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Sustainable
Prosperity

Incenting Green Infrastructure for Stormwater Management

Presented by: Sara Jane O'Neill

February 9, 2016

FCM Sustainable Communities Conference

Sustainable Prosperity

- Sustainable Prosperity (SP) is a national green economy think tank/do tank
 - *Working with business, environment, policy and academic leaders, we harness leading-edge thinking to advance innovation in policy and markets, in the pursuit of a greener, more competitive Canadian economy.*
- Sustainable Communities Research Team
 - Stephanie Cairns – Director, Sustainable Communities
 - Sara Jane O’Neill – Senior Research Associate

Incenting Green Infrastructure for Stormwater Management – Research Phase

Research

- ▣ Currently in research phase
- ▣ Two reports (tentative release May 2016):
 - ▣ *Stormwater User Fees: Putting urban stormwater on an ecological and sustainable footing*
 - ▣ *Grants, rebates, financing & incentives for natural urban stormwater management: best practices*

Communications & Outreach

- ▣ 3 National webinars
- ▣ 5 Community workshops
- ▣ 3 in-depth local government workshops

Agenda

Introduction

Part 1

- Grey vs Green Infrastructure – Costs & Benefits

- Market Based Instruments – Introduction

- MBIs & Stormwater Management

BREAK

Part 2

- Stormwater User Fees

- Other Incentives

- Comprehensive Program Example: Washington, DC

Discussion / Questions

QUESTION TIME

- How much do you currently know/understand about Market Based Instruments (MBIs) for stormwater management?
 - I'm an expert
 - Quite a bit
 - Enough to be dangerous
 - Very little
 - Absolutely nothing

- While Canadian municipalities are just starting to implement MBIs for stormwater management, the United States is much farther along with over 1500 stormwater utilities in place. Would you prefer:
 - more time/information on US examples
 - more time/information on Canadian examples
 - equal time spent on both

QUESTION TIME

■ The *2016 Canadian Infrastructure Report Card: Informing the Future* was published in January. Across all municipalities, 24% of stormwater assets were in fair, poor, or very poor condition. In general, what is the state of stormwater infrastructure assets in your municipality?

- Very Good (fit for the future)
- Good (adequate for now)
- Fair (requires attention)
- Poor (increasing potential of affecting services)
- Very Poor (unfit for sustained service)
- Unsure / Don't know

1.

Grey vs Green Infrastructure

Costs & Benefits

Grey Infrastructure for Stormwater

- ▣ Structural engineering solutions to manage increased runoff from development
- ▣ Designed to collect & convey
- ▣ Require maintenance, upgrades, replacement
- ▣ City of Mississauga
 - ▣ \$1.7 Billion in SW Infra Assets (2011)
 - ▣ \$14,650,000 Capital/O&M spent 2012



http://orig07.deviantart.net/db5a/f/2010/029/f/urban_street_02_by_chrrambow.jpg

Grey Infrastructure – Other Costs

- ▣ Flooding

- ▣ City of Toronto 2013 flood ~\$1B

- ▣ Erosion

- ▣ US Army Corps - \$180M/yr dredging

- ▣ Water Quality

- ▣ NY to buy Catskills land to avoid \$10-15B filtration plant



Green Infrastructure for Stormwater

- ▣ More cost-effective way of managing stormwater
- ▣ Reduced infrastructure costs for new and existing developments
- ▣ Reduced economic losses from major flooding events
- ▣ Other indirect cost and other benefits
 - ▣ See CNT Report in Resources



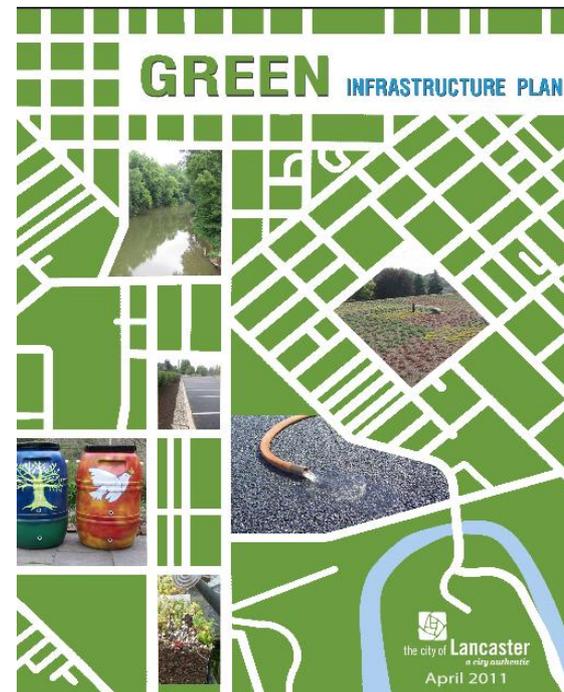
12th Avenue Green Street, Portland, Oregon

The Economic Benefits of Green Infrastructure

Case Study: Lancaster, PA

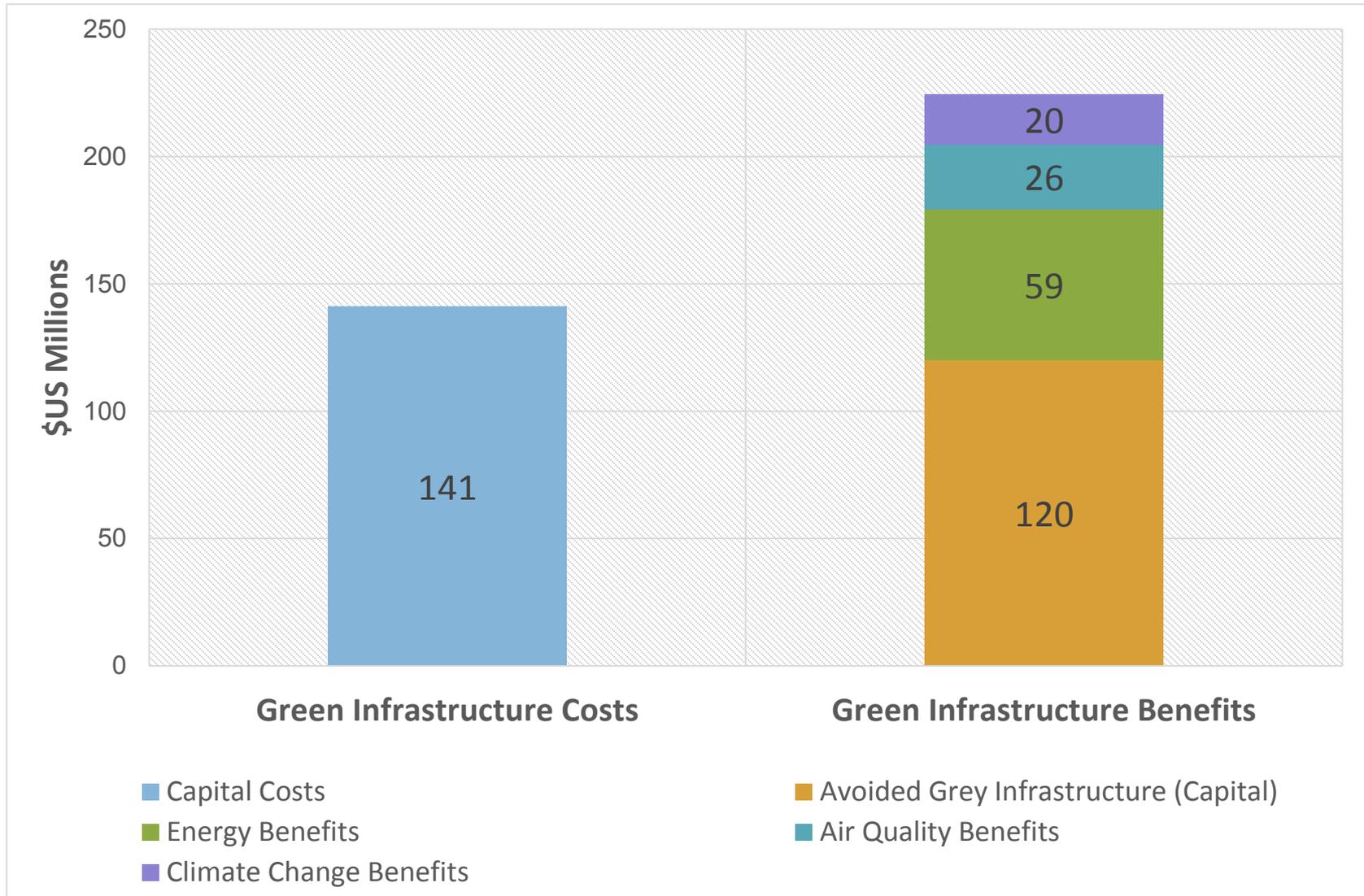
- Pop 60,000; with CSS
- Each year ~750 million gallons untreated wastewater leaked to Conestoga River
- Estimated \$250 million to manage remaining CSOs with gray infrastructure

