
SPECIAL REPORT

TD Economics



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THE GREENING OF NEW YORK CITY: LESSONS FROM THE BIG APPLE

Highlights

- Cities play a crucial role in greening the economy.
- Municipal policy-makers can create “bottom-up” environmental policies tailored to meet the specific needs of individual cities and their economies.
- Crafting effective environmental policy is an art. The best policy uses a combination of tools to help market forces motivate the greening of the economy.
- Environmental policy also creates economic benefits. New York City has integrated environmental elements into urban development strategies, creating situations where improving environmental performance complements economic performance.

“The greening of the economy,” refers to how consumers, businesses and government are improving environmental performance while fostering economic growth (see Text Box 1). We first used the term in the paper “The Greening of the Canadian Economy,” which discussed the greening of a national economy. In this paper, we use it in the context of cities, using New York City as an example of how municipal policy-makers are greening the economy by incorporating environmental elements into urban development strategies.

The role of the city

Developing policy that is both good for the environment and the economy is challenging. The reality is that federal and state legislators are not in a position to develop the “bottom up” policy required to address the specific and often differing needs of the businesses, citizens and consumers in all the various municipalities within their jurisdictions. Municipal policy-makers, on the other hand, have the defined scope and legislative authority necessary to create regulation tailored toward the specific needs of the municipalities they serve. Municipal environmental policy can result in more than just environmental benefits. It can be designed to meet the environmental challenges of urban development, while creating jobs, improving living conditions and fostering economic growth (for further discussion, see Text Box 2 located on page 3).

Lessons from New York City

In recent years New York City (NYC) has made tremendous progress in reducing its environmental footprint and is now hailed as one of the greenest cities in the United States. This success can, to a large extent, be attributed to strong leadership coupled with progressive environmental policy which views the environment not as a cost, but as an opportunity. Environmental policy is used to help solve “big picture” issues related to urban development, such as expansion, unemployment and public health. Our analysis of NYC environmental policy finds that the most effective programs use a combination of policy tools to create economic benefits while managing issues related to urban development.

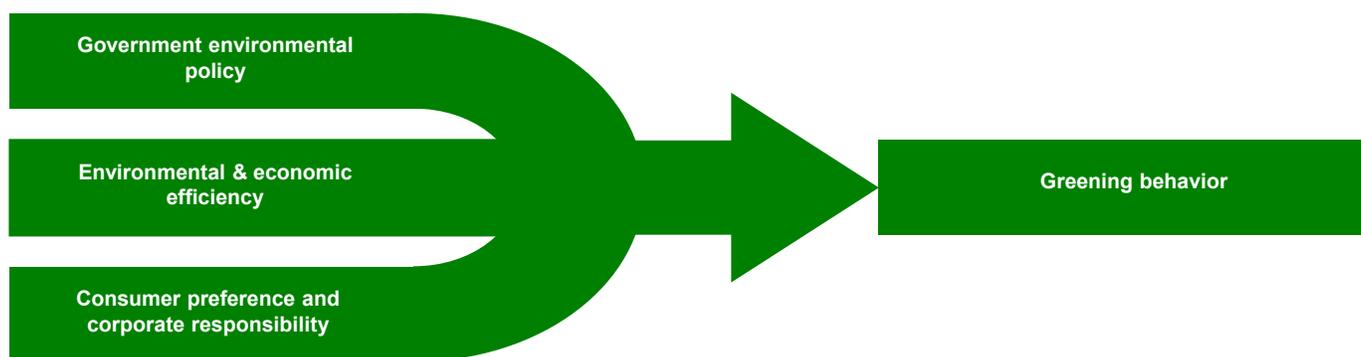
Text Box 1: The Greening of The Economy

“The greening of the economy” is a broad, holistic way of defining the relationship between the environment and the economy, advocated by TD Economics. We define the greening of the economy as:

“The aggregation of consumer, corporate and policy efforts to increase operational efficiency and minimize environmental impact while fostering economic growth, diversification and competition.”

