EPA
United States
Environmental Protection
Agency

Region 5 Air Communities Work:
2019 MCDI Meeting

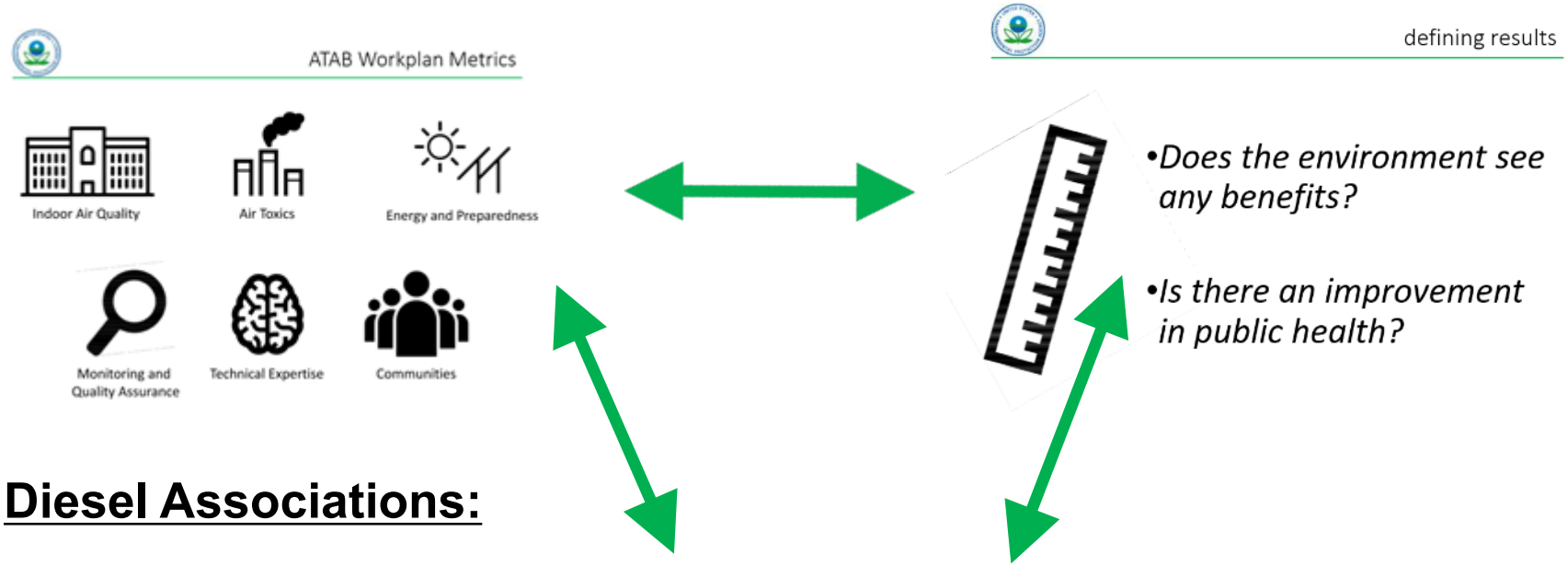
Sheila Batka, EPA

EPA United States Environmental Protection Agency

Region 5 Air Communities Session:

- Focused Goals for Region 5 (R5) Air Community Work
- R5 Air Communities
- Ways the Air Community Work is Incorporating a Diesel Emissions Focus
  - Indoor Air Quality (IAQ) Building Assessment Walkthroughs
  - Supplemental Environmental Projects (SEP) Opportunities
  - Other Projects – Detroit/Oakland ORD RESES Project for Near-roadway vegetative barriers research project.

Focused Goals for R5 Air Community Work



Diesel Associations:

Indoor Air Goals: Assist schools, child & senior care centers, & other public buildings in identifying & remedying indoor air problems (includes OA sources of concern).

