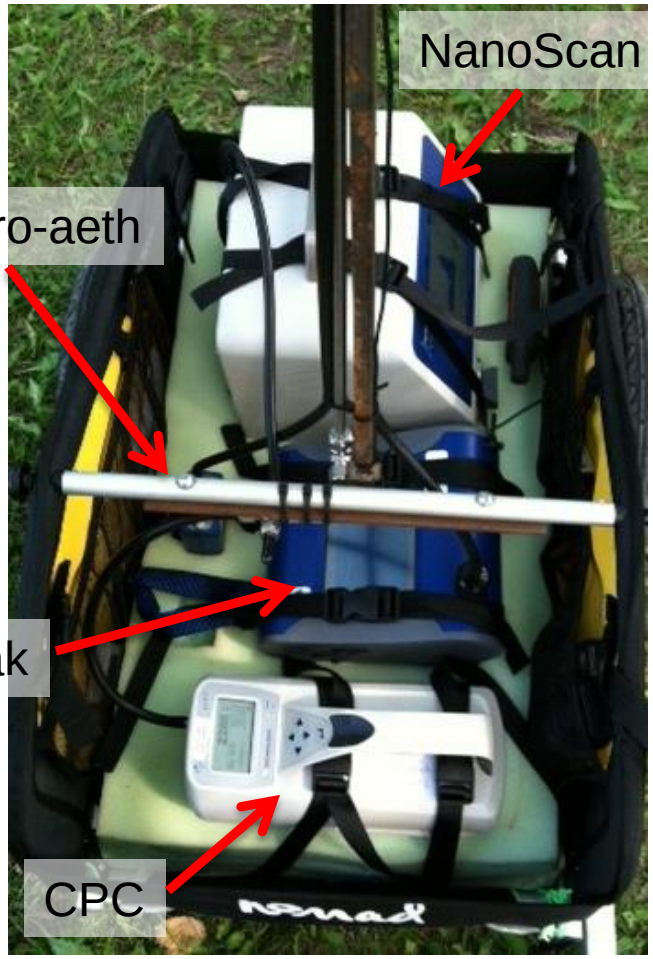




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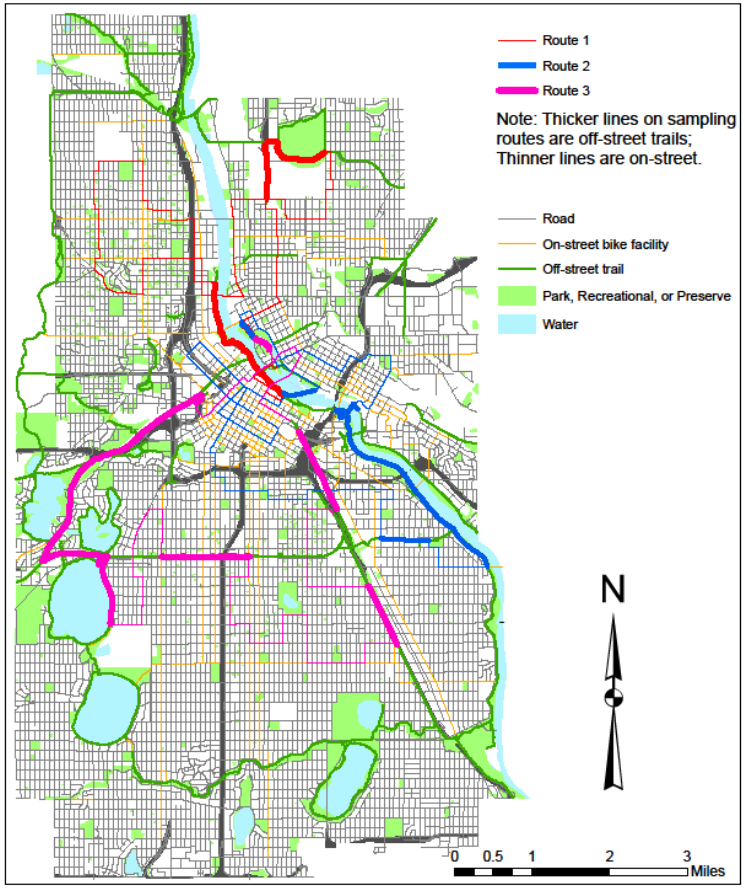
Methods: Sampling apparatus

