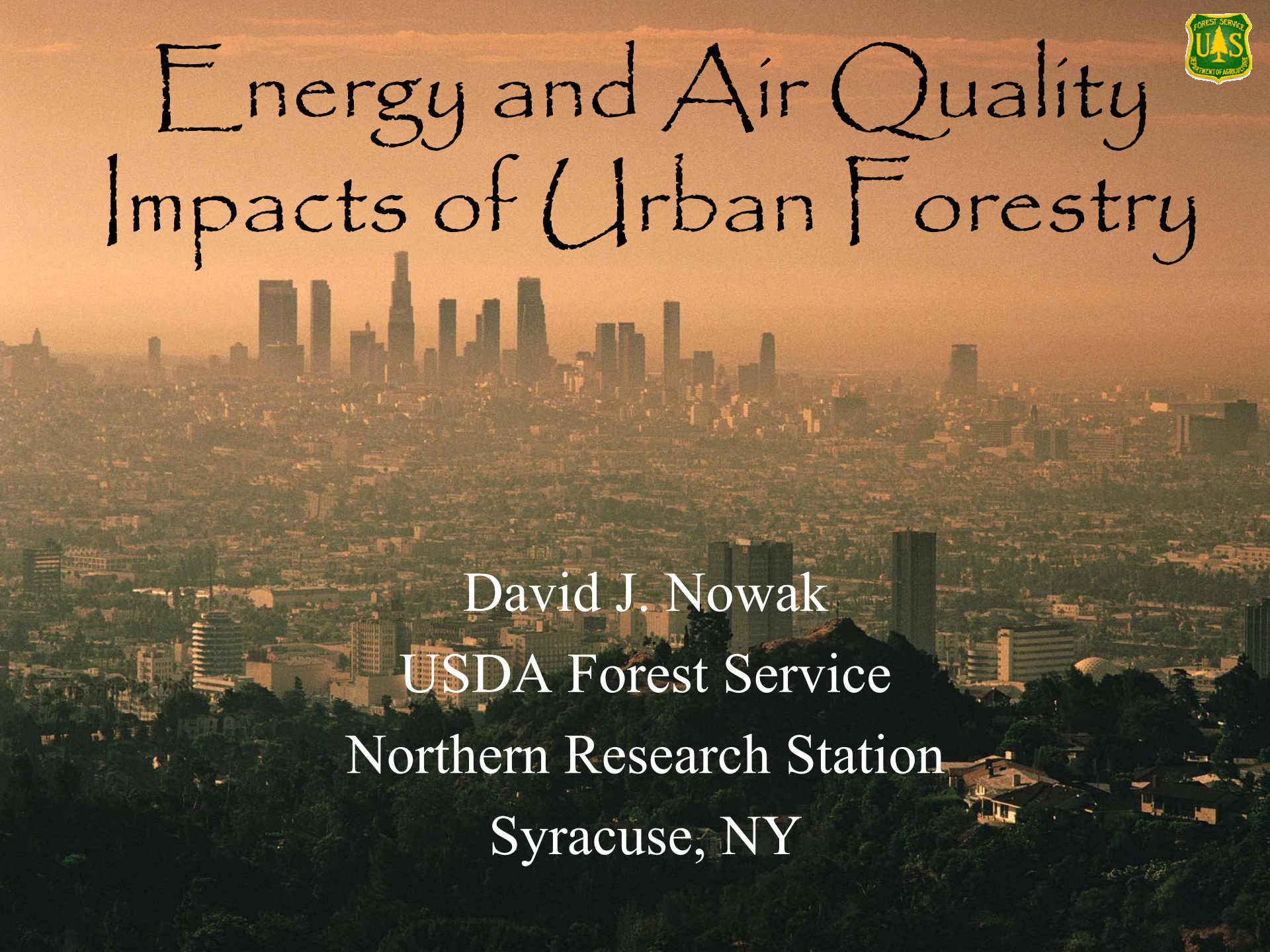
Energy and Air Quality Impacts of Urban Forestry