Assessing progress in the greening of the economy requires a framework from which the relationship between the environment and the economy can be understood. We believe greening efforts are shaped by government environmental policy, environmental and economic efficiency and corporate responsibility (see Figure 1 below).

FIGURE 1: DRIVERS OF GREENING IN THE ECONOMY



For a more in-depth discussion of “the greening of the economy” please see the study by the same name available at www.td.com/economics

Urban expansion

With almost 8.4 million people in a 303-square-mile (785-square-kilometre) area, NYC is the largest and most densely populated city in North America. Urban expansion is constrained laterally, as four of the city’s five boroughs are located on islands. This means that if the city is to grow, it must grow up rather than out. Limited supply and overwhelming demand for commercial and residential space has made NYC’s real estate among the most expensive in North America. Despite this, about 20% of NYC is classified as green space and 75% of New Yorkers live within a quarter mile of a park. In fact, NYC’s proportion of green space is well above the North American average for large cities (see Table 1).

Although land in the Big Apple has a huge potential real estate value, it’s clear that NYC is not willing to sacrifice green space for additional development. NYC recognizes that green space does more than provide aesthetic value - it provides a range of environmental, economic and health benefits. The physical value of trees alone in NYC is estimated at over \$5 billion. When combined with the annual benefits they provide, the value of this land as green space can be greater than its potential real estate value. Recognizing this,

NYC has sought out opportunities to increase the amount of available green space. For example, NYC’s One Million Tree strategy plants trees across the city in areas with low concentrations of green space and high rates of hospitalization for children with asthma. These trees not only beautify and revitalize neighborhoods, they improve air quality, lower hospital admittance and increase property values (see Table 2). For every dollar spent on maintenance, NYC street trees

Measure	New York City	North American Average*
Green space (% of total area)	20%	14%
Electricity consumed (GJ/Person)	23	38
Electricity consumed (GJ/\$Million real GDP)	178	392
Water consumption (gallons/person/day)	126	165
Water Leakage Rate (% share)	14%	13%

* Based on the average of 9 cities with populations of approximately one million or greater.
 Source: TD Economics; Economist Intelligence Unit; NYISO; US Census Bureau; New York City Mayors Office.

Text Box 2:

“Top down” and “bottom up” regulatory policy

Policy created by federal and state regulators must be broad enough to apply to their entire jurisdictions, while not extending beyond their areas of legislative authority. The result is often “top down” policy – or put another way, policy that simply outlines what the end result needs to be without addressing the fundamentals that drive the results. Efforts to create “bottom up” likely to result in regulation that suits some, but causes undue economic hardship to others. However, top down policy does have its place, as it is a good way of establishing environmental standards, such as emissions targets or hazardous materials thresholds, across multiple industries and jurisdiction.

Municipal policy-makers, on the other hand, have the defined scope and legislative authority necessary to create regulation tailored toward the specific needs of the municipalities they serve. This includes ground level authority over areas like water management and sanitary services, building codes, public transportation, waste management and land use. When used effectively this policy can stimulate local economies while improving environmental conditions.

provide \$5.60 worth of benefits to their communities, with the average tree providing \$200 worth of benefits per annum. All together, the estimated economic benefit of NYC’s One Million Tree strategy is valued at over \$200 million.

Accommodating growth in NYC without sacrificing green space is challenging given its lateral constraint on growth and calls for the city to find innovative ways to use existing land to its maximum potential. NYC’s approach to reclamation of former industrial lands, known as brownfield development, not only improves environmental quality but

provides economic stimulus. The Green Property Certification program (GPCP) provides certification to verify that reclamation has restored environmental quality along with tax breaks for private industry or clean-up grants for not-for-profit entities. In the extremely competitive NYC real estate market, certification provides a competitive edge to developers by bolstering their corporate social responsibility profile. Through the GPCP, NYC used a combination of tax incentives and certification to create a situation where meeting the growing demand for real estate drives local economy and improves environmental condition.