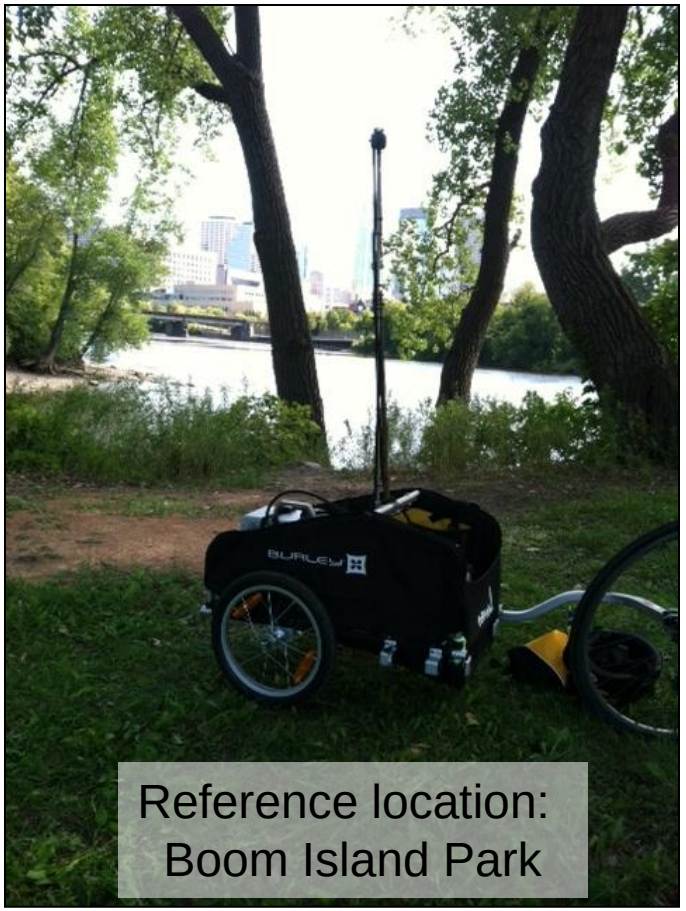




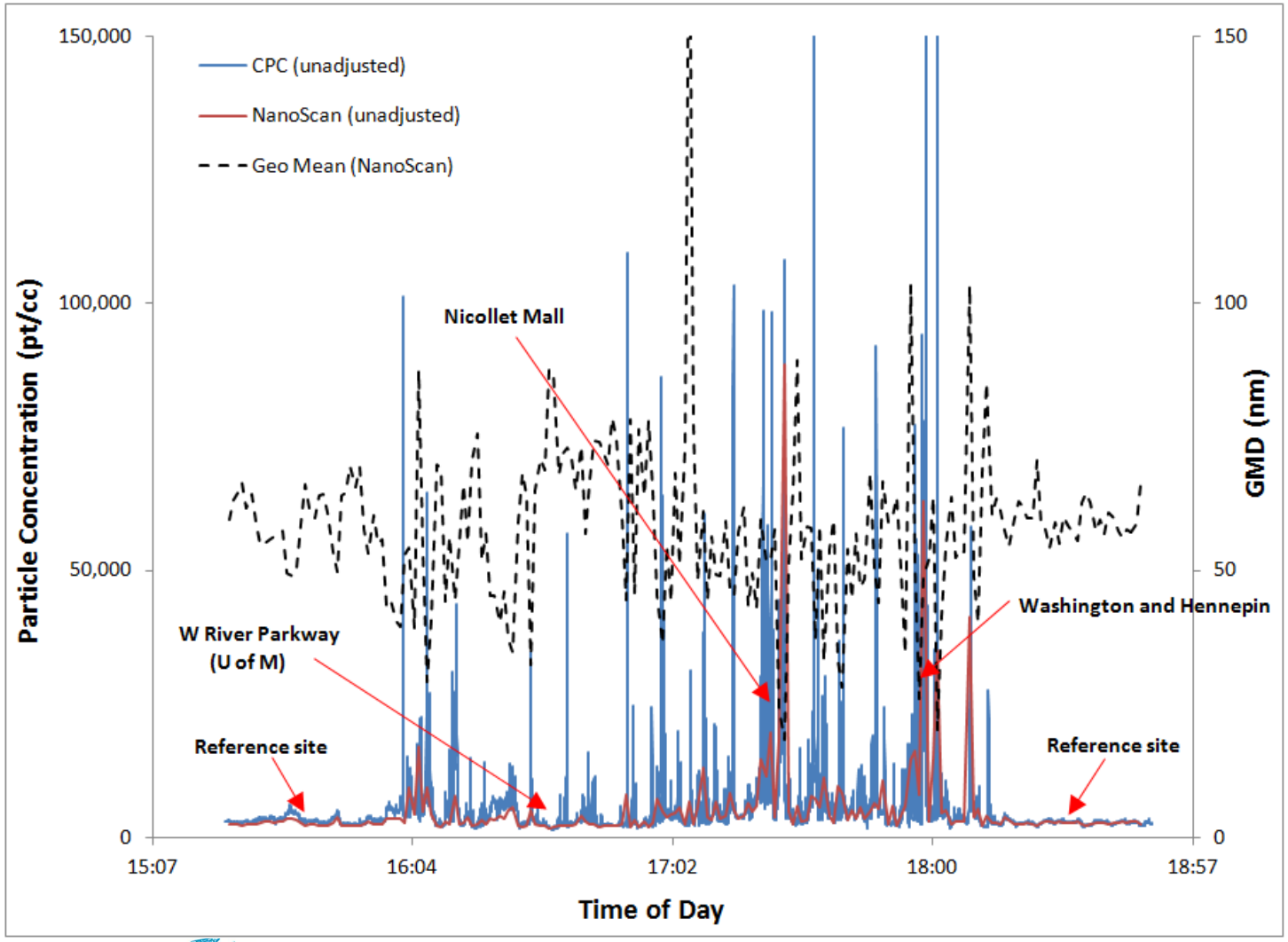
Methods: Sampling routes and protocol

Map 1: Sampling Routes





Results: Example of sampling run

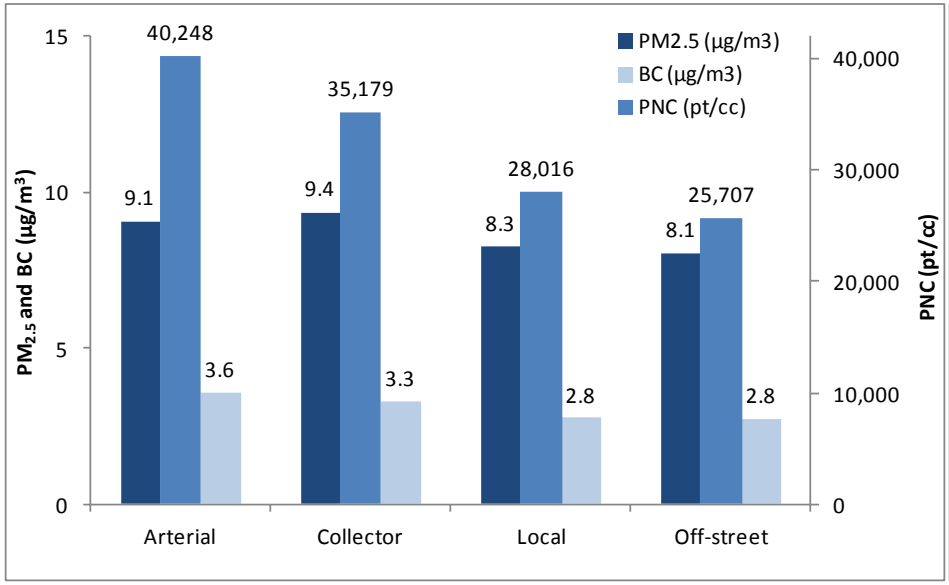


Results: Morning/afternoon rush hour

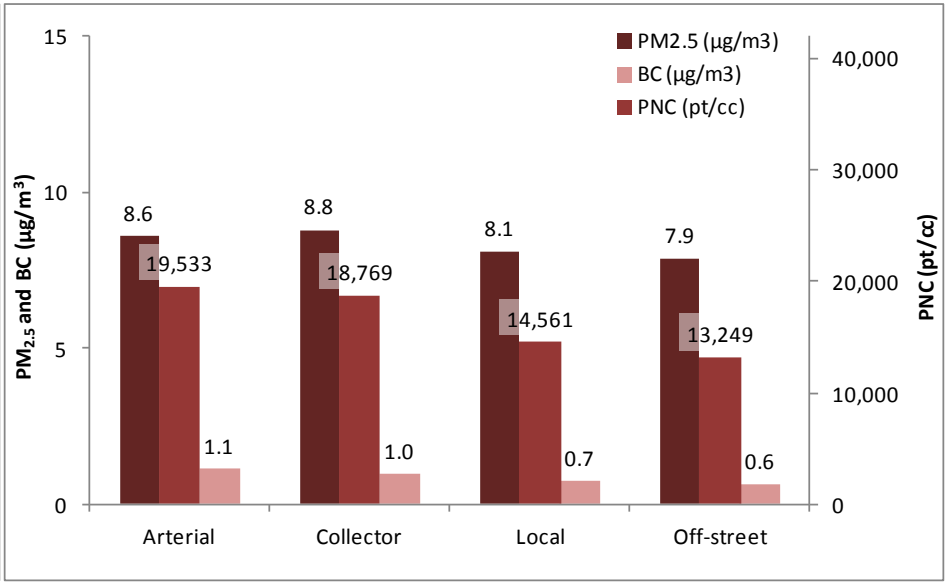
