



CLOUDBURST MANAGEMENT PAYS OFF

Economics of cloudburst and stormwater
management in Copenhagen



”In Copenhagen we always try to find solutions that do not just solve the problem, but also create a better quality of life for the citizens in Copenhagen. we incorporate climate change adaptation at all levels of city planning and prepare comprehensive solutions for the entire city.”

Mayor for technical
and environmental affairs
Morten Kabell
City of Copenhagen

CLOUDBURST IS A TERM DENOTING HEAVY RAIN WITH MORE THAN 15 MM OF PRECIPITATION WITHIN 30 MINUTES

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PURPOSE AND BACKGROUND

The City of Copenhagen has produced a report on the economics of managing heavy rains and stormwater in Copenhagen, which presents:

- An overall assessment of the costs of and benefits from protecting the city against heavy rains and more everyday rain
- An estimate of construction expenditure for the collective technical solution, which is referred to in the report as the “combined solution”

The City of Copenhagen has already carried out a number of different analyses of the construction costs and socio-economics of cloudburst and stormwater management in Copenhagen. These can be found in the Copenhagen Climate Adaptation Plan (2011), the Copenhagen Cloudburst Management Plan (2012) and Detailing of the Cloudburst Management Plan Divided into 7 Water Catchment Areas (2013-2014).

The combined solution has developed and taken shape over time. There is therefore a need for a new collective description of the economics of the combined solution.

◀ This cloudburst struck Copenhagen on the night of Sunday 31 August 2014. A young girl is stranded at Ryparken Station.

COMBINED OR TRADITIONAL SOLUTION

The City of Copenhagen has primarily adopted two scenarios for the management of extreme rainfall events and stormwater:

The traditional solution

A technical solution that drains water away through an expansion of the sewer network underground.

The combined solution:

A technical solution that combines surface solutions and sewer-based solutions as well as retaining and draining water. The combined solution consists in expanding the sewer network and around 300 surface projects spread across the city. The combined solution is the one Copenhagen will continue to work on. Read more in “Cloudburst Management in Copenhagen – From Plan to Solution”.

SUMMARY

When we calculate the socio-economic expenditure on and benefits from protecting the city against heavy rains, the calculation is based on the level of service adopted in the Cloudburst Management Plan in 2012.

CONVINCING SOCIO-ECONOMICS

The socio-economic assessment is intended to show us whether cloudburst and stormwater management can pay off for society as a whole. The calculation thus shows what it costs society to protect Copenhagen against high-intensity rains. It is consequently a more extensive assessment than the actual construction cost estimate. Briefly, the assessment shows that under current conditions we can expect an overall socio-economic surplus of DKK 5bn over 100 years from adopting the combined solution for the management of heavy rains in Copenhagen, compared with a scenario in which the City of Copenhagen does nothing.

If the traditional sewer-based solution is chosen, on the other hand, there will be a deficit for society of DKK 4bn over 100 years.

COORDINATION CAN REDUCE EXPENDITURE ON CONSTRUCTION

The cost of construction for cloudburst and stormwater management can be reduced if cloudburst and stormwater management projects are integrated with other construction projects. If this potential is exploited throughout the construction period, the nominal saving may be up to DKK 1bn.

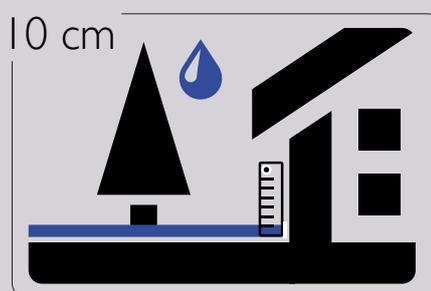
URBAN SPACE IMPROVEMENTS AND PROPERTY VALUE

It is estimated that urban space improvements with high recreational value can be established at a cost of around DKK 1bn, if this is done at the same time as cloudburst management. An increase in real estate prices of around DKK 1.4bn is expected in Copenhagen in the wake of the new urban spaces. This means higher municipal tax revenues as a result of a significant rise in the value of nearby properties.

LEVEL OF SERVICE

The entire economics of the solution is based on the level of service adopted in connection with the cloudburst management plan, where it was decided that Copenhagen was to be protected to a level at which damaging floods do not occur in a 100-year rainfall event.

'Damaging floods' means that there is water to a depth of more than 10 cm on the ground, for example on streets. Pavements in some areas will be flooded with up to 10 cm of water, and there is therefore also a need to protect buildings.