Energy – electricity consumption

Despite the high proportion of green space, the majority of NYC is occupied by buildings. New Yorkers spend 90% of their time indoors, contributing to the fact that buildings account for over 75% of the city’s total energy consumption. In the past decade, per capita electricity consumption has grown by 2%, while electricity consumption per unit of GDP has fallen by 6% (see Chart 1), which can be attributed to NYC’s prolific economy growing faster than its population. NYC’s consumption of electricity, both per capita and per unit of GDP, are below the North American average for large cities (see Table 1). This is due in part to NYC’s dense population and high concentration of tall buildings, which tend to be more energy efficient.

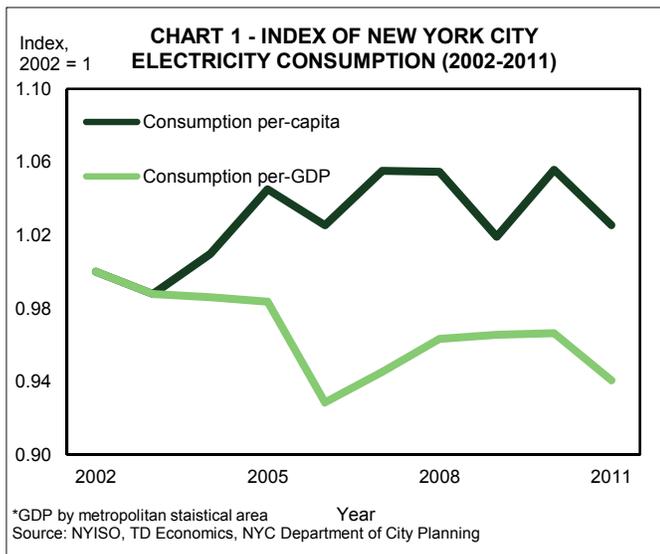
NYC is striving to improve the efficiency of new and existing buildings through the city’s Greener, Greater Buildings Plan (GGBP). The GGBP is an energy efficiency initiative consisting of mandatory energy audits, energy benchmarking, minimum efficiency standards and retrofitting guidelines for buildings above a certain size and area. In 2011, NYC benchmarked and disclosed the energy performance of almost 3,000 buildings through the GGBP. A bad benchmark score can hurt a building owner’s bottom

Table 2: Annual benefits of NYC street trees

Benefit	Description	Tangible benefit	\$ saved/tree
Energy savings	Energy saved through shading and climate moderation.	45, 609 MWH of electricity saved 16 million therms of natural gas saved	\$47.63
Atmospheric CO2 reductions	Carbon sequestered from the atmosphere and emissions avoided through energy savings.*	56,060 tons sequestered 68,687 tons avoided	\$1.29
Air quality	Air pollutants intercepted, removed and avoided by street trees.	191 tons of ozone removed 63 tons of particulate matter	\$9.02
Sewage and runoff	Reduced strain on water transportation and processing infrastructure from rain and stormwater runoff intercepted.	891 million gallons of runoff avoided	\$61.00
Property value	Increased property tax revenue received from aesthetic benefits	-	\$89.88
Total benefit	Sum of economic benefits provided by street trees.	-	\$208.83
Cost benefit ratio	Benefits to citizens for every \$ spent on maintenance.	-	\$5.60

* Carbon avoided and sequestered is net of the emissions from the decomposition and maintenance of trees.

Source: New York Municipal Forest Resource Analysis, TD Economics



line as it exposes poor performers to reputational risks. It also informs the investment decisions of environmentally conscious individuals, steering both corporate and residential investors to better performing buildings.