2011 Green Infrastructure Plan



The Economic Benefits of Green Infrastructure

Case Study: Lancaster, PA



Triple Bottom Line Benefits of Green Infrastructure – Philadelphia, PA

- ▣ The Philadelphia Water Department (PWD) examined the benefits and external costs beyond capital and operations costs of LID vs traditional

- ▣ *A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds Final Report (2009)*
 - ▣ Recreational Use and Values
 - ▣ Property Values, as Enhanced by the LID Options
 - ▣ Heat Stress and Related Premature Fatalities Avoided
 - ▣ Water Quality and Aquatic Habitat Enhancements and Values
 - ▣ Wetland Enhancement and Creation
 - ▣ Poverty Reduction Benefits of Local Green Infrastructure Jobs
 - ▣ Energy Usage and Related Changes in Carbon and Other Emissions
 - ▣ Air Quality Pollutant Removal from Added Vegetation
 - ▣ Construction- and Maintenance-Related Disruption Impacts

Triple Bottom Line Benefits of Green Infrastructure – Philadelphia, PA

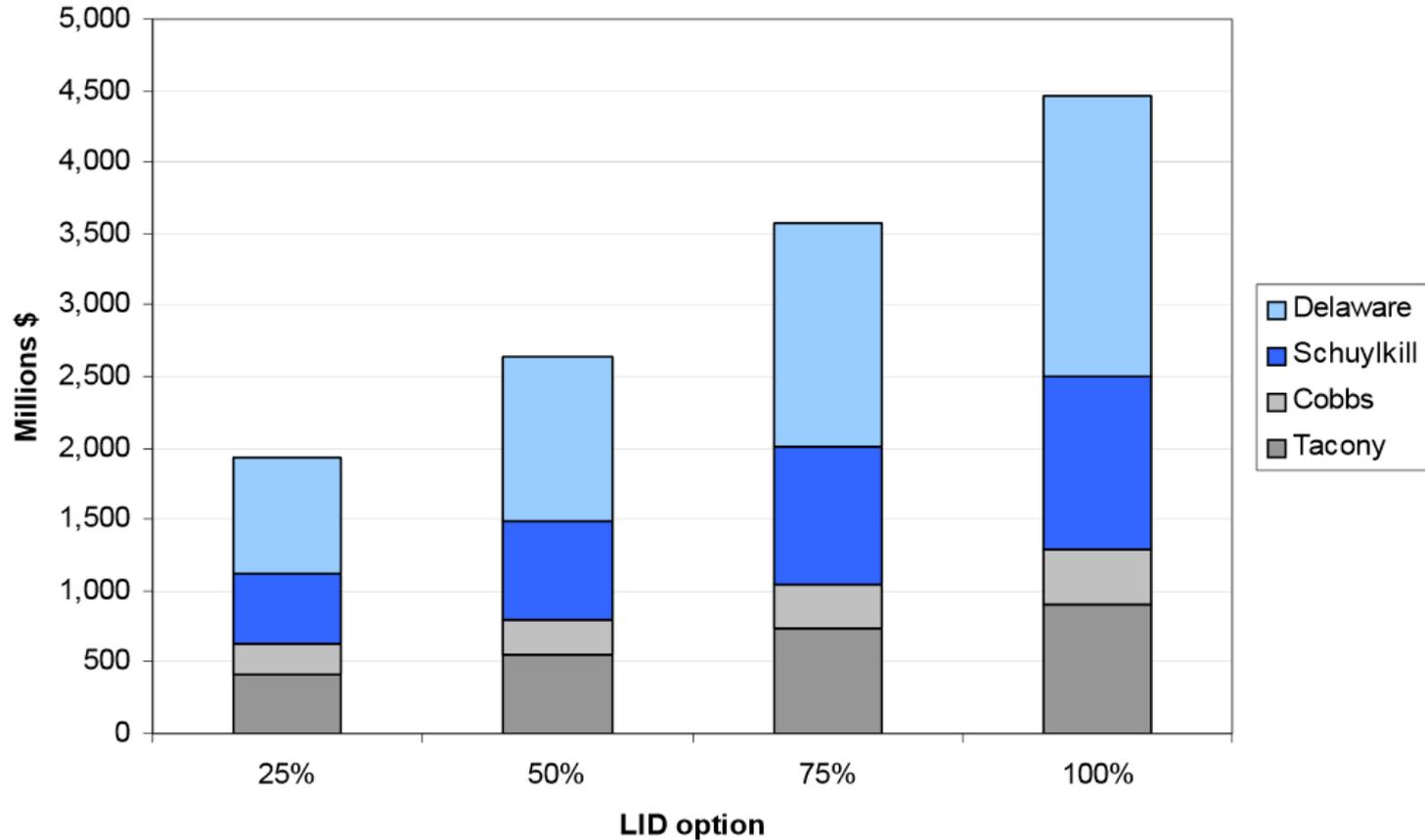


Figure 5.1. City-wide net benefits for LID options by watershed.

Triple Bottom Line Benefits of Green Infrastructure – Philadelphia, PA

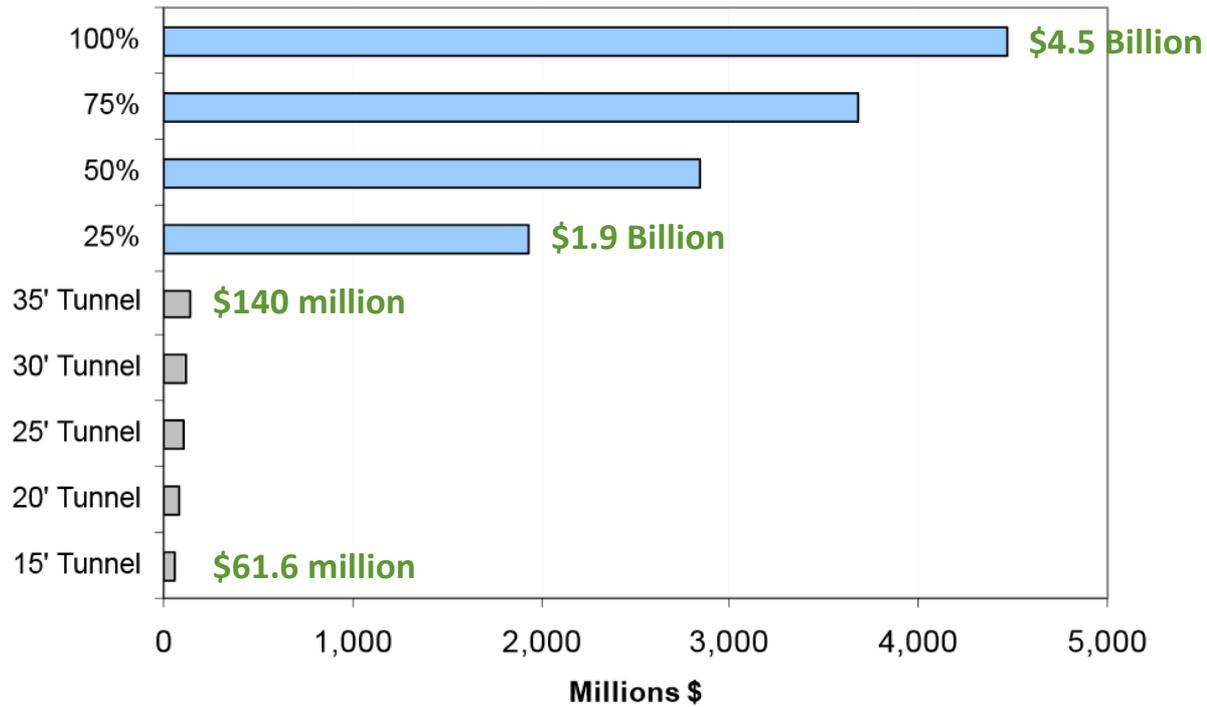


Figure 5.3. City-wide present value benefits/external costs of the LID and tunneling CSO control options, over 40-year project period (2009 USD).

Group Discussion 1



What do you think are the biggest questions about green infrastructure costs & benefits?

What information will help to address these questions?

2.

