

Challenge: How can the City of Pittsburgh quantify the value of a “Green First” approach to stormwater management?



The City of Pittsburgh, through the Pittsburgh Water and Sewer Authority (PWSA), the Allegheny County Sanitary Authority (ALCOSAN), and its engineers engaged Autocase in an evaluation of options to help the City meet regulatory requirements for combined sewer outflows (CSO’s) and sanitary sewer outflows (SSO’s) across 30 high-priority sewersheds.

According to the City of Pittsburgh and PWSA’s *City-Wide Green First Plan* PWSA “is committed to Green Infrastructure (GI) and has been developing a “Green First” program, which involves consideration of implementing GI first to capture stormwater at its source to maximize overflow reduction and

the myriad of associated local community benefits, often referred to as Triple Bottom Line (TBL) benefits. This “Green First” approach can then inform the necessary implementation of associated gray infrastructure, such that when coupled together into an Integrated Plan, can meet both the City’s and potentially the region’s similar Consent Orders, and overall short-term and long-term Clean Water Act requirements.”

The major goals for Pittsburgh were to:

- maximize the reduction of combined sewer outflows in the conveyance system
- reduce basement sewage backups and localized surface flooding
- better direct stream inflows and improve water quality
- deliver local community and regional benefits: “economic, social and environmental, often referred to as the Triple Bottom Line (TBL) benefits”

How could Pittsburgh include the triple bottom line benefits as well as the extensive analysis required to determine capital and O&M costs?

Solution: Autocase delivers the data and analysis for multiple benefit categories

Autocase calculated the dollar value of cleaner air and water, lower carbon emissions, higher property values, reduced urban heat island, energy savings as well as recreational benefits of the Green First plan using over 400 inputs for the project conditions. Many of these inputs have default local values that are collected, maintained and updated automatically by Autocase. As a result, the PWSA report was able to include a very site-specific analysis without project delays and incorporated Autocase’s extensive documentation in the final report.

Table 8-3:
50-Year TBL Benefits (Net Present Value) for 1,286 Acres of Directly Connected Impervious Area Managed by GI

Category	90% Confidence Interval NPV	
	Low Range	High Range
Air Pollution Reduced by Vegetation	\$5,070,000	\$9,180,000
Carbon Reduced by Vegetation	\$710,000	\$2,960,000
Flood Risk Reduction	\$333,130,000	\$666,260,000
Heat Island Effect Reduction	\$3,020,000	\$6,750,000
Property Value Increase	\$33,120,000	\$68,270,000
Recreational Value Addition	\$9,880,000	\$15,550,000
Economic Water Quality Benefit	\$7,280,000	\$9,780,000
Total TBL Benefit	\$392,210,000	\$778,750,000
Total TBL Benefit without Flood Risk Reduction	\$59,080,000	\$112,490,000

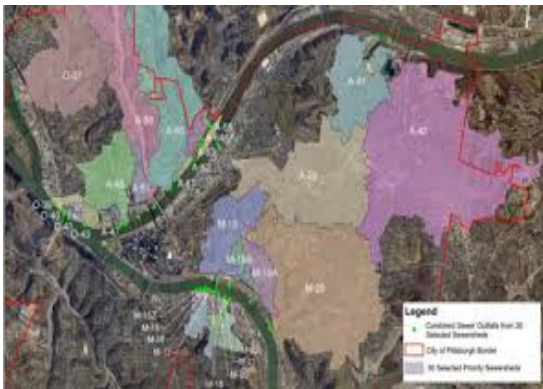
Results: Dry basements matter, to the tune of \$300 million ... at a minimum

Autocase calculated the Net Present Value (NPV) of the social, environmental and economic benefits accruing over the plan’s 50-year lifespan. Because, at the planning stage, many of the inputs are only approximately known, Autocase allows the user to input a range of values and run a Monte Carlo simulation of the Triple Bottom Line Cost Benefit Analysis (TBL-CBA) model. For Pittsburgh, green infrastructure across 1,286 acres and 13 watersheds provide net benefits (benefits after accounting for capital and operating costs) of

between \$392million and as \$779million, with flood risk reduction being the major contributor.

“Because of the diverse benefits that can be calculated by Autocase, there are over 400 potential inputs that can be defined. Having this large number of inputs allows the analyses to be tailored to closely match specific project conditions. Each input impacts at least one of the benefit calculations, and many inputs are used across multiple benefit calculations.

Because many of the inputs are only approximately known, Autocase also allows the user to input a range of values and relevant probability distributions. These ranges provide the basis for the risk assessment in the model, allowing the user to indicate uncertainty around values. Many of the inputs have default values that are calculated automatically by Autocase based on published research or from other input values, but a user can overwrite any of these defaults.” (Ibid)



“Autocase allows evaluation of a wide spectrum of GI feature types that can be evaluated individually or collectively as part of an overall project. As a user selects the design feature(s) that are applicable for their project they input relevant data and answer input questionnaires for the selected design features. These designs can include both grey and green infrastructure features, and each project can be set up with a combination of these design features, or just have a single feature.” (Ibid)

With Autocase, the City of Pittsburgh benefitted from:

- extensive Green Infrastructure (GI) research at a significantly lower expense of time and money than doing the literature review and data gathering
- confidence in an analysis backed by credible data, professional economists, and peer-reviewed research
- flexibility to compare best management practices (BMP) across different scenarios

“For this study...Autocase was chosen as the primary TBL computation software because it is an easy to use and popular TBL software that allows projects to be quickly defined and calculated.”

[PWSA City-Wide Green Infrastructure Assessment](#) – 11/10/16

Autocase: Making the business case for resilient green infrastructure

Autocase
SITES

Autocase for Sites from Impact Infrastructure, Inc.

Autocase for Sites is a software tool that models the environmental and social dollar values of green infrastructure designs and, together with financial costs, evaluates their net, triple bottom line (TBL) benefit over the life of a project using a rigorous cost-benefit analysis (CBA) framework.

With Autocase, the cost and time required to compare design alternatives at any stage of a project is a fraction of today’s custom studies. As a result, design firms can easily evaluate and justify different approaches and, in so doing, contribute to the future economic, social, and environmental success of every project.

For more information about how TBL-CBA would assist your resilience project, go to www.autocase.com