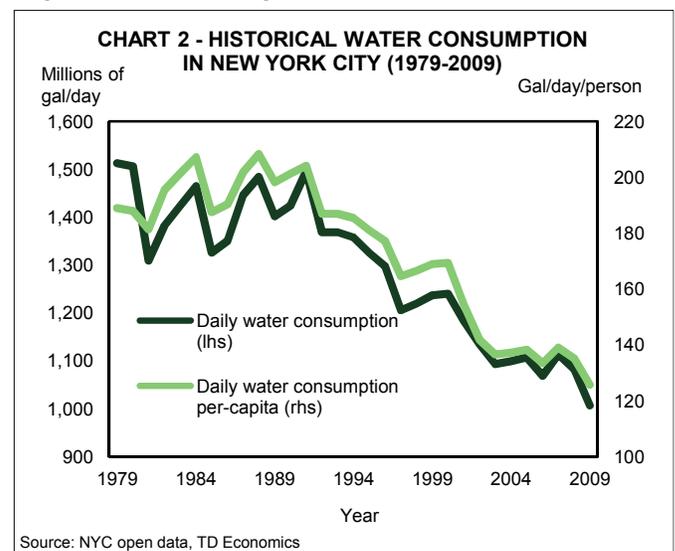
Recognizing that energy efficiency upgrades requires large capital expenditure, which may not be affordable, especially for small/non-corporate building owners, NYC accompanied the GGBP with an independent financing entity known as the NYC Energy Efficiency Corporation (NYCEEC). The NYCEEC was created in tandem with state policy makers to ease the financial burden of funding energy efficiency retrofits, by offering loans at low cost. This makes retrofitting buildings more accessible for building owners of all size, which makes everyone better off, as it improves environmental conditions and results in significant cost savings. By 2011, a number of city-owned retrofitted buildings recorded savings of more than \$2 million per facility. Overall, the GGBP is expected to cost the city \$5 billion, while generating \$12 billion in savings for a net benefit of \$7 billion over a 10 year span. Additional benefits include reducing greenhouse gas (GHG) emissions by 5% and creating 18,000 jobs in construction.

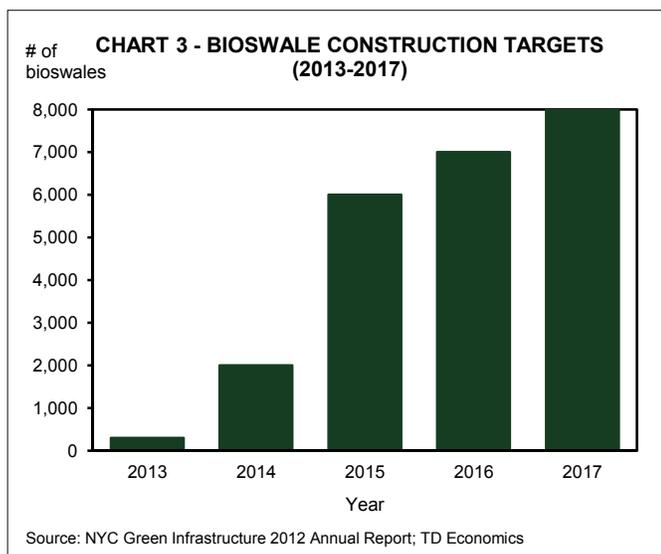
Efforts to improve energy performance are not solely restricted to buildings. The Big Apple is also making significant investments in the local energy generation infrastructure, such as energy-from-waste and cogeneration technologies. Gases flared at waste-water treatment facilities account for 7% of the city's GHG emissions. Installation of "waste-gas-to-grid" technologies would see this gas captured and used to generate electricity. If successful, these generators would reduce emissions from venting and flaring by up to 60%. It would also reduce dependence on more

carbon intensive sources of energy, lower energy costs and create additional employment opportunities. In response to the PlaNYC Climate Challenge, a citywide initiative to strengthen the economy and combat climate change, New York University upgraded its 30-year-old oil-fired cogeneration plant, to a cleaner, more efficient natural-gas cogeneration facility. Compared with its predecessor, this new plant reduces GHG emissions by 23%, reduces air pollutants by 68% and decreases operating costs by \$11million to \$14 million annually.