Market Based Instruments

Introduction

Market Based Instruments

- ▣ Tool to encourage behaviour through price signals
- ▣ Adjust market signals to include environmental and social costs/benefits

Price Based	Rights Based	Market Friction
Parking Pricing	License for Commercial Parking	Environmental Choice Labelling
Transit Pass Subsidies	Peak-period licensing	Hybrid/EV parking locations
Carpool Subsidies		Reporting Requirements

MBIs & Regulations

Regulations

- ▣ mandate behavior in law
- ▣ work best when costs of compliance are equal between parties and/or a certain level of performance or target is necessary
- ▣ do not provide incentive for going beyond standard

MBIs

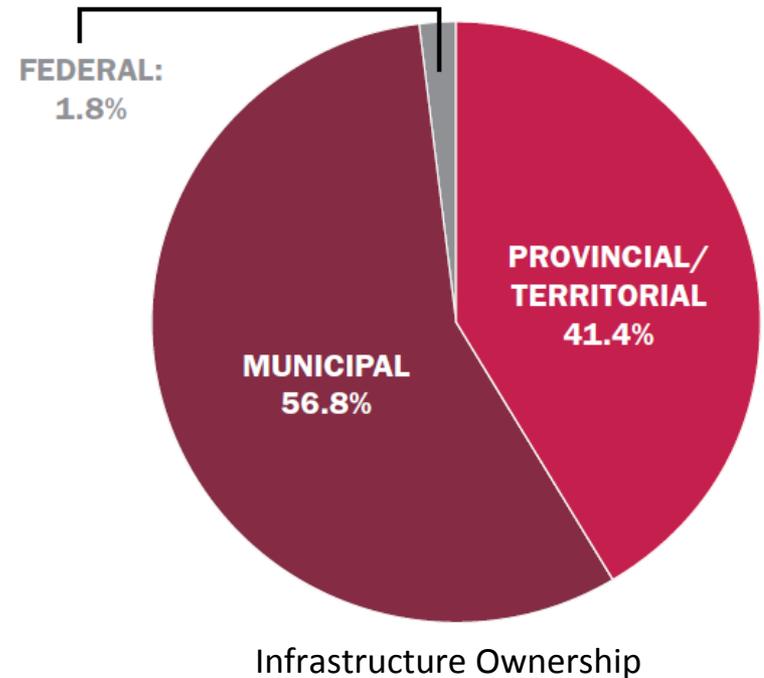
- ▣ behaviour change through market signals
- ▣ work best when goal can be met with flexibility in response, allows for reduced total costs
- ▣ provide incentive for innovative approaches and increased compliance

A vibrant outdoor dining scene with people eating at tables under a canopy, with a sign for 'Vegan' visible on the left. The background shows a busy street with trees and buildings.

MBIs are a tool that are often underutilized by local governments to support environmental goals and generate revenue

MBIs & Local Governments

- ▣ Increasing municipal responsibilities
- ▣ Environmental Incentives + New revenue source
- ▣ Deteriorating infrastructure
- ▣ Limited revenue sources



The Case for MBIs & Stormwater Management

- In Canada, most stormwater programs are financed through property or general tax revenue

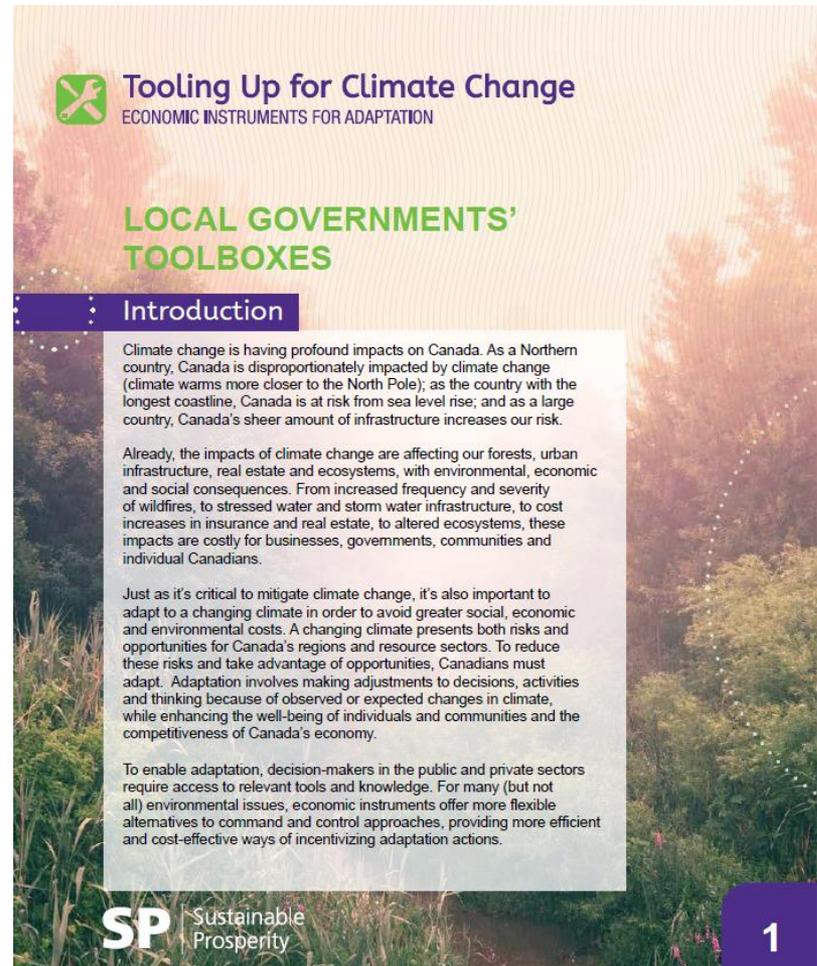
- Issues with this system:
 - Competing with all other essential City services
 - Costs/requirements for SW not transparent
 - Actual cost for each property not linked to service requirements
 - Many properties are tax-exempt

- MBIs can create a dedicated revenue stream for Stormwater Management Programs that more accurately cover true costs of program and provide incentives for reducing overall program costs in the long-term

- Unique ability to target private property

Tooling up for Climate Change: Economic Instruments for Adaptation

- Sustainable Prosperity, funded in part by Natural Resources Canada through Canada's Climate Change Adaptation Platform
- Shares knowledge and policy findings from Adaptation Platform to decision-makers across Canada on economic instruments for adaptation



Tooling Up for Climate Change
ECONOMIC INSTRUMENTS FOR ADAPTATION

LOCAL GOVERNMENTS' TOOLBOXES

Introduction

Climate change is having profound impacts on Canada. As a Northern country, Canada is disproportionately impacted by climate change (climate warms more closer to the North Pole); as the country with the longest coastline, Canada is at risk from sea level rise; and as a large country, Canada's sheer amount of infrastructure increases our risk.

Already, the impacts of climate change are affecting our forests, urban infrastructure, real estate and ecosystems, with environmental, economic and social consequences. From increased frequency and severity of wildfires, to stressed water and storm water infrastructure, to cost increases in insurance and real estate, to altered ecosystems, these impacts are costly for businesses, governments, communities and individual Canadians.

Just as it's critical to mitigate climate change, it's also important to adapt to a changing climate in order to avoid greater social, economic and environmental costs. A changing climate presents both risks and opportunities for Canada's regions and resource sectors. To reduce these risks and take advantage of opportunities, Canadians must adapt. Adaptation involves making adjustments to decisions, activities and thinking because of observed or expected changes in climate, while enhancing the well-being of individuals and communities and the competitiveness of Canada's economy.

To enable adaptation, decision-makers in the public and private sectors require access to relevant tools and knowledge. For many (but not all) environmental issues, economic instruments offer more flexible alternatives to command and control approaches, providing more efficient and cost-effective ways of incentivizing adaptation actions.

SP Sustainable Prosperity

1

Tooling up for Climate Change: Economic Instruments for Adaptation

- ▣ Municipal, Provincial, Federal

- ▣ 4 focus areas

- ▣ Forestry
- ▣ Infrastructure
- ▣ Real estate
- ▣ Ecosystem services

sustainableprosperity.ca/adaptation

adaptation.nrcan.gc.ca

- ▣ Products

- ▣ 12 sets of policy tools for different levels of government and different focus areas
- ▣ 3 "toolkits", 1 for each level of government
- ▣ A key themes paper that synthesizes the findings across the project

Group Discussion 2



Does your community consider adaptation in stormwater planning?

How?

MBIs for Stormwater Management



3.