Technical Assistance: Provide & evaluate technical assistance requested by community and see where it can be replicated

Academic Institution: Partner on community-based air projects and see where they can be replicated with other institutions

Supplemental Environmental Projects (SEPs): Incorporate community-based SEPS into settlements

R5 Air Communities' Process

- ***Select Communities*** based on:
  - » *density of sources*
  - » *existing relationships or projects*
  - » *EJ screen*
  - » *data review*
  - » *NGO, local govt. air concerns, etc.*
- ***Engage groups*** and collect data to identify opportunities
- ***Partner*** to deliver resources and achieve results

R5 Air Communities

United States Environmental Protection Agency

Cleveland (HQ/R5 2002)	Alton (2014)	Southeast Chicago (2014)	Illinois I-55 Corridor (2014)
Kenosha/ Racine (2014)	Toledo	Kalamazoo	Indianapolis
Cincinnati	New Brighton	Dayton	East St. Louis (2018-Rochele Marcelliers/Mickey Jencius)
Waukegan/ N. Lake Co, (2018-Ben Weiss)	Green Bay/ Oneida (2018-Monica Paguia)	Detroit (2018-Megan Gavin)	Southeast Wisconsin (2018-Andrew Meindl)

EPA United States Environmental Protection Agency

R5 Air Community Work Includes:

- Diesel Retrofit Projects
- Bus & Car Idling Management Work
- ENERGY STAR Benchmarking
- IAQ Walkthroughs
- Radon Testing & Mitigation
- Community Requested/Non Air Projects, such as coordinating on Scrap Tire Issues
- Outreach Projects, such as the Flag Program, Sensor Loan Program

EPA United States Environmental Protection Agency

R5's Air Community Work Highlights

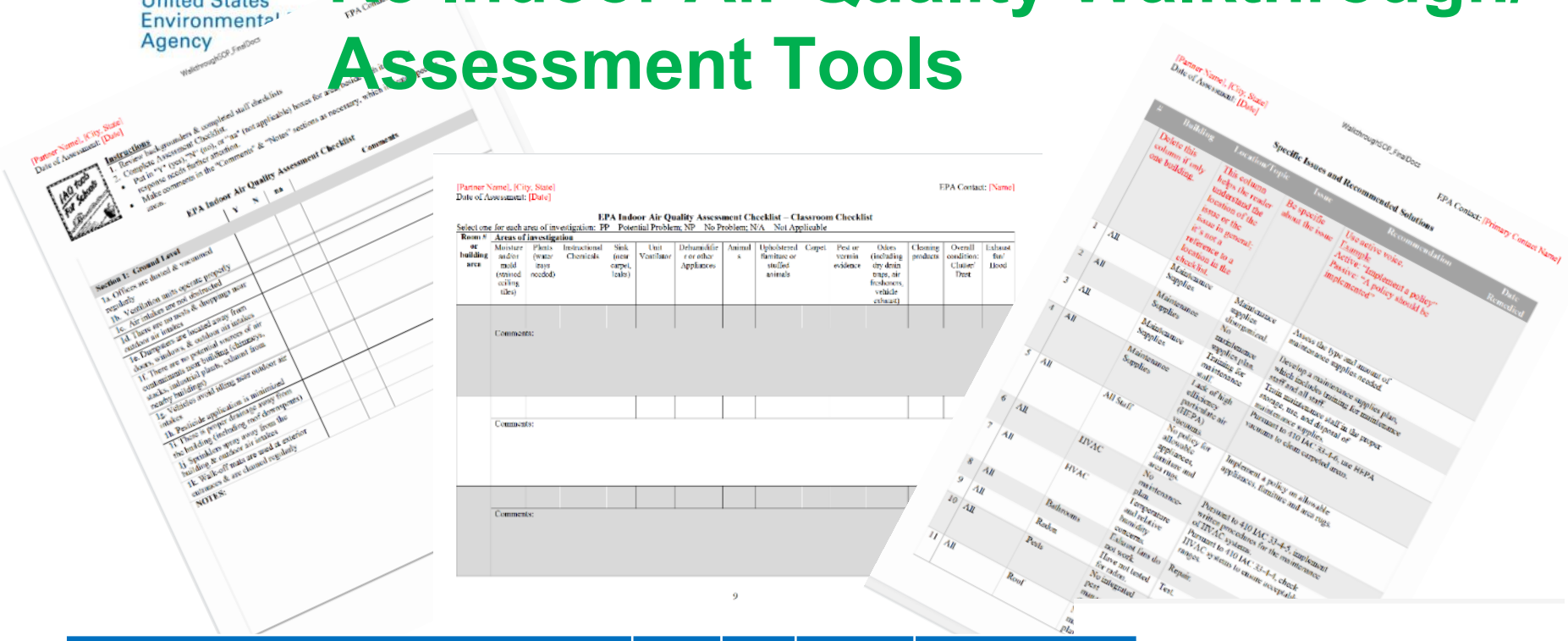
- ***Anti Idling Signs*** - Provided to Gary Public Schools
- ***IAQ Walkthrough Assessments*** - Schools, daycares and senior centers in all locations within several communities. Includes review of outdoor grounds (drop-off/pick-up & near roadway) and ventilation/air intakes/filtration .
- ***Community Requested EPA Inspections -*** Scrapyard and issued a violation. Settlement included a SEP for a boiler in a school district.
- ***Community Requested Trainings and Meeting Collaboration*** – Asthma Management, Daycare Inspector Environmental Training incorporating Air Contaminant Concerns, Black Carbon & NO_2 Air Sensor Hands-On Training for Use at Near roadway locations – both in Detroit
- ***Historic Building Preservation & Energy Conservation Work*** - Worked with local partners to develop cost-effective ways to preserve integrity of historic buildings while making them more energy efficient