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Air Pollution Problems

- Human health issues (asthma and other respiratory problems, heart disease)
- Reduced visibility
- Environmental problems (plant damage, acid rain, global warming, reduced water quality)

State Implementation Plans (SIPs)

- Establish rules and regulations to limit emissions
- Establish legal authority, resources, and enforcement sufficient to ensure compliance
- New SIPs are being written for many states related to ozone

Temperature reduction

Removal

Emissions

Energy Conservation

Urban Trees and Ozone in the Northeastern United States

- Increased urban tree cover (from 20 to 40%):
  Reduced ozone (O_3) in urban areas (-1 ppb daytime)
- Physical effects of trees on pollution removal, air temperature, wind speed and boundary layer height are important
- Tree removal of NO_x led to increased O_3 at night (loss of NO_x scavenging of O_3)
- Tree VOC emissions had no detectable (<1 ppb) effect on O_3

(Nowak, Civerolo, Rao, Sistla and Luley, 2000)

New York City Area Summary

- 10% increase in urban tree cover
  - Reduced 1-hour maximum O_3 by ~4 ppb (132 ppb to 128 ppb)
  - 8-hour maximum O_3 by ~1 ppb
- Little difference in maximum reductions between 10% and 30% tree cover increase
- Very significant impact
  - 3% reduction in peak ozone levels
  - 37% reduction in amount needed to gain attainment

Good News

- Based on studies – there is evidence that increased urban tree cover can reduce ozone
- EPA released Emerging and Voluntary Measures document that addresses urban trees (October 2004)

Emerging Measures

- Uncertainty in quantification
  - Trees fall here for now (new process)
  - Through time, trees may not be an emerging measure as quantification becomes more certain
- Up to 6% credit in emission reduction (based on amount of reduction needed for attainment)

Voluntary Measures

- Not enforceable
  - e.g., encourage people to plant trees
  - if regulations force people plant trees, it is not a voluntary measure
- Up to 6% credit in emission reduction (based on amount of reduction needed for attainment)
- Trees can be both emerging and voluntary, but maximum credit is 6%
- Each measure has its own requirements, but both are similar

Incorporating Urban Vegetation within SIPs

1. Resource assessment
2. Modeling the effect of increasing canopy cover on ozone
3. Developing reasonable management programs that could be used to achieve modeled changes in canopy cover
4. Incorporating the modeling results and management programs within a SIP

Issues / Lessons Learned

- Verification
- Cover change vs. tree planting
- Maintenance program

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Urban Tree Cover And Air Quality Planning

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Introduction:

Welcome to the website created by the project dedicated to building the case for urban tree canopy cover inclusion in State Implementation Plans (SIPs). On this website are documents critical to 1) understanding the link between trees and air quality and 2) navigating the state air quality improvement planning process.

The topic is serious. Almost half of all Americans live in areas that do not meet national air quality standards. In these areas, the ambient air contains enough pollutants to affect residents' health. Exposure to persistent ground-level ozone (smog) and particle pollution has been tied to rising rates of heart disease, lung cancer, and childhood asthma.

The creation and preservation of tree canopy is an innovative strategy being proposed to improve urban air quality and thus help to meet Clean Air Act standards. This project provides a resource center for materials concerning the rationale and process of incorporating urban tree planting into SIPs. It also aims to foster the dialogue between policy makers, air quality regulators, foresters, individuals and organizations interested in air quality improvement and community forestry.

We are grateful to the individuals and organizations granting permission to publish their material on this site.

Partners:

NATIONAL TREE TRUST www.nationaltreetrust.org

USDA

CENTER FOR CHESAPEAKE COMMUNITIES

DAVEY RESOURCE GROUP

Energy Effects ($)

	MBTU	MWH	C Avoided	Total
Minneapolis, MN	-1,182,000	1,403,000	15,900	236,900
New York, NY	-1,263,000	12,494,000	167,000	11,398,000
Philadelphia, PA	-1,996,000	3,174,000	14,400	1,192,400
Washington, DC	17,000	2,636,000	96,000	2,749,000


Questions?
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