Testimony of

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Subcommittee on Technology and Innovation

regarding

Green Transportation Infrastructure:
Challenges to Access and Implementation

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Chairman Wu, Members of the Subcommittee:

It's an honor to discuss with you the challenges and opportunities of green transportation technologies.

I am Sam Adams, a member of the City Council for the City of Portland, Oregon, and the Commissioner-in-Charge of Portland's Office of Transportation and Bureau of Environmental Services.

Portland is a city of 563,000 residents, inhabiting 145 square miles, spread over 5 watersheds at the confluence of the Columbia and Willamette Rivers. The City's transportation system consists of 4,000 miles of local streets and arterials. The sanitary sewer and stormwater utilities operate 2,400 miles of sanitary, stormwater and combined sewers, 9,000 stormwater sumps and two wastewater treatment plants.

Portland receives 37 inches of precipitation per year, producing 17 billion gallons of transportation-related stormwater runoff. Historically, we have treated this stormwater as a waste product: channeled to a sewer or piped directly to the Willamette River. This approach simultaneously deprived the river of clean, cool groundwater from below, while flooding it with warm and dirty surface runoff. We are committed to reverse this approach and begin to value stormwater runoff as an asset for watershed health. To that end, I am pleased to report that Portland is the first city in the nation to adopt comprehensive green street policies to address the interrelated challenges of street design and stormwater management.

I appear before you today to provide the following recommendations on the ways the federal government can promote the further development and use of green transportation infrastructure:

1. Align Regulatory Policies with Green Initiatives.

   I would like to recognize Representatives Ehlers and Honda of this Subcommittee, and Ben Grumbles of the Office of Water at the Environmental Protection Agency (EPA) for promoting green technologies at the federal level.

   The Congressional *Statement of Support for Green Infrastructure* sends an important signal to members of Congress about the need for a new approach to public works. And EPA's *Green Infrastructure Statement of Intent* establishes an important partnership with the National Association of Clean Water Agencies (NACWA) and Natural Resources Defense Council (NRDC) to expand the use of green technologies nationally.

   Now that a national policy consensus is taking shape, it is time for EPA and other federal agencies to align their regulatory policies accordingly. Existing policies and rules must be reviewed and updated to reflect the green revolution that is occurring in the environmental sciences and civil engineering.

Portland is currently dealing with two issues where EPA's regulatory policies are frustrating our efforts to use green technologies:

- In 2001, Portland attempted to get regulatory approval for a comprehensive plan to eliminate combined sewer overflows (CSOs), advance our compliance with the Endangered Species Act, and improve watershed health. Our "Clean River Plan" called for integrated watershed planning, green technologies and multi-purpose infrastructure investments applied over a 20-year period. Unfortunately, our Plan failed to get support from the Oregon Department of Environmental Quality and EPA. In fact, EPA said our 2001 efforts were the root cause of enforcement actions that Portland is dealing with now 6 years later. Both agencies favored traditional engineered solutions that assured regulatory compliance within a tightly constrained timetable. Neither agency was willing to provide additional time for Portland to pursue more sustainable, cost effective and affordable strategies that also promoted comprehensive watershed health. Had Portland spent more time over the past several decades developing green technologies, we would have been able to reduce the size and expense of traditional technologies.

- Green technologies incorporate stormwater quality protections to produce discharges that are an asset to watershed health. These discharges more closely emulate the natural water cycle and provide multiple ecosystem benefits. EPA considers these treated discharges as a waste product and a potential risk to groundwater. This interpretation produces regulations that make it cumbersome, costly and risky to use surface infiltrating green technologies by requiring green technologies to be equipped with redundant filtering systems. The expanded use of green technologies will be significantly hindered if EPA does not revise its current policy on stormwater infiltrating through sumps and drywells. Municipalities and private developers will not take advantage of such technologies as flow-through planters and street swales that use specially designed landscaping to filter, detain and reduce stormwater runoff before it is discharged to a sewer, outfall or sump.

