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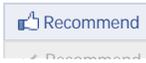
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Sun Nov 4, 2012 7:59am EST

* Flood defense plan could cost up to \$29 billion

* May include barriers, levees and dikes

* Federal funding key, private financing unlikely

By Greg Roumeliotis

NEW YORK, Nov 4 (Reuters) - When Jeroen Aerts, a Dutchman tasked with crafting a plan to defend New York City from flooding, first looked at its coastline seven years ago, he was taken aback by how vulnerable it was.

Unlike some of the other large cities around the world, such as London and Amsterdam, that have comprehensive flood defense systems with levees and storm surge barriers, New York was completely at the mercy of the elements.

"I was looking at the water and wondering - where are the levees?" said Aerts, a professor of environmental risk management at the VU University in Amsterdam and an adviser to New York City. "Nobody was doing anything on flood risk."

As the devastation after super storm Sandy this week made all too clear, little progress has been made since Aerts first looked at the Atlantic Ocean from New York's shores. The storm caused widespread flooding, power outages, travel chaos and left more than 40 people dead in New York City. Early estimates predict it also caused up to \$18 billion in economic losses

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in New York state alone.

New York state and city officials have started talking about the need for a comprehensive flood defense system, but many obstacles remain. According to Aerts' top estimate, it could cost as much as \$29 billion to build and implement. The question of who will pay for it remains unresolved.

Most comprehensive proposals for storm surge defenses involve a system of two to four barriers, each spanning from a third of a mile (.5 km) to six miles (9.6 km) and towering about 30 feet (9 metres) above sea level. This is to be supplemented by levees, dikes, bulkheads and beach strengthening.

One of the most prominent plans calls for a 0.84-mile East River storm surge barrier from Whitestone in Queens to Throgs Neck Bridge in the Bronx, and a much longer 5.92-mile Outer Harbor barrier linking Sandy Hook in New Jersey to the Rockaway Peninsula in Long Island.

Aerts estimates storm surge barriers could cost between \$10 billion to \$17 billion, while additional defenses such as levees and adding sand to eroding beaches could cost another \$10 billion to \$12 billion.

Even if the city were to find that kind of money, an infrastructure project on such a scale can take more than eight years to build, which means New Yorkers would be exposed to the fury of any such storm in the meantime.

As shown in the past week, the city's current strategy is to take precautions - such as evacuations from areas that flood easily - then take the hit and try to recover as best as it can.

"The city's approach is something that they call 'resilience'. If they are hit by a storm and they have flooding there will be damage but after the storm they can clean up... kind of repairing the damage after it's happening, bouncing back," said Malcolm Bowman, an oceanography professor at Long Island's Stony Brook University. "Obviously it is not enough."

New York City and state officials did not respond to a request for comment on the question of flood barriers. A city spokesperson also did not respond to a request to comment on the significance of Aerts's role. The city will occasionally tap advisers to carry out research.

WHO PAYS

To many New Yorkers, Sandy's destruction came as a shock. But to scientists, engineers, environmentalists and public officials, this was a tragedy waiting to happen. A 2007 study by the Organization for Economic Co-operation and Development ranked greater New York second among the world's large port cities most exposed to coastal flooding based on the value of their property.

"People have said for many years - specifically since Hurricane Katrina hit New Orleans - that New York City was prone to such a super storm," New York City Comptroller John Liu said on

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Thursday.

Still it took Hurricane Irene in August last year for the city to seriously start exploring a flood plan, according to Aerts, who said the city asked him to develop a comprehensive cost-benefit analysis for a flood strategy.

After Sandy, the momentum behind such a plan is set to build. Andrew Cuomo, governor of New York state, said this week that infrastructure will need to be re-examined and reinforced.

But it is not clear how New York will pay for it, and it may well take an act of Congress to prevent the next act of God from bringing the world's financial center to its knees again.

"We have to weigh our damages against the cost of building such a levee system," said Liu.

On paper, New York City has the capacity to borrow more to spend on infrastructure. The latest relevant report from Comptroller Liu's office projects the city to be \$18.28 billion below its general debt limit by July 2013 and \$18.74 billion by July 2014.

"I don't see tight debt capacity as a hurdle down the road," said George Friedlander, chief municipal strategist at Citigroup Inc.

But the city's government is likely to be loath to jeopardize its strong credit in the municipal bond markets. It will have to clinch a deal with the state, the federal government, as well as other states vested in this, particularly New Jersey, at a time when relations between Democrats and Republicans are highly polarized.

"When we saved New York City from [bankruptcy](#) thirty years ago, Governor (Hugh) Carey got people together and made them understand they were better off talking to each other," said Wall Street veteran Felix Rohatyn, currently a special adviser to Kenneth M. Jacobs, CEO at the Lazard investment bank. "I'm worried this is something we cannot do today."

FEDERAL MONEY

Federal money may prove key to any major flood protection program. This would mean negotiating funds with Congress rather than relying on the Federal Emergency Management Agency, which reimburses states and cities for recovery projects. And getting that kind of money is going to be increasingly difficult given the lack of consensus in Washington on how to handle the U.S. government's large budget deficit and soaring debt.

"We have to get a long-term commitment from the federal government to put money up, which can be contingent on the state and local governments producing a significant match," said former Pennsylvania Governor Ed Rendell.

Rendell, a major advocate of private sector involvement in infrastructure [finance](#), argued that public-private partnerships could be part of the funding mix for such projects.

Even though something like levees would be not be revenue-generating, private ownership or management was still an option, said Raj Agrawal, head of infrastructure for North America at investment firm KKR & Co LP.

"If you get this under private ownership or private operation, you can certainly raise more capital than you could in the bond market by getting a capital infusion of funds from a private party," he said.

POLITICAL DECISIONS

In Europe, the Delta Works in the Netherlands, as well as the Thames Barrier in Britain, were both kicked off after the North Sea Flood of 1953 and are early examples of how major storms can result in significant infrastructure investments.

The United States has not always been quick off the mark in erecting such defenses. Storm surge barriers off Rhode Island, Connecticut and Massachusetts were constructed in the 1960s as a result of a hurricane in 1938, said Graeme Forsyth, a technical director at [engineering](#) consultancy Halcrow.

"The design may take two years, the [construction](#) might take six, and the rest of it is more to do with getting the ball rolling politically, getting the funding in place and all that kind of thing," said Forsyth, whose firm is behind a storm surge barrier for St. Petersburg, [Russia](#), that cost \$6.9 billion.

Still, [construction](#) of the storm surge barrier in New Orleans was completed in 2011 - just six years after Hurricane Katrina devastated the city.

"My experience in other countries with this kind of project is that these are political decisions. If the population is in favor of it, then a politician will say we'll go for it. ... Now we have momentum," said Aerts.

Some skeptics argue that barriers and other large-scale infrastructure projects are not cost-effective because they protect only specific areas.

"There is too much coastline. In a funny kind of way you can protect one area at the expense of another. I don't think huge capital infrastructure like that is going to be constructive," said Steven Cohen, a professor at Columbia University's School of International and Public Affairs.

Aerts, though, says he is producing an estimate for the cost of barriers to give to the city's government.

"In the short-term you can look at existing building codes to make sure that they are maintained. In the longer term, the barriers come into play," Aerts said.

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