	Morning (7-9am)				Afternoon (4-6pm)				Morning: Afternoon ratio
	Sampling days	Mean on-road	Mean reference	Ratio	Sampling days	Mean on-road	Mean reference	Ratio	
PNC (pt/cc)									
CPC 3007	12	32,446	15,800	**2.2**	30	16,717	11,737	**1.5**	**1.9**
NanoScan	12	26,820	13,279	**2.2**	29	14,313	9,776	**1.6**	**1.9**
$PM_{2.5}$ ($\mu g/m^3$)	12	8.6	8.2	**1.2**	29	8.4	7.7	**1.2**	**1.0**
BC ($\mu g/m^3$)	12	3.1	2.0	**2.2**	21	0.89	0.46	**2.3**	**3.5**
Particle size (GMD)	12	41.5	42.6	**1.0**	29	39.1	39.3	**1.0**	**1.1**

Results: Street classification

Morning (7-9am)

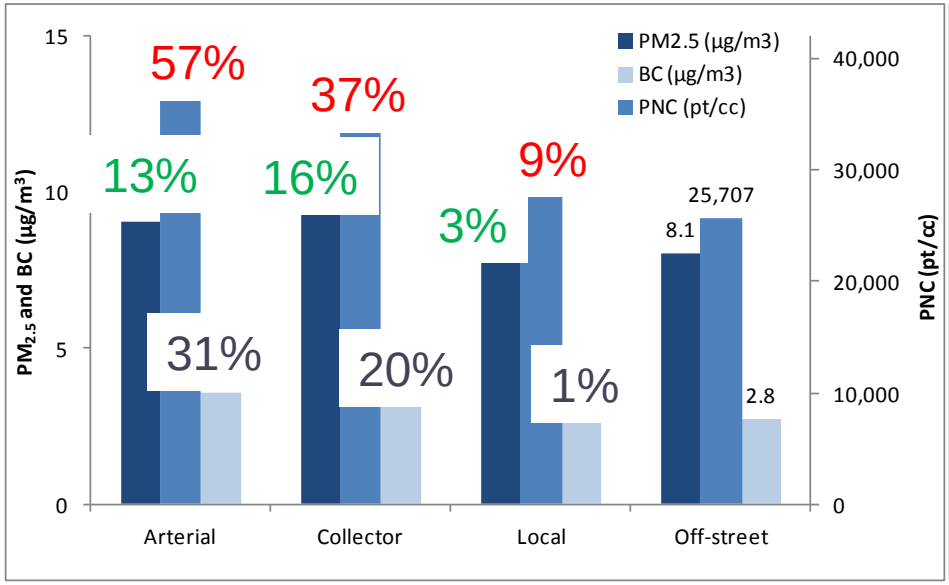


Afternoon (4-6pm)