2. Incorporate Green Technologies into Federal Transportation Policies and Programs.

Federal and state highways traverse Portland, discharging about 5 billion gallons of stormwater runoff per year. These discharges contain heavy metals, solvents, chemicals, particulates, heat and other pollutants that find their way into our groundwater, rivers and streams. Investments in the upgrade, replacement and addition of new transportation infrastructure must include provisions for green transportation technologies. As with the EPA, we strongly recommend that the US Department of Transportation and state transportation agencies adopt the use of green technologies wherever practical, and coordinate their stormwater management improvements with those of municipalities. In addition, federal and state agencies should be required to compensate municipalities for the costs of managing stormwater discharges from federal and state highways.

3. Support Research and Development of Green Technologies.

   Developing new technologies is an expensive and risky business. A national program of innovative design and product development will help jump start the use of green transportation infrastructure, and promote the creation of green economies throughout the country. Such a program should be coordinated with EPA, National Association of Clean Water Agencies (NACWA), Natural Resource Defense Council (NRDC), state environmental agencies, universities and municipalities. A national technology development program fits nicely into EPA's *Green Infrastructure Statement of Intent* and the Congressional *Statement of Support for Green Infrastructure*.

4. Support Research on the Appropriate Placement and Performance of Green Technologies.

   Developing new green technologies is not enough. Many states and municipalities are trying to determine which green technologies provide the most benefits given specific site characteristics and watershed conditions. Research on the performance of green technologies needs to become a national priority if we are serious about their effective use. Coincidentally, compliance with current Clean Water Act requirements for the application of stormwater best management practices (BMPs) to the maximum extent practicable (MEP) is also reliant on a solid demonstration of the effectiveness of those BMPs. As with technology development, research on "BMP effectiveness" must be coordinated with the EPA, NACWA, NRDC, state environmental agencies, universities and municipalities. The research must be sensitive to the regional variations of hydrology, climate, plant biology, soils and other factors that impact the effectiveness of green technologies. The research should include ongoing and statistically-significant monitoring to determine the long-term effectiveness of green technologies. And the research must be transferable to and among the end users such as municipalities, state agencies, private developers, and EPA.

5. Support Research on the Costs and Benefits of Green Technologies.

   It is difficult for policy-makers and the public to see the full costs of environmental degradation and the full value of green technologies to restore watershed health. As a society, we have not developed a comprehensive method of accounting for the full costs and benefits of stormwater management. We have not placed an economic value on stormwater that incorporates the full costs of old technologies and the full value of ecosystem benefits. If we are going to begin to make decisions in the best long-term interests of society and the planet, this must change. A national research program of economic research into the costs and benefits of different stormwater management technologies is an essential companion to research on "BMP effectiveness. Solid economic analysis will support state and local efforts to develop fair, equitable and adequate funding mechanisms for public stormwater management, and provide the necessary basis for the development of new market-based initiatives.

6. Support the Development of Information Technologies and Systems Modeling.

   Portland has spent more than a decade and millions of dollars developing geographical information systems (GIS), watershed characterization techniques and planning tools needed to make informed decisions about capital investments in stormwater and sanitary sewer infrastructure. Our systems are well tested and accurate at a localized level of planning. We developed these tools out of necessity, in support of our CSO response, in a watershed context. Soon we will add new tools to manage our capital assets and further inform our decisions about facilities maintenance and replacement. We have learned that such tools are indispensable to comprehensive and integrated watershed planning. Any national program to promote green technologies must include programs to deliver planning tools and training to municipalities and states.

These recommendations are offered based on nearly two decades of groundbreaking work on green technologies by the City of Portland. I believe Portland comes by its leadership position on green transportation honestly. After years of experimentation, we have embraced green technologies as a core value to manage stormwater runoff from all City streets. We have designed and installed award winning street planters, rain gardens and swales that integrate seamlessly into the urban landscape. These green technologies take pressure off our combined sewer system, soften the streetscape and infiltrate stormwater to recharge our streams and rivers. When coupled with trees and native vegetation, our green streets increase evapotranspiration and carbon sequestration, reduce the urban heat island effect, provide traffic calming, and add landscape amenities for adjacent private property. These benefits are not possible with traditional approaches to street drainage.