Water consumption

Another key environmental issue is water, which is fundamental to all urban centers. NYC's water consumption is at its lowest level in 50 years and is well below the North American average for large cities (see Table 1 and Chart 2). The mandatory installation of water meters has been a major contributor to the conservation of water. Water meters have made it possible to change the way water is priced, from a flat rate to a unit rate. Under a flat rate, consumers pay a fixed monthly fee regardless of the amount of water they consume. Under the unit rate, consumers are charged based on their level of consumption. Consumption is typically lower under unit rate pricing, as consumers can save money by conserving water. Water metering has the additional benefit of increasing the amount of information available to the consumer. NYC's Department of Environmental Protection, the body that manages water supply and sewage systems, has created a supply monitoring system to continuously monitor water usage and notify customers of spikes in consumption via email. This alerts customers to leaks early on, reducing potential property damage, and also allows them to adjust usage to suit their budget.





Despite low levels of consumption, water leakage rates in NYC are above the North American average (see Table 1). This is primarily due to the aging water transportation network, which is over 100 years old in some places. Fixing these leaks can be difficult, as the majority of NYC’s water transportation infrastructure cannot be repaired while still in use. To overcome this challenge, NYC is investing \$5 billion to build supplementary infrastructure. This project has been underway since the 1970s, and upon completion will allow the primary water tunnels to be shut down for repair for the first time in their history. Repairs to the primary infrastructure are expected to significantly reduce leakage and lower operating costs. Moreover, once repairs are complete the supplementary infrastructure will be used to efficiently manage the city’s growing water transportation requirements.

Storm-water management is also a concern for NYC’s water transportation and treatment system. Storm-water runoff can overburden processing infrastructure and strain equipment by forcing it to work above capacity. The additional burden placed on the system reduces the lifespan of equipment and is ultimately very costly. In an effort to reduce the physical impact and cost burdens of storm-water runoff, NYC piloted its innovative bioswale project. Bioswales look like small gardens filled with local vegetation on curb-sides or right-of-ways. Beneath the surface, a reservoir of crushed

gravel slows the flow of runoff and facilitates drainage while helping support vegetation. By slowing the flow of runoff, bioswales reduce the strain on water-processing equipment, allowing the system to run within capacity during most storms. When fully implemented, these bioswales are expected to reduce water flowing through sewage and treatment systems by 1.5 billion gallons (5.6 billion liters) annually. With costs ranging from \$13,000 to \$36,500 each, bioswales are expensive. However, as the scale of installations increases, this cost is expected to fall and ultimately be outweighed by the benefits provided (see Chart 3). The projected cost savings of slowing storm-water runoff is in excess of \$35 million annually, with an additional \$400 million obtained from new tax revenue that will result from improved property values. Beyond economic benefits, bioswales will provide improvements in water quality, air quality and the amount of available green space.

Bottom line

Cities play a crucial role in the greening of the economy. When it comes to government environmental policy, top-down regulation has its place, however it is not the sole means of addressing environmental issues. Local policy-makers possess the precise scope and legislative authority necessary to create bottom-up environmental policy that results in a wide range of benefits. NYC is a prime example of this. Its innovative approach of integrating environmental elements into solutions for urban development issues has improved environmental conditions, increased property values, cut costs, created jobs, improved public health and enhanced the quality of life. Moreover, NYC has demonstrated that by combining policy tools, municipal policy-makers can create conditions where market forces motivate the greening of the economy. NYC has made one thing clear, if they want to improve environmental condition, they need to move from perceiving the environment as a cost to an opportunity. Thinking in these terms, it becomes clear that consumers, businesses and government can engage the traditional market place to green the economy and create a cleaner, brighter world for current and future generations.



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