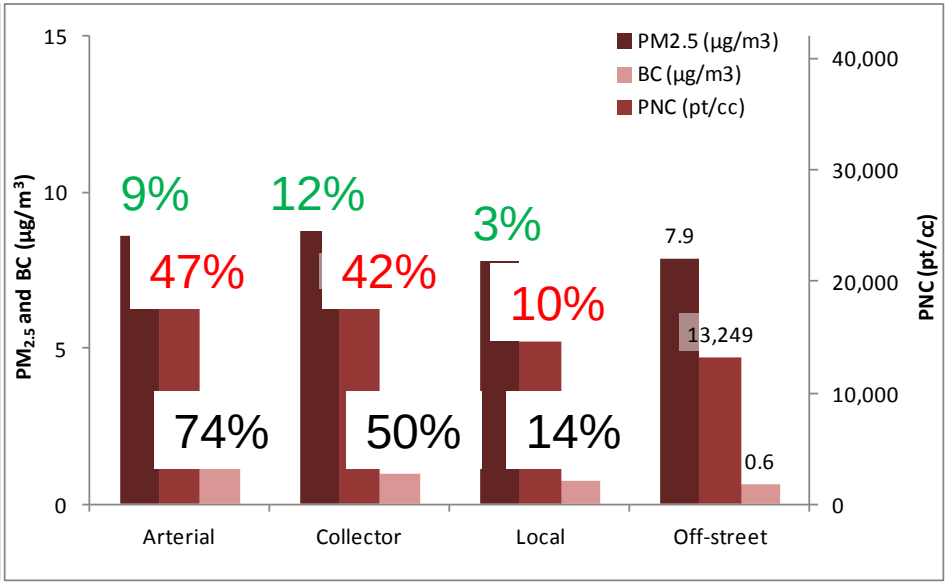


Results: Street classification

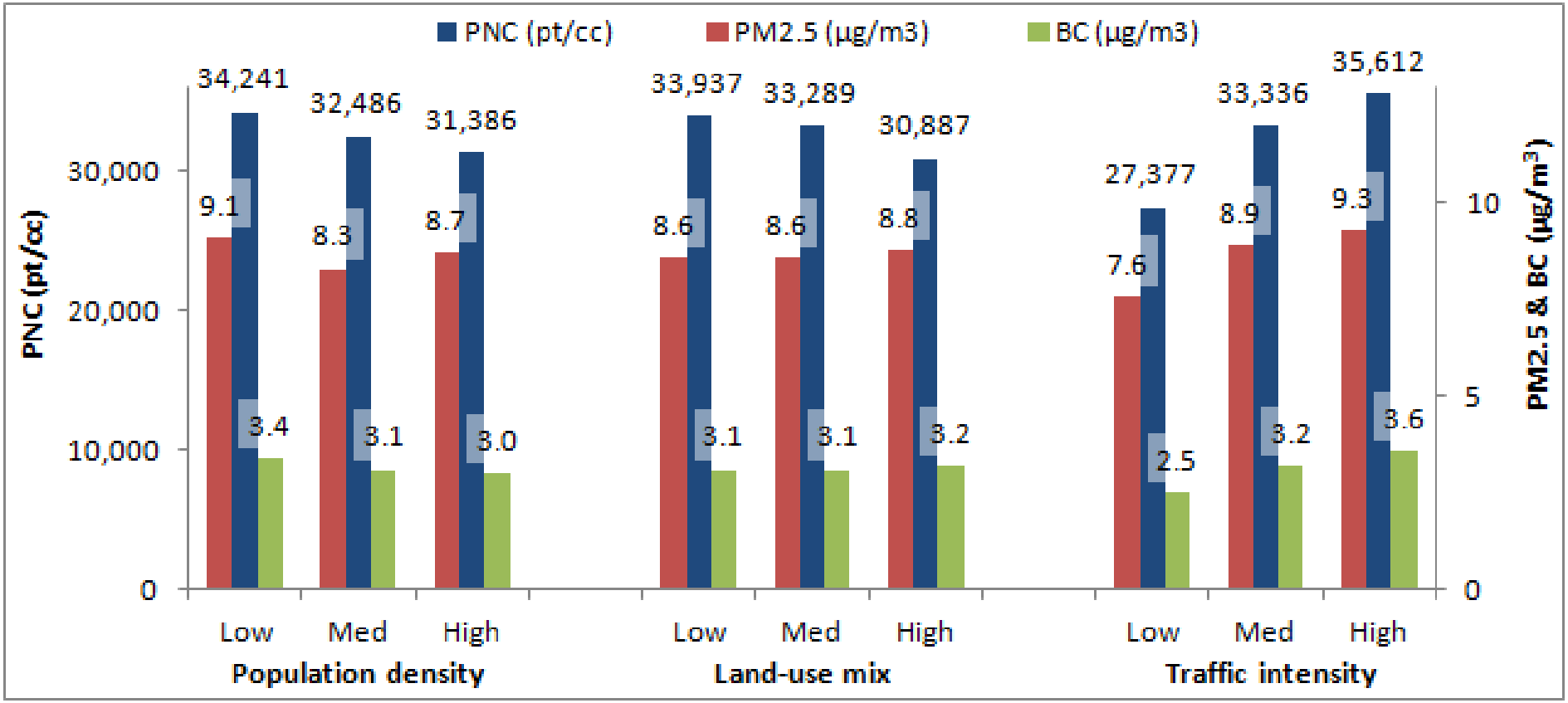
Morning (7-9am)