EPA United States Environmental Protection Agency

Region 5 Air Communities Session:

- Focused Goals for Region 5 (R5) Air Community Work
- R5 Air Communities
- Ways the Air Community Work is Incorporating a Diesel Emissions Focus
  - Indoor Air Quality (IAQ) Building Assessment Walkthroughs
  - Supplemental Environmental Projects (SEP) Opportunities
  - Other Projects – Detroit/Oakland ORD RESES Project for Near-roadway vegetative barriers research project.

R5 Indoor Air Quality Walkthrough/ Assessment Tools



	n/a	Ok	Follow Up	Observations
OUTSIDE GROUND LEVEL				
No potential sources of air contaminants near building (chimneys, stacks, industrial plants, exhaust from nearby buildings)				
Vehicles do not idle near outdoor air intakes				

APPENDIX A: OPTIONAL INVITATION EMAIL FOR SCHOOLS

ear **[Recipient Name]**:

he health and comfort of students and teachers are among the many factors that contribute to arning and productivity, which in turn affects performance and achievement. EPA's Indoor ir Quality (IAQ) Tools for Schools Action Kit is a comprehensive resource that can help you aintain a healthy environment in your buildings, by identifying, correcting, and preventing IAQ roblems. The Action Kit contains easy steps that shows schools how to carry out a practical lan to improve indoor air problems at little- or no-cost using straightforward activities and in- ouse staff.

PA wants to help your school start or advance its indoor air quality plan by conducting an IAQ ssessment of your school building(s). Conducting an assessment is a key step in improving door air quality. We can help you identify IAQ issues and provide recommendations to ldress the findings. We have partnered with many schools throughout the Midwest—schools ommitted to improving indoor air quality. We want your school to be one of them.