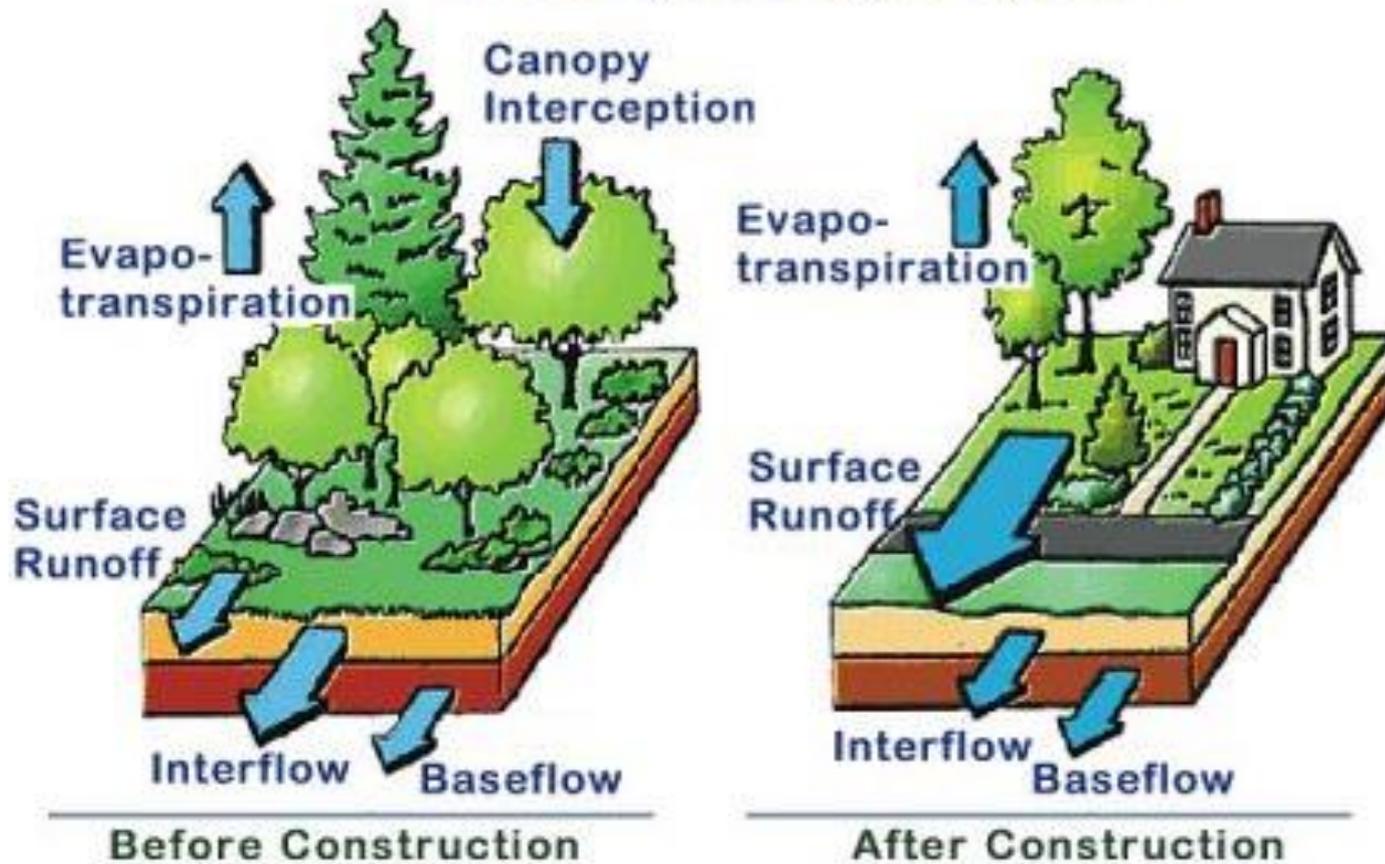
Stormwater User Fees

Stormwater User Fees

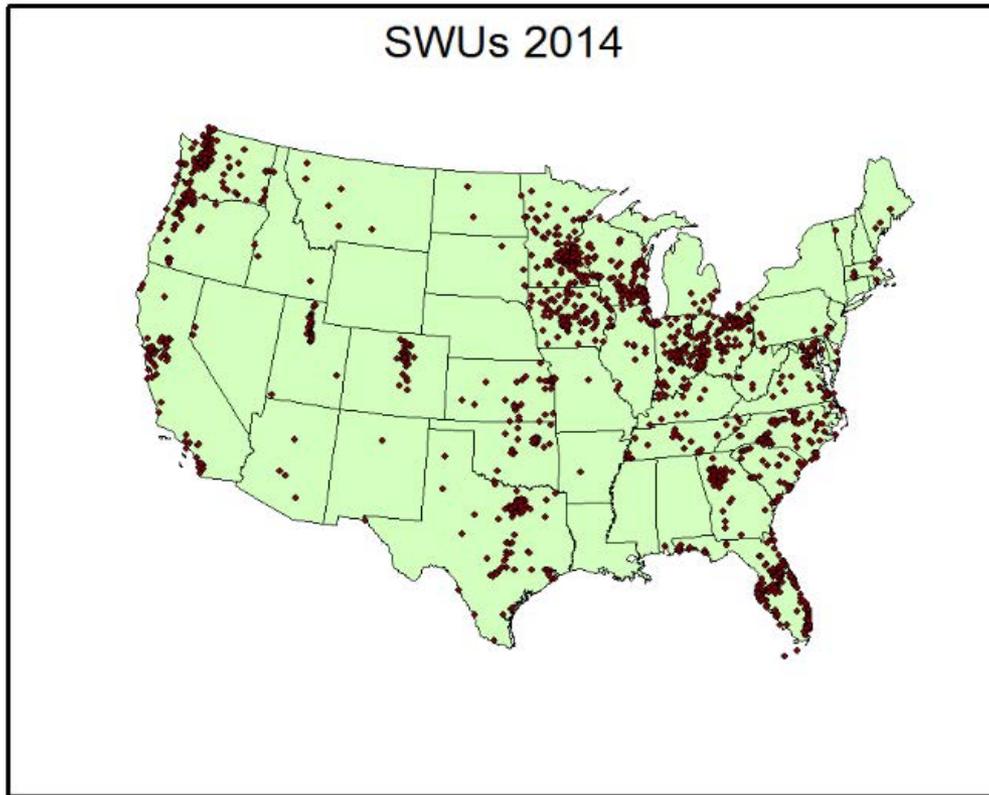
- Mechanism to fund the cost of services directly related to stormwater programs (similar to water and sewer fees)
- Stand alone charge separated out from property or general taxes
- Often called a “fee” or a “utility” depending on design
- A charge paid by property owners to cover their contribution of stormwater
- Fee Collection
 - New Stormwater Utility Bill
 - Added to water or sewer utility bills

Stormwater User Fees: Equitable & Transparent

Local Hydrologic Cycle



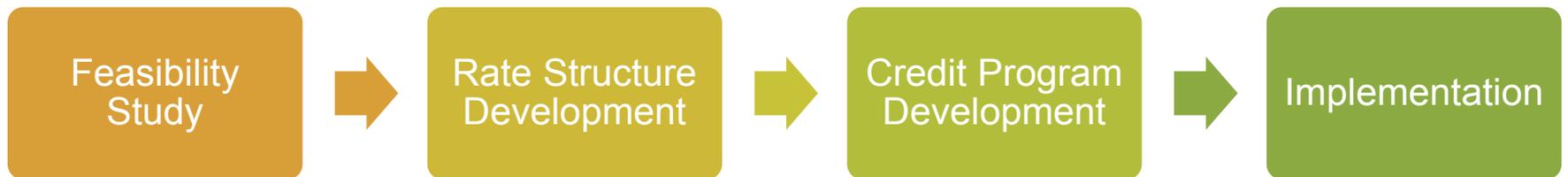
Stormwater User Fees in the U.S.