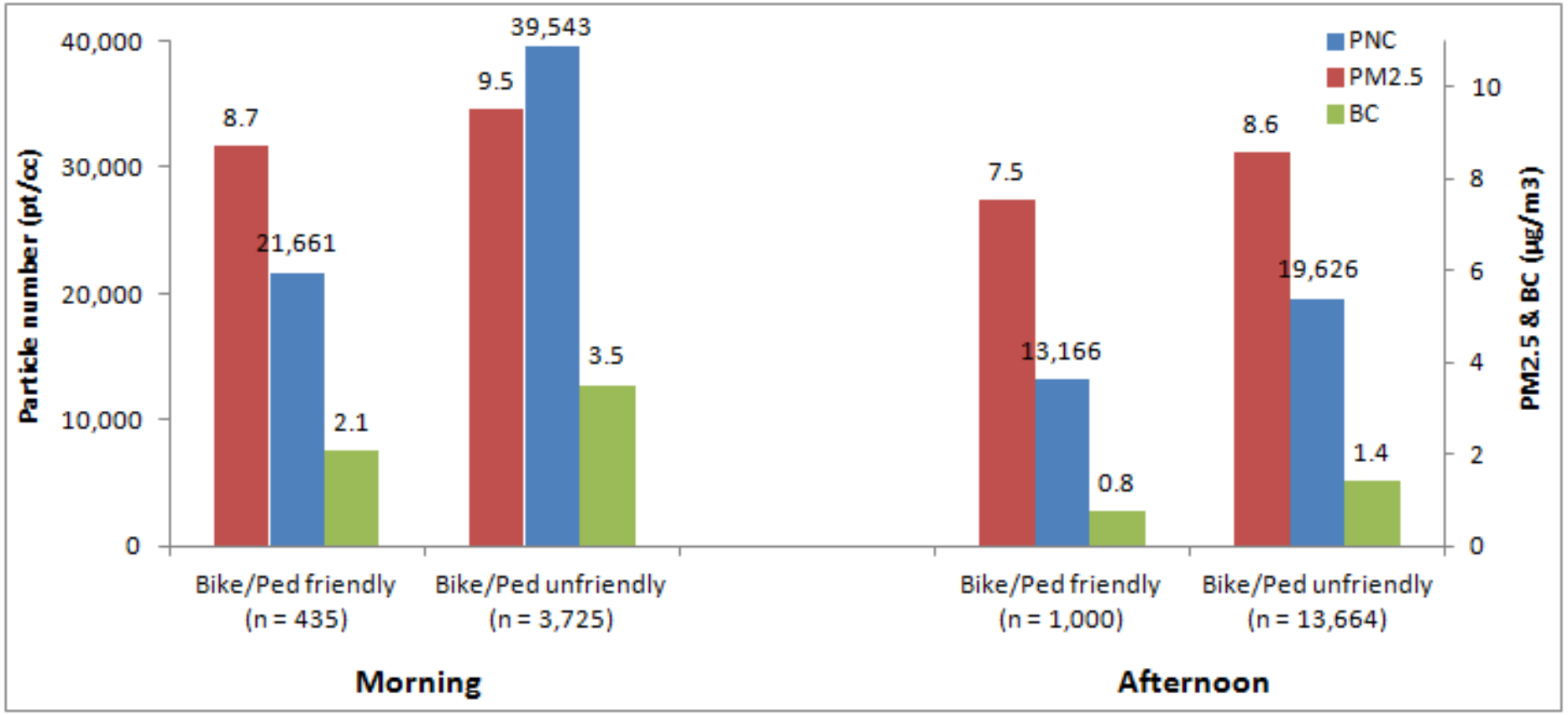
Afternoon (4-6pm)



Results: Impacts of built environment



Results: Bike/ped friendly environments?



Next steps: Dissemination of results

1. Make block-specific air pollution estimates publicly available.

2. Integrate data into existing bike/walk tools (e.g., Cyclopath).

3. Make recommendations for future bike/walk infrastructure location.

Take away points

1. Particle concentrations are higher on-road (factor of 1.5-2.5) and in the morning (factor of 2-3).

2. Particle concentrations are associated with street classification and traffic intensity (maybe associated with density, land-use?).