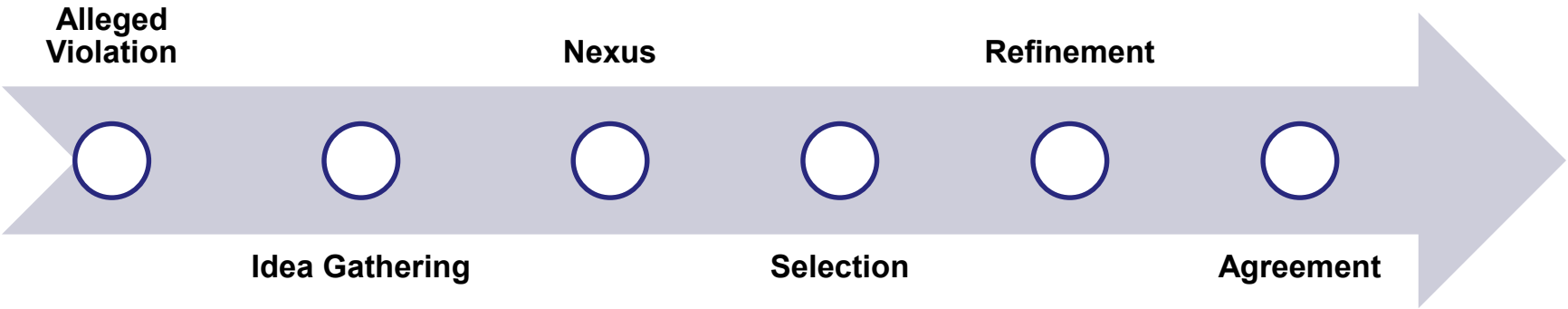
o take advantage of this opportunity, we ask you to:

- Sign and return our Commitment Letter (attached);
- Select an IAQ Coordinator and establish an IAQ team to address IAQ issues within the school;
- Work with EPA to conduct an IAQ assessment of your school(s);
- Adopt EPA's recommendations to address IAQ issues where feasible;
- Educate and help spread the word about the importance of indoor air quality to your staff, students, parents, and community; and
- Share your progress and milestone achievements with EPA.

SEPs – What Are They?

- ***Voluntary project(s)*** which is/are part of a settlement in which an alleged violator agrees to undertake an environmentally beneficial project related to the violation in exchange for mitigation of the penalty to be paid.
  - Violators must still return to compliance with the law
- SEPs Must:
  - Be well-defined projects with ***tangible benefits***
    - Improve, protect, or reduce risks to public health or the environment;
  - Have a ***nexus***, or relationship, between the project and the alleged violation(s)
  - Go ***beyond compliance*** what is and not otherwise required by law;
  - ***Not augment*** federal funding or appropriations;
  - Have ***significant, quantifiable benefits*** to public health or the environment;
  - Be part of a ***settlement that includes a cash penalty***

Standard SEP Idea Gathering Process



Near Roadway Barriers

- Positive attributes includes improving air quality
  - Noise barriers reduce noise and can improve aesthetics
  - Roadside vegetation can:
    - Reduce stormwater runoff/flooding
    - Improve water quality
    - Increase carbon sequestration
    - Reduce urban heat island effects
    - Improve aesthetics/property values
    - Enhance community livability
    - Generally improve public health

Green spaces and cognitive development in primary schoolchildren

Payam Dadvand[a,b,c,1], Mark J. Nieuwenhuijsen[a,b,c], Mikel Esnaola[a,b,c], Joan Forns[a,b,c,d], Xavier Basagaña[a,b,c], Mar Alvarez-Pedrerol[a,b,c], Ioar Rivas[a,b,c], Mònica López-Vicente[a,b,c], Montserrat De Castro Pascual[a,b,c], Jason Su[e], Michael Jerrett[g], Xavier Querol[h], and Jordi Sunyer[a,b,c,i]

[a]Centre for Research in Environmental Epidemiology (CREAL), 08003 Barcelona, Spain; [b]Environmental and Health Sciences, Pompeu Fabra University, 08008 Barcelona, Catalonia, Spain; [c]Ciber en Epidemiología and Public Health (CIBERESP), 28029 Madrid, Spain; [d]Department of Genes and Environment, Division of Epidemiology, Norwegian Institute of Public Health, 0473, Oslo, Norway; [e]Department of Geosciences, Institute of Environmental Assessment and Water Research, Spanish National Research Council (CSIC-IDAEA), 08034 Barcelona, Catalonia, Spain; [f]Environmental Health Sciences, School of Public Health, University of California, Berkeley, CA 94720-7360; [g]Department of Environmental Health Sciences, Fielding School of Public Health, University of California, Los Angeles, CA 90095; and [i]Hospital del Mar Medical Research Institute (IMIM), 08003 Barcelona, Catalonia, Spain