- 1500 stormwater utilities (SWUs) located in 40 states and the District of Columbia

Stormwater User Fees: Factors to consider

- Municipal Resources / Capacity
- Baseline Information / Program Requirements
- Population size / number of properties
- Poverty rate / Impact of fees / Assistance Program
- Geographical / site characteristics
- Development of Credit programs
- Public Consultation / Messaging



Stormwater User Fees: Design

- Residential and non-residential treated separately
- For residential, there are a number of ways of calculating the stormwater user fee rate:
 - Flat Rate
 - Runoff Coefficient
 - Intensity of Development Factor
 - Equivalent Residential Unit (ERU)
 - Single Family Unit (SFU)
 - Equivalent Hydraulic Area (EHA)
 - Tiered Residential Rate
 - Level of Service Geography Base
 - Impervious Area Measurement



Stormwater User Fee – Flat Rate

- Charge does not vary according to impervious area of property, though often have different rate for different property type
- Ex: \$7 per month per water meter account OR \$1,000 per hectare per month for non-residential property

	Flat Rate	ERU	Tiered Rate	Impervious Area
<i>Applicability</i>	Green	Light Blue	Light Blue	Light Blue
<i>Revenue</i>	Light Blue	Yellow	Light Blue	Light Blue
<i>Fairness</i>	Light Blue	Light Blue	Red	Light Blue
<i>Administration</i>	Green	Light Blue	Light Blue	Light Blue

Stormwater User Fee – Flat Rate

■ St. Albert, AB – Flat Rate Storm Sewer Utility

City of St. Albert
Cultivate Life

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- Applications, Licences and Permits
- Assessment & Taxation
- Community Directory
- Family and Community Support Services
- Home and Property
- Moving to St. Albert
- St. Albertans' Legacy
- Utilities**

Billing Rates

Monthly Utility Rates

Water Rates	2015	2016
Flat Rate (per month)	\$9.76	\$9.76
Water Rate (per cubic metre)	\$1.60	\$1.60
Supplemental Capital Contribution	\$11.63	\$10.69

Wastewater Rates

Wastewater Rates	2015	2016
Flat Rate (per month)	\$9.76	\$9.90
Wastewater rate 100% (per cubic metre)	\$1.61	\$1.65
Wastewater rate 80% (per cubic metre)	\$2.02	\$2.06
Supplemental Capital Contribution	\$3.59	\$1.94

Stormwater Rates

Stormwater Rates	2015	2016
Residential - single/side-by-side	\$15.79	\$15.79
Residential - stacked/condo	\$10.86	\$10.86
Non-Residential - industrial/commercial	\$42.24	\$42.24
Supplemental Capital Contribution	\$5.09	\$5.38

Solid Waste Rates

Solid Waste Rates	2015	2016
Flat fee	\$7.13	\$7.24

RELATED

- e-Services
- Payment Options
- Contact Utility Services

Stormwater User Fee – Equivalent Residential Unit (ERU) / Tiered ERU

- ERU method used by more than 80% of all US Stormwater Utilities
- ERU = average impervious area of residential parcels
 - determined by statistical sampling
 - ERU becomes base billing unit for all charges
- SFU = Same process as ERU but for Single-Family residential parcels only
- Fees for non-residential parcels are determined proportionally to the ratio of the impervious area to the ERU
- Tiered ERU Rates generally split single family residential dwelling into small, medium, and large lots with variable rates

Stormwater User Fee – Equivalent Residential Unit (ERU) / Tiered ERU



Table 3 - Proposed Stormwater Rate Schedule

Rate Code	Description	Basis for Charge	Number of Dwelling Units	SFU Factor	Monthly Charge per Property ¹	Annual Charge per Property ¹	Number of Customers ²
1	Residential Single Detached Small	Detached homes with building footprint size of 105 m ² or less	1	0.6	\$6.30	\$76	4,180
2	Residential Single Detached Medium	Detached homes with building footprint size between 106-236 m ²	1	1.0	\$10.50	\$126	33,450
3	Residential Single Detached Large	Detached homes with building footprint size of 237 m ² or more	1	1.3	\$13.80	\$166	4,180
4	Residential Townhouse	Per property (per Tax Roll ID number)	1	0.7	\$7.50	\$90	6,390
5	Residential Condominium	Per property (per Tax Roll ID number)	1	0.4	\$4.20	\$50	8,840
6	Multi-Residential (2-5 Units)	Per building	Duplex	0.4	\$8.40	\$101	1,400
			Triplex	0.4	\$12.60	\$151	260
			Four-plex	0.4	\$16.80	\$202	150
			Five-plex	0.4	\$21.00	\$252	30
7	Multi-Residential (>5 Units)	Per property (according to number of dwelling units)	varies	0.2	Charge = (# units) × (\$2.10/month) See Note 3	Charge = (# units) × (\$25.20/year) See Note 3	1,190
8	Non-Residential Smallest	26 - 1,051 m ² of impervious area	n/a	1.9	\$20.10	\$241	1,080
9	Non-Residential Small	1,052 - 1,640 m ² of impervious area		5.1	\$53.70	\$644	300
10	Non-Residential Medium-Low	1,641 - 7,676 m ² of impervious area		13.4	\$140.70	\$1,688	950
11	Non-Residential Medium-High	7,677 - 16,324 m ² of impervious area		39.1	\$410.70	\$4,928	200
12	Non-Residential Large	16,325 - 39,034 m ² of impervious area		94.8	\$995.40	\$11,945	110
13	Non-Residential Largest	39,035 m ² or greater of impervious area		203.5	\$2,136.90	\$25,643	40

Notes:

1. Monthly stormwater rate charge per property to generate \$11.56M/yr. Assumes 95% collection rate. All charges rounded to the nearest 30¢.
2. Approximate count as of May 5, 2010.
3. Example: 10-unit apt. = \$21.00/mo (\$252/yr); 25-unit apt. = \$52.50/mo (\$630/yr); 100-unit apt. = \$210.00/mo (\$2,520/yr).
4. Non-Residential tiers (Rate Codes 8-13) include both Taxable and Tax-Exempt properties.
5. Non-Residential properties with less than 26.0 sq. m. of impervious area are not charged.

Stormwater User Fee – Equivalent Residential Unit (ERU) / Tiered ERU

	Flat Rate			ERU			Tiered Rate			Impervious Area		
<i>Applicability</i>	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
<i>Revenue</i>	Light Blue	Yellow	Light Blue	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
<i>Fairness</i>	Light Blue	Light Blue	Red	Light Blue	Yellow	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Light Blue
<i>Administration</i>	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Light Blue

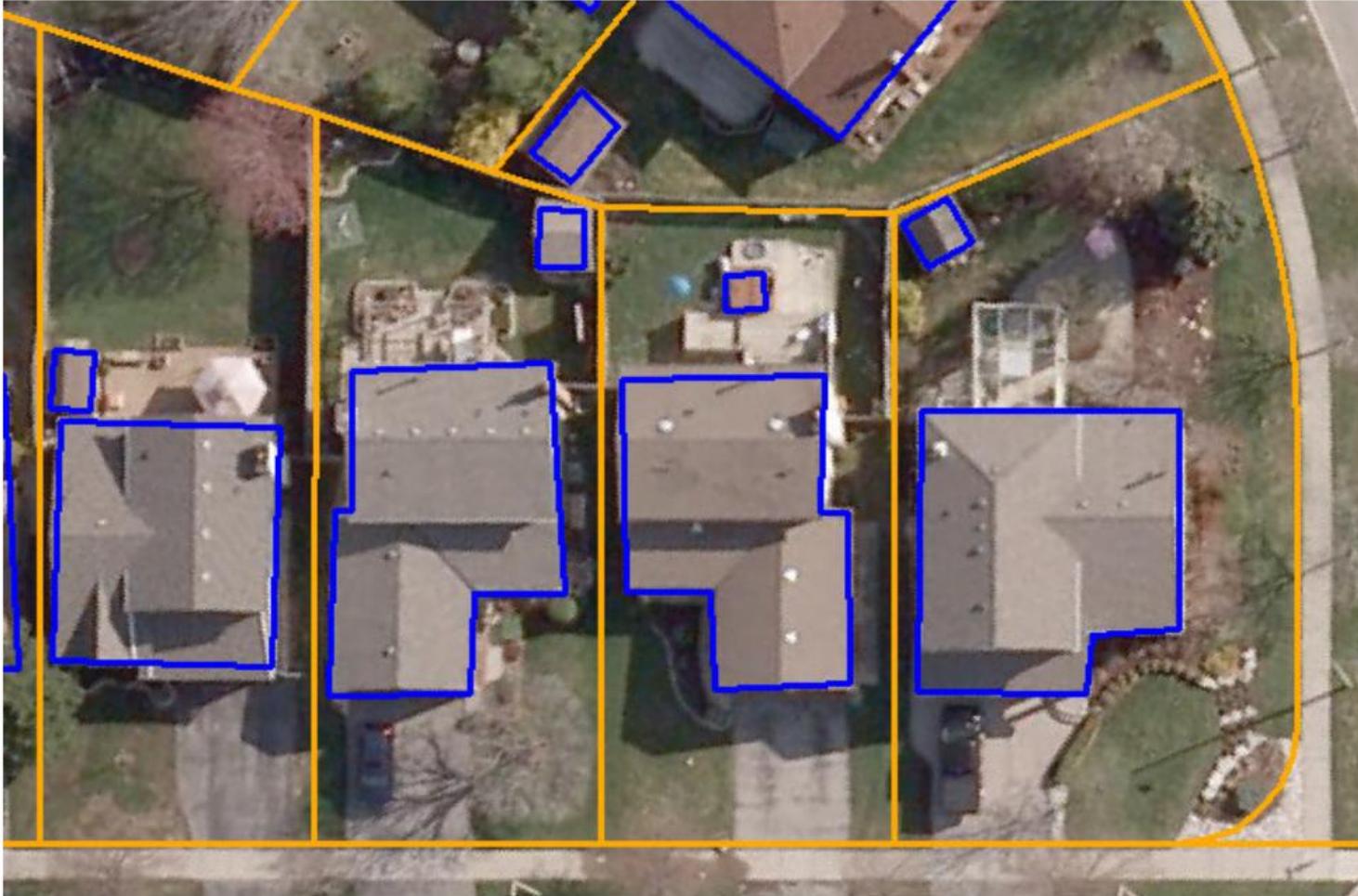
Stormwater User Fee – Impervious Area

- Each property assessed charge based on the amount of impervious area
- Most equitable and accurate method – but depending on data available, size of population, etc. can be administratively prohibitive