Examples of Green Transportation Technologies

Consider the following three examples of cost-effective and sustainable green transportation technologies:

- Portland has found very simple ways to turn traditional streets into green streets without spending substantial sums for planning, design and engineering. Simple street swales capture, filter and infiltrate stormwater runoff before it has a chance of getting into traditional combined or separated sewers. These swale are carved out of the existing street along the curb immediately upstream of a sewer inlet. Abutting property owners participated in the selection of native plants and help with simple maintenance.

- Portland has developed award–winning infiltration planters that collect and infiltrate street runoff within the tight dimensions of an urban streetscape. The planters are sunken below the level of the sidewalk and receive stormwater through grated curb cuts. Some designs allow stormwater to flow in and out of multiple planters during heavy rain events. Native vegetation and trees facilitate drainage and provide multiple ecosystem benefits.

- Porous pavement and pervious pavers offer another type of green technology that provides a way for stormwater to filter into soils rather than flow into sewers, streams and rivers. Portland uses both types of green paving depending on site conditions, land uses and traffic patterns. In the case of pervious pavers, Portland uses traditional asphalt paving for the heavily-used traveling lanes of neighborhood streets. Pervious pavers are concentrated in the parking areas where runoff can be captured and filtered into the ground. Special soils are used to facilitate infiltration. The project takes stormwater runoff out of local combined sewers, and increases groundwater recharge for the benefit of local streets. The street design is very well received by local residents.

Integrating Green and Traditional Technologies

Portland's stormwater systems reflect the evolution of science, engineering and regulation over the City's 156-year life. For most of our history, we conveyed stormwater as quickly as possible to our streams and rivers without much thought about the consequences. As we developed into an urban center, we added combined sewers, separated stormwater sewers, sumps, and pollution reduction facilities. Today, we pursue comprehensive strategies that treat stormwater as an asset for watershed health. We incorporate natural functions into our infrastructure to complement, enhance and strengthen our watersheds. Portland will always have a complex and overlapping system of older sewers and newer green technologies. Our challenge and our opportunity are to align and integrate the older and newer technologies in ways and at locations that maximize their benefit to our watersheds.

Lessons Learned

In Portland, we have fundamentally redefined "technology" and "infrastructure" in order to capture the full potential of green streets and sustainable stormwater management. To do otherwise would have perpetuated our reliance on traditional infrastructure that is ineffective, unsustainable and works in opposition to natural systems.

Portland has moved beyond traditional transportation engineering principles to embrace a comprehensive and multi-disciplinary approach to infrastructure based on natural systems, soils, hydrologic function, biology, chemistry and plant sciences. We view stormwater as an asset rather than a liability. We look for opportunities to seamlessly integrate man-made structures into the urban landscape in ways that enhance and strengthen the natural functions of our watersheds.

As with any new technology or innovation, our early efforts required additional investments in research, planning and design. However, after more than a decade of experience, our recent green street projects are increasingly cost-effective. Our most recent pre-design for green street projects identify design and construction savings of 20% to 63% over traditional storm sewer systems. These savings are calculated without accounting for the value of improved air and water quality, increased natural habitat, and other ecosystem benefits.

In Closing

A transition from traditional to green technologies is unavoidable. We must hasten the change by expanding our definition of technology and infrastructure to integrate built and natural environments. Green technologies marry together science, engineering and design to construct green infrastructure that is seamless, sustainable and cost effective. We need a partnership with federal and state agencies, universities and others to affect a fundamental change to green transportation technologies. This Subcommittee can take an important first step by giving careful consideration to my recommendations:

- Redefine Technology and Infrastructure
- Align Regulatory Policies with Green Initiatives
- Incorporate Green Technologies into Federal Transportation Policies and Programs
- Support Research and Development of Green Technologies
- Support Research on BMP Effectiveness and Performance Measures
- Support Research into the Economic Value of Stormwater Management
- Support the Development of Information Technologies and Systems Modeling

Thank you for your attention and interest. I will gladly entertain any questions.