Edited by Susan Hanson, Clark University, Worcester, MA, and approved May 15, 2015 (received for review February 19, 2015)

Exposure to green space has been associated with better physical and mental health. Although this exposure could also influence cognitive development in children, available epidemiological evidence on such an impact is scarce. This study aimed to assess the association between exposure to green space and measures of cognitive development in primary schoolchildren. This study was based on 2,593 schoolchildren in the second to fourth grades (7–10 y) of 36 primary schools in Barcelona, Spain (2012–2013). Cognitive development was assessed as 12-mo change in developmental trajectory of working memory, superior working memory, and inattentiveness by using four repeated (every 3 mo) computerized cognitive tests for each outcome. We assessed exposure to green space by characterizing outdoor surrounding greenness at home and school and during commuting by using high-resolution (5 m × 5 m) satellite data on greenness (normalized difference vegetation index). Multilevel modeling was used to estimate the associations between green spaces and cognitive development. We observed an enhanced 12-mo progress in working memory and superior working memory and a greater 12-mo reduction in inattentiveness associated with greenness within and surrounding school boundaries and with total surrounding greenness index (including greenness surrounding home, commuting route, and school). Adding a traffic-related air pollutant (elemental carbon) to models explained 20–85% of our estimated associations between school greenness and 12-mo cognitive development. Our study showed a beneficial association between exposure to green space and cognitive development among schoolchildren that was partly mediated by reduction in exposure to air pollution.

neurodevelopment | greenness | cognition | built environment | school

Significance

Green spaces have a range of health benefits, but little is known in relation to cognitive development in children. This study, based on comprehensive characterization of outdoor surrounding greenness (at home, school, and during commuting) and repeated computerized cognitive tests in schoolchildren, found an improvement in cognitive development associated with surrounding greenness, particularly with greenness at schools. This association was partly mediated by reductions in air pollution. Our findings provide policymakers with evidence for feasible and achievable targeted interventions such as improving green spaces at schools to obtain improvements in mental capital at population level.

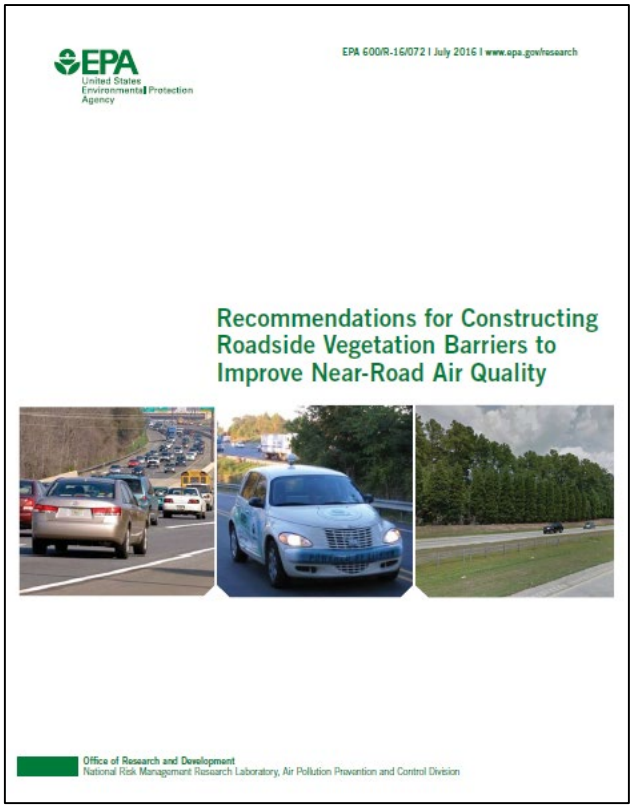
"Exposure to green space has been associated with better physical and mental health"

What's Needed for Installing a Vegetative Barrier?