	Flat Rate			ERU			Tiered Rate			Impervious Area		
<i>Applicability</i>	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue
<i>Revenue</i>	Light Blue	Light Blue	Red	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue
<i>Fairness</i>	Light Blue	Light Blue	Red	Light Blue	Yellow	Light Blue	Light Blue	Yellow	Light Blue	Green	Light Blue	Light Blue
<i>Administration</i>	Green	Light Blue	Light Blue	Green	Light Blue	Light Blue	Light Blue	Yellow	Light Blue	Light Blue	Light Blue	Red ?

Stormwater User Fee – Impervious Area

Figure 1 - Delineation of the rooftops and sheds/garages on a number of residential properties.



Stormwater User Fee – Impervious Area

Figure 2 - Delineation of all impervious areas on a non-residential property.



Stormwater User Fee – Impervious Area

- ▣ Victoria, BC

- ▣ Stormwater User Fee calculated for each property based on:
 - ▣ Impervious Surface Factor (total area of all impervious surfaces)
 - ▣ Street Cleaning Factor (based on street frontage of the parcel and classification of street)
 - ▣ Intensity Code Factor (based on property classification)
 - ▣ Codes of Practice Factor (specific businesses subject to additional cost)

Stormwater User Fee – Property Tax Reduction?

- City of Kitchener - reduction in the following base budgets can be implemented as of fiscal 2011 resulting from a shift to a storm utility model
 - Tax supported operating budget of \$262,084
 - Water utility of \$627,576
 - Sanitary utility of \$241,549
 - Gas utility of \$127,848
 - Federal gas tax revenue of \$1,091,008

- Does not mean Property Tax decreases – City of Mississauga SW utility transferred budget, property tax still increased

Group Discussion 3



What are your main questions
with respect to
Stormwater User Fees?

QUESTION TIME

- Has a stormwater user fee been considered /discussed in your municipality?
 - Yes
 - No
 - Not aware / Don't know

- What other incentives are you interested in learning about most? Rank most interested to least interested
 - Credit Programs
 - Loans/Grants
 - P3 Model
 - Tradable Stormwater credit program

4.

Other Incentives

Other Incentives for Green Infrastructure

- Credit Programs
- Development Charges
- Rebates
- Grants / Loans
- P3 Model
- Tradable Stormwater Credit Program
 - Generally more advanced in U.S. examples...why?

Stormwater Management – U.S. Context

- The **National Pollutant Discharge Elimination System (NPDES)** permit program under the **Clean Water Act (CWA)** is the primary federal vehicle to regulate the quality of the nation's waterbodies.
- To comply with the **CWA regulations**, industrial and construction permittees must create and implement a stormwater pollution prevention plan, and MS4 permittees must implement a stormwater management plan
- Funding not provided for the required stormwater system improvements needed to maintain or obtain permitted status
 - Clean Water State Revolving Fund (CWSRF) provides loans to eligible recipients

Main Drivers for Green Infrastructure

	United States	Canada
Federal CSO & MS4 Requirements		
Asset Management		
Flood Control		
Larger Sustainability Goals		

Credit Programs

- Discount applied for implementing approved BMPs
 - Reduction in impervious area
 - Installation of BMPs
 - Managing stormwater on-site
- Generally tied to Stormwater User Fee / Utility Program
- Encourages retrofits of existing properties
 - If fee is high enough...
- Benefits overall system by reducing amount of stormwater leaving sites
- Balance required between cost of fee and level of discount possible
- Often different programs for residential & non-residential

Credit Programs - Examples

- Portland, Oregon – Clean River Rewards Program
 - Property owners can receive 100% discount if they manage all stormwater on their properties
 - Partial credit also available for managing portions of site stormwater

- City of Kitchener – Stormwater Credit Program
 - In March 2012, council approved the stormwater credit policy. Property owners are now able to apply for stormwater credits of up to 45% of the stormwater portion of their utility bill. Different applications for residential and non-residential properties

- Minneapolis, MN – Stormwater Credit Program
 - 50% credit for SW quality
 - 50-100% credit for SW quantity

Development Charges

- ▣ One-time cost that can be used to fund eligible growth-related capital costs
- ▣ Revenue can usually be applied to projects throughout the City
- ▣ Structure already in place
- ▣ But dependent on new growth – not useful for built out municipalities or ones with limited growth – and limited to capital costs associated with growth

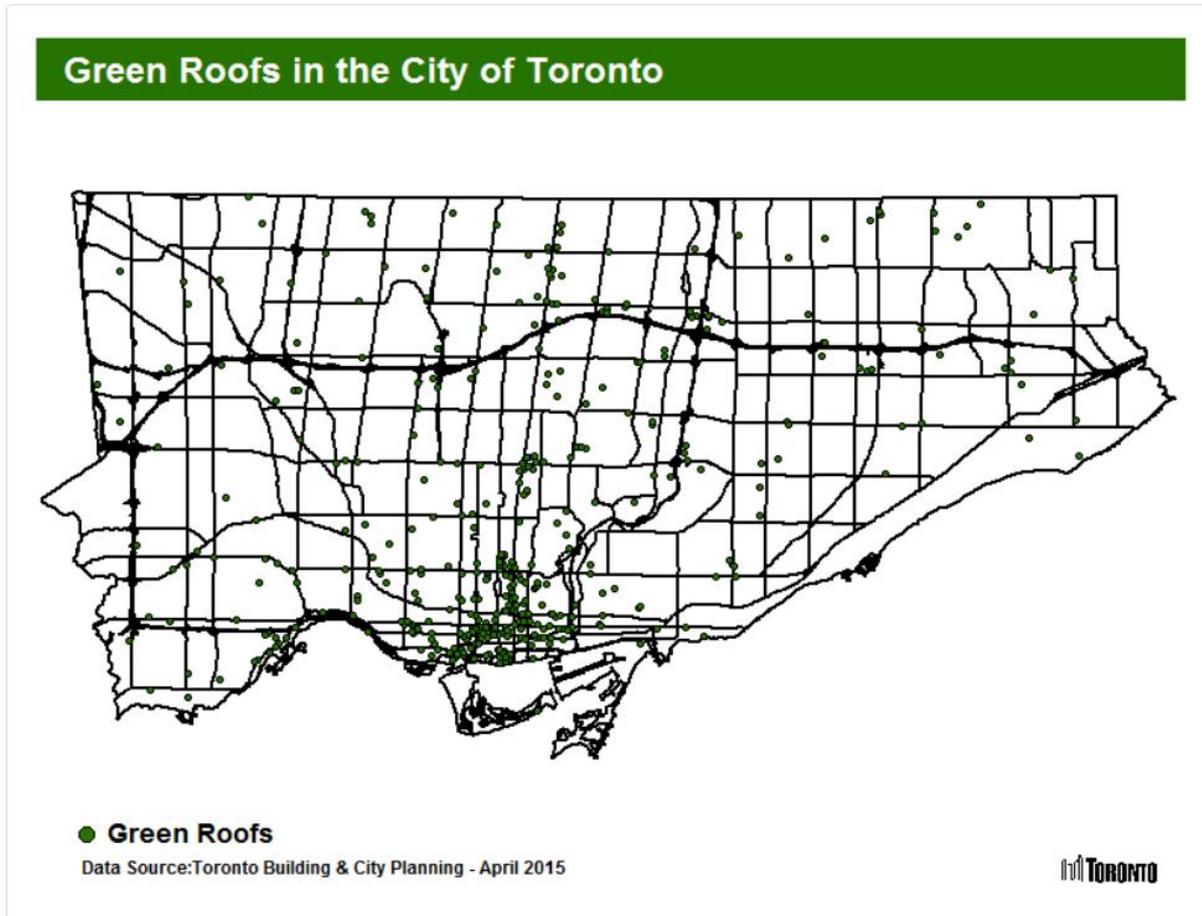
Rebates

- One-time lump sum payment
- Financial incentive for implementing specific green infrastructure practices or within specific areas
- Often implemented in combined sewer areas to reduce amount of stormwater

- Guelph, ON
 - Rainwater Harvesting System Rebate

- Toronto Eco-Roof Incentive Program
 - Eligible green roof projects will receive \$75 / square metre up to a maximum of \$100,000.
 - Eligible cool roof projects will receive \$2 - 5 / square metre up to a maximum of \$50,000.