- **Expertise:**
  - Urban foresters and highway maintenance departments
    - Ensures uniformity, vegetation appropriateness, and species type for application
  - DOT and other transportation experts
    - Ensures safety and transportation concerns are considered
- **Specific physical characteristics of the vegetation:**
  - Height, thickness, and length to match previous research (no gaps)
  - Non-seasonal vegetation (conifers, bushes, etc.)
  - Waxy leaf and branch surfaces for pollutant removal
  - Low pollution/pollen emissions
  - Generally low porosity (e.g. leaf area density of 0.5-0.9)
- **Tools** exist to help in the design process, including:
  - EPA Roadside Vegetation Design Recommendations
  - USFS i-Tree model

Recommendations for the Design of Roadside Features

- EPA has developed recommendations for designing and planting roadside vegetation
  - Developed for implementing the Oakland and Detroit pilot studies
  - Includes vegetation alone and vegetation in combination with solid barriers
  - Maximize the potential for near-road air pollution reduction
  - Avoid unintended consequences such as increased downwind pollution concentrations due to gaps in the vegetation



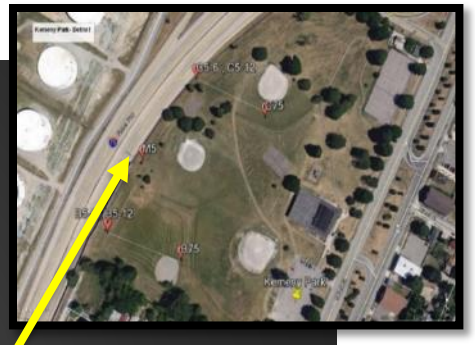
Roadside Vegetation Project Overview

- Collecting air quality, meteorology, and noise (Detroit only) measurements before and after roadside vegetation planting
- Assessing benefits for air quality and water runoff control

Kemeny Park- Detroit, MI

- Portable BC and NO_2 sensors collected 3-days of data
- One behind noise barrier transect; one clearing transect; one barrier edge
- Sensors collocated for approximately 1-hour each day
- Met data at two locations; 2-level (2 and 4m)

Detroit BC data- 17th May 2016 Mean- Median



	B5-6	B5-12	B75	M5	C5-6	C5-12	C75-6
Mean	1631.814815	1781.081481	1408.162963	2392.859259	2430.792593	2033.333333	1775.2
Median	1476.8	2077.2	1347.6	1957.8	2144.6	2102	1605.4

- Sampling from ~8AM to 12PM
- 1-minute averaging times

I - 75

EXISTING TREES

TENNIS

BASKETBALL

EXISTING GARDEN

BED E: ~1,500 SF

BED D: ~700 SF

BED C: ~1,200 SF

BED B: ~800 SF

BASEBALL

BED A: ~34,000 SF

SOCCER

TREE/SHRUB KEY

AC ABIES CONCOLOR

JV JUNIPERUS VIRGINIANA

PA PICEA ABIES

PG PICEA GLAUCA

PN PINUS NIGRA

PO PINUS OMORIKA

PS PINUS STROBUS

TGG THUJA 'GREEN GIANT' (E AND W)

EA EUONYMOUS ALATA

FML FORSYTHIA 'MEADOWLARK'

PD PHYSOCARPUS 'DIABLO'

RT RHUS TYPHINA

VD VIBURNUM DENTATUM

AAB AMALANCHIER ARBOREA

BASEBALL

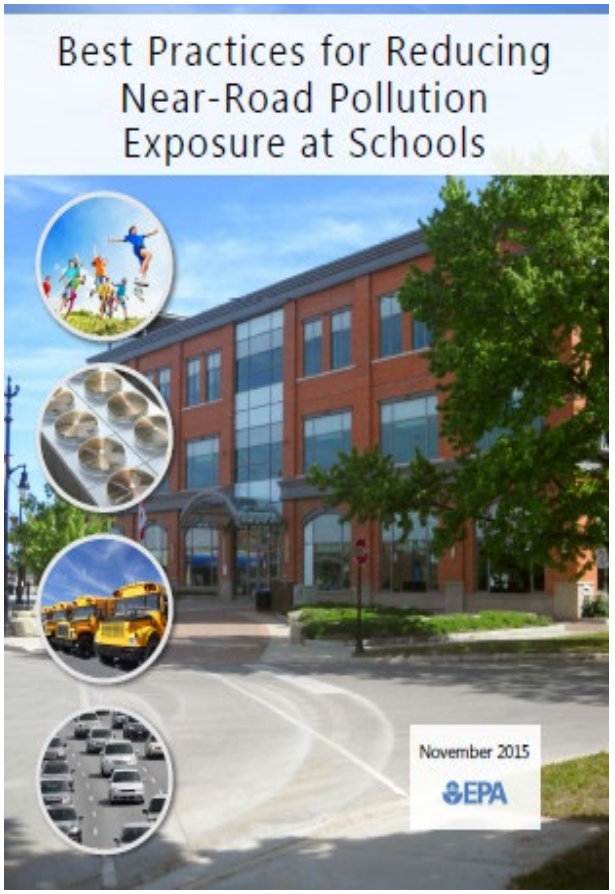
PARKING

Detroit Vegetative Barrier Project & The Community

- **Availability Sessions** for the Public to Ask Questions of the Researchers
- **Sensors Remain in Community**
  - Once Detroit/Oakland study completed, BC & NO2 sensors are left behind (Detroit Health Department)
- **Hands-on training** to Detroit Health Department and its Partners (2018 & expecting in 2019)
- **Environmental Education**
  - Collaborating with residents, school district & nearby schools to participate in indoor air assessments & possible 2019 site visit
    - ORD developed DRAFT Curriculum for air sensor use & air quality – piloting expected in Oakland & Detroit

Best Practices for Reducing Near-Road Pollution Exposure at Schools

- Developed to provide practical solutions to mitigate traffic-related pollution based on issues in the School Siting Guidance
- Document for schools and parents
- Types of solutions provided:
  - Building Design and Operation Strategies
    - Ventilation, Filtration, and Indoor Air
    - Building Occupant Behavior
  - Site-Related Strategies
    - Transportation Policies
      - Anti-Idling and Idle Reduction Policies
      - Upgrade Bus Fleets
      - Encourage Active Transport
    - Site Location and Design
    - Roadside Barriers
      - Noise Barriers
      - Vegetation



https://www.epa.gov/schools/best-practices-reducing-near-road-air-pollution-exposure-schools

For More Information

- Websites:
  - http://www.epa.gov/nrmrl/appcd/nearroadway/workshop.html
  - http://www.epa.gov/ord/ca/quick-finder/roadway.htm
- References

  - Baldauf, R.W., A. Khlystov, V. Isakov, et al. 2008a. Atmos. Environ. 42: 7502–7507
  - Baldauf, R.W., E. Thoma, M. Hays, et al. 2008b. J. Air & Waste Manage Assoc. 58:865–878
  - Baldauf, R.W., N. Watkins, et al. 2009. J. Air Quality, Atmos & Health. Vol. 2: 1-9
  - Baldauf, R.W., D.K. Heist,, V. Isakov, et al. 2012. Atmos. Environ. 64: 169-178
  - Brantley, H, G. Hagler, P. Deshmukh et al. 2014. Sci. Tot Environ. 468/9: 120–129
  - Hagler, G.S.W., M-Y. Lin, A. Khlystov, et al. 2012. Sci. Total Environ. 419: 7-15
  - Steffens, A., Y.J. Wang, K.M Zhang. 2012. Atmos. Environ. 50: 120-128
  - Lin, Hagler, Khylsttov et al. 2016. Sci. Total Environ. 553: 372-379
  - Tong, Baldauf, Isakov et al. 2016. Sci Total Environ. 541: 920-927

United States Environmental Protection Agency

For more information:

Sheila Batka
U.S. EPA Region 5
Air & Radiation Division
312-886-6053
batka.sheila@epa.gov