City of Toronto – Green Roofs



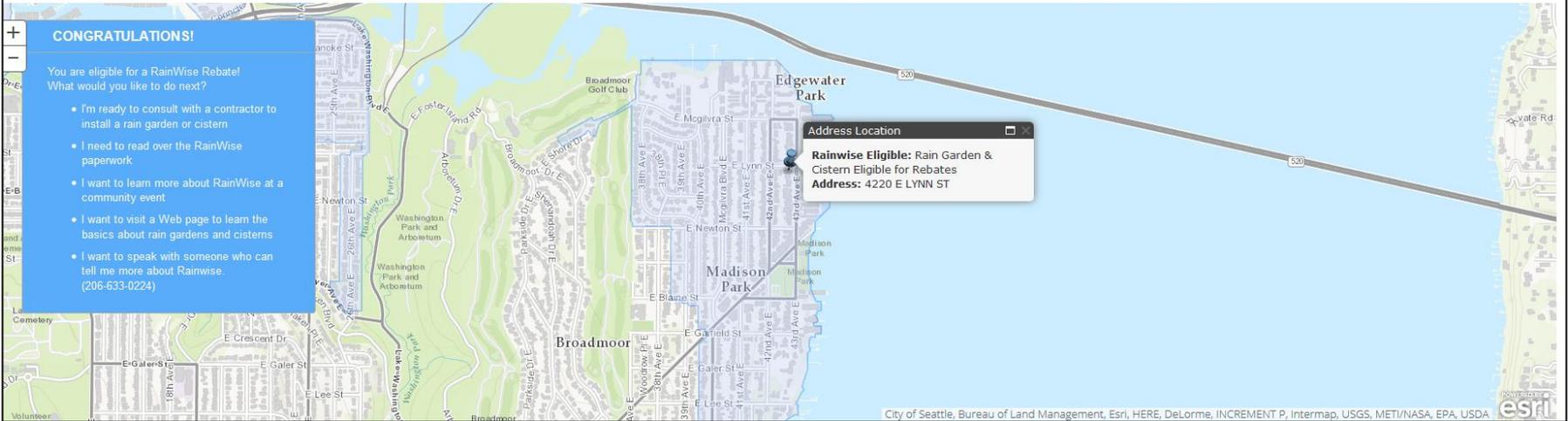
Seattle's Rainwise Program

■ Seattle, Washington

- For homeowners that reside in one of the city's several target CSO basins, the city will pay up to 100% of the cost of installing rain garden and cisterns

Check My Eligibility for a Rainwise Rebate

Please do not use any punctuation when entering your address (no commas, periods, dashes, etc.)

Grants / Loans

- ▣ Provincial/Federal grants can provide additional funding for projects
- ▣ U.S. 2009 American Recovery and Reinvestment Act (ARRA) provided \$6 billion for clean water and drinking water infrastructure through the State Revolving Fund*
 - ▣ 20% of water infrastructure funding was dedicated to green infrastructure programs – Green Project Reserve
- ▣ Recent Government of Canada announcements on Green Infrastructure spending could mean more funding available through federal grants??

Grants / Loans

- New York State Environmental Facilities Corporation (EFC)
 - Green Innovation Grant Program (GIGP) established in 2009 under ARRA
 - 121 innovative green infrastructure projects (\$92 million leveraging \$162 million)



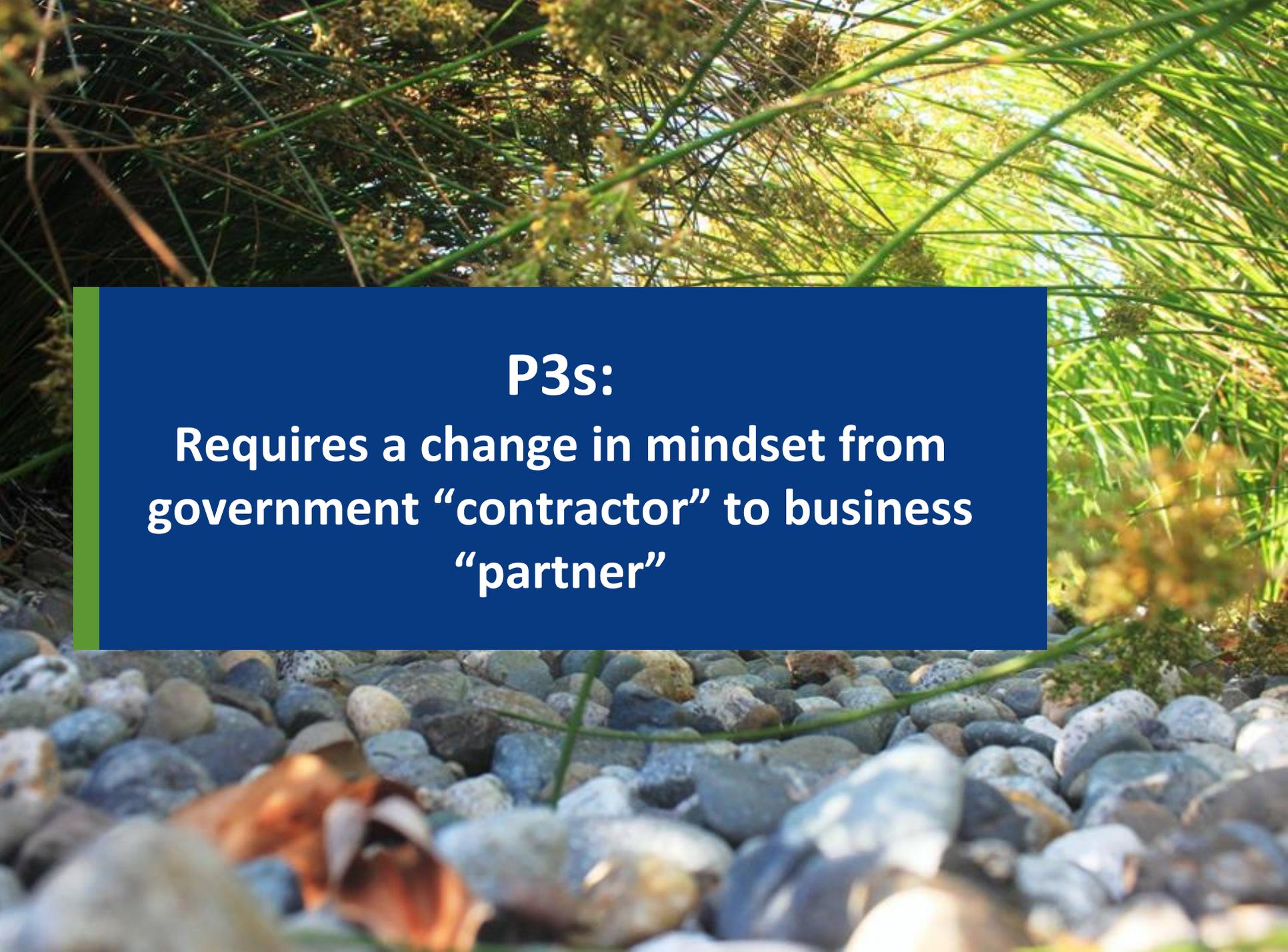
Catskill Mountains

P3 Model

- ▣ Contractual agreement between the public agency and the private sector
- ▣ Approach engages private sector in funding, planning, designing, construction, and O&M of infrastructure projects to meet public needs
- ▣ Government repays the private sector over the long term, provided it meets all agreed to terms
- ▣ Provides a more stable funding source for private sector – long term O&M
- ▣ Increased accountability – firm that constructs project must also operate = incentive to find efficiencies & cost savings

P3 Model

- ▣ Flexibility provided by private sector to find innovative practices
- ▣ Cost savings occur through efficiencies and economies of scale
 - ▣ Competitive market drives cost effectiveness
 - ▣ Private sector can acquire materials in greater quantities for additional projects
 - ▣ Private sector will ensure long-term quality of project and reducing overall costs because they are responsible for long-term O&M
- ▣ EPA – P3s can reduce cost to gov't by 20-50%
- ▣ Banks / financiers in US now seeing SW management as an emerging market

The background of the slide is a photograph of a stream. The foreground is filled with smooth, grey and blue river stones. In the middle ground, there are green reeds and grasses growing along the bank. The background shows more reeds and a glimpse of a blue sky through the foliage.

P3s:

**Requires a change in mindset from
government “contractor” to business
“partner”**

Prince George County, Maryland

- Part of Chesapeake Bay TMDL – established 2010
- Clean Water Act Fee, 2013
- To meet the Federal mandate, County has to treat 15,000 acres of uncontrolled impervious surfaces by 2025.
 - Estimated cost \$1.2 billion



Prince George County, Maryland

- P3 Model – Clean Water Partnership - signed March 2015
- 30-year agreement ensuring regulatory urban stormwater compliance for the design, retrofit, and maintenance of up to 4,000 acres of impervious area
- 30-40% of project must utilize local, minority, or women-owned businesses
- County will benefit from the private-sector financing, the private sector will be paid from stormwater fees collected by the County



Philadelphia, PA

Green City, Clean Waters Plan

- ***Green City, Clean Waters (2012)***
- Manage the first 1" of SW from ~10,000 acres of impervious land or 1/3 of impervious land in CCS area
- 3 pronged strategy
- Highest SW utility, 80% discount if manage first 1"
- Low Green Infrastructure uptake initially



Philadelphia, PA: SMIP & GARP

- 2012 – Stormwater Management Incentive Program (SMIP)
 - Green Infrastructure capital rebate program
 - First 3 years only 36 applications
 - Now paying ~\$100,000 per green acre as opposed to \$250-\$300,000 per acre for City project

- 2014 – Greened Acre Retrofit Program (GARP)
 - SMIP redesigned
 - Contractors and third parties can apply
 - Larger scale projects
 - Aggregated applications
 - Requires 45 yr O&M agreement

Only applied to non-residential projects

Benefits of GARP

per NRDC Issue Brief

- ▣ Philadelphia Water Department (PWD) obtains installed stormwater retention infrastructure at a **fraction of the cost** of public right-of-way projects with similar environmental impact
- ▣ Local green infrastructure contractors benefit from a program that rewards **project aggregation** and provides long-term green infrastructure maintenance opportunities
- ▣ Property owners benefit from aggregators identifying cost-effective green infrastructure **opportunities** that can result in **reduced stormwater fees** and improved property value.

5.

Comprehensive Program

Washington, DC

SP

Washington, DC

Washington, DC

- 1/3 of City served by CCS
- ~1.5 billion gallons of CSOs to Anacostia / 850 million to Potomac / 52 million to Rock Creek each year (Anacostia ~ most polluted in nation)
- Clean Rivers Project: 2005 signed agreement with EPA to build 3 huge tunnels over 15 yrs for CSSs during storm events
 - Expected to cost City ~\$2.6 billion



<http://www.nps.gov/anac/learn/education/upload/Air2.JPG>

Tradeable Stormwater Credit Program

- 2007/2009 studies demonstrated sig. benefit of green infrastructure – potentially eliminating need for 2/3 tunnels
- 2013 adopted local stormwater regulations
 - Major land disturbing projects and major substantial improvement projects must retain the volume from the respective 1.2 – or 0.8 inch storm
 - 50% of this volume can be retained offsite (create Stormwater Retention Credit (SRC), buy SRC, or pay in-lieu to DDOE)
 - Private sites generate SRCs by voluntarily installing green infrastructure or by exceeding regulatory requirements
 - Retention requirements are on-going – potential for reliable revenue stream
 - DDOE only SRC-certifying authority
 - 3 year certification cycle
 - First certification/trade in April/September 2014

Washington, DC – Comprehensive Program

- ▣ SRC latest in Washington effort to green stormwater management

- ▣ Many components to Washington Program:
 - ▣ 2001 – Stormwater Fee & RiverSmart Rewards and Clean Rivers IAC Incentive Programs
 - ▣ 2006 – Green Building Act
 - ▣ 2007 – Green Roof Subsidy Program
 - ▣ 2007 – RiverSmart Homes Program
 - ▣ 2008 – Clean and Affordable Energy Act
 - ▣ 2009 – Impervious Area Charge

Toronto, ON – Comprehensive Program

- ▣ Stormwater User Fee being assessed (Spring 2017)
 - ▣ Wet Weather Flow Master Plan (25 yr)
 - ▣ Downspout Disconnection Program
 - ▣ Green Roof By-law
 - ▣ Eco-roof Incentive Program
 - ▣ Toronto Green Standard
 - ▣ Rainwater Harvesting
 - ▣ Tree Canopy
- ▣ All green infrastructure programs viewed as a way to bring City costs down

6.

Discussion / Next Steps

Group Discussion 4



What other questions do you have about MBIs and Green Infrastructure for Stormwater Management?

FINAL QUESTION TIME

- Now that the session is over, how much do you now know/understand about MBIs for stormwater management?
 - I'm an expert
 - Quite a bit
 - Enough to be dangerous
 - Very little
 - Absolutely nothing

Contacts

- Stephanie Cairns
 - scairns@sustainableprosperity.ca

- Sara Jane O'Neill
 - soneill@sustainableprosperity.ca
 - @SaraONeillatSP
 - 613-562-5800 ext 4868

Key Resources

- CNT (2010) - The Value of Green Infrastructure: A Guide to Recognizing It's Economic, Environmental, and Social Benefits
 - http://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

- US EPA – Green Infrastructure
 - Information on all aspects of green infrastructure
 - <http://www.epa.gov/green-infrastructure>

- NRDC – Rooftop to Rivers II: Green Strategies for Controlling Stormwater and Combined Sewer Overflows
 - Includes 14 case studies
 - <http://www.nrdc.org/water/pollution/rooftopsII/default.asp>

Key Resources

- US EPA – Getting to Green: Paying for Green Infrastructure, Financing Options and Resources for Local Decision-Makers
 - http://www.epa.gov/sites/production/files/2015-02/documents/gi_financing_options_12-2014_4.pdf

- Philadelphia, PA –A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds (Final Report 2009)
 - http://www.phillywatersheds.org/ltcpu/Vol02_TBL.pdf

- Lancaster, PA – The Economic Benefits of Green Infrastructure, US EPA Case Study
 - <http://www.epa.gov/green-infrastructure/economic-benefits-green-infrastructure-case-study-lancaster-pa>

Key Resources

- ▣ Presentation: The ABCs of P3s and the role of Partnerships for Addressing our Stormwater Retrofit Challenge in the Chesapeake Bay & Beyond
 - ▣ [http://www.mde.state.md.us/programs/Marylander/outreach/Documents/EPA%20Region%20III Better,%20Cheaper,%20Greener%20GI%20and%20P3.pdf](http://www.mde.state.md.us/programs/Marylander/outreach/Documents/EPA%20Region%20III%20Better,%20Cheaper,%20Greener%20GI%20and%20P3.pdf)
- ▣ Western Kentucky University – Stormwater Utility Survey (2007 – 2014 reports)
 - ▣ https://www.wku.edu/engineering/civil/fpm/swusurvey/wku_swu_survey_2014_incorporating_rd_comments.pdf

Key Resources

- Green Build-Out Model: Quantifying the Stormwater Management Benefits of Trees and Green Roofs in Washington, DC (2007)
 - [http://www.capitolgreenroofs.com/pdfs/Green Infrastructure Report.pdf](http://www.capitolgreenroofs.com/pdfs/Green_Infrastructure_Report.pdf)
- Enhanced Green Build-Out Model: Quantifying Stormwater Management Benefits of Green Infrastructure in the District of Columbia (2009)
 - [http://www.anacostia.net/temporary/Workshops/LID PDF/Busiek GBOM Anacostia LID-R.pdf](http://www.anacostia.net/temporary/Workshops/LID_PDF/Busiek_GBOM_Anacostia_LID-R.pdf)

Key Resources

■ NRDC Issues Brief – Wanted: Green Acres, How Philadelphia’s Green Acre Retrofit Program is catalyzing low-cost green infrastructure retrofits on private property

□ <http://www.nrdc.org/water/files/philadelphia-green-infrastructure-retrofits-IB.pdf>

■ NOAA - Economic Assessment of Green Infrastructure Strategies for Climate Change Adaptation: Pilot Studies in The Great Lakes Region

□ https://coast.noaa.gov/digitalcoast/sites/default/files/files/publications/04062014/GLPilots_Final_5-5-14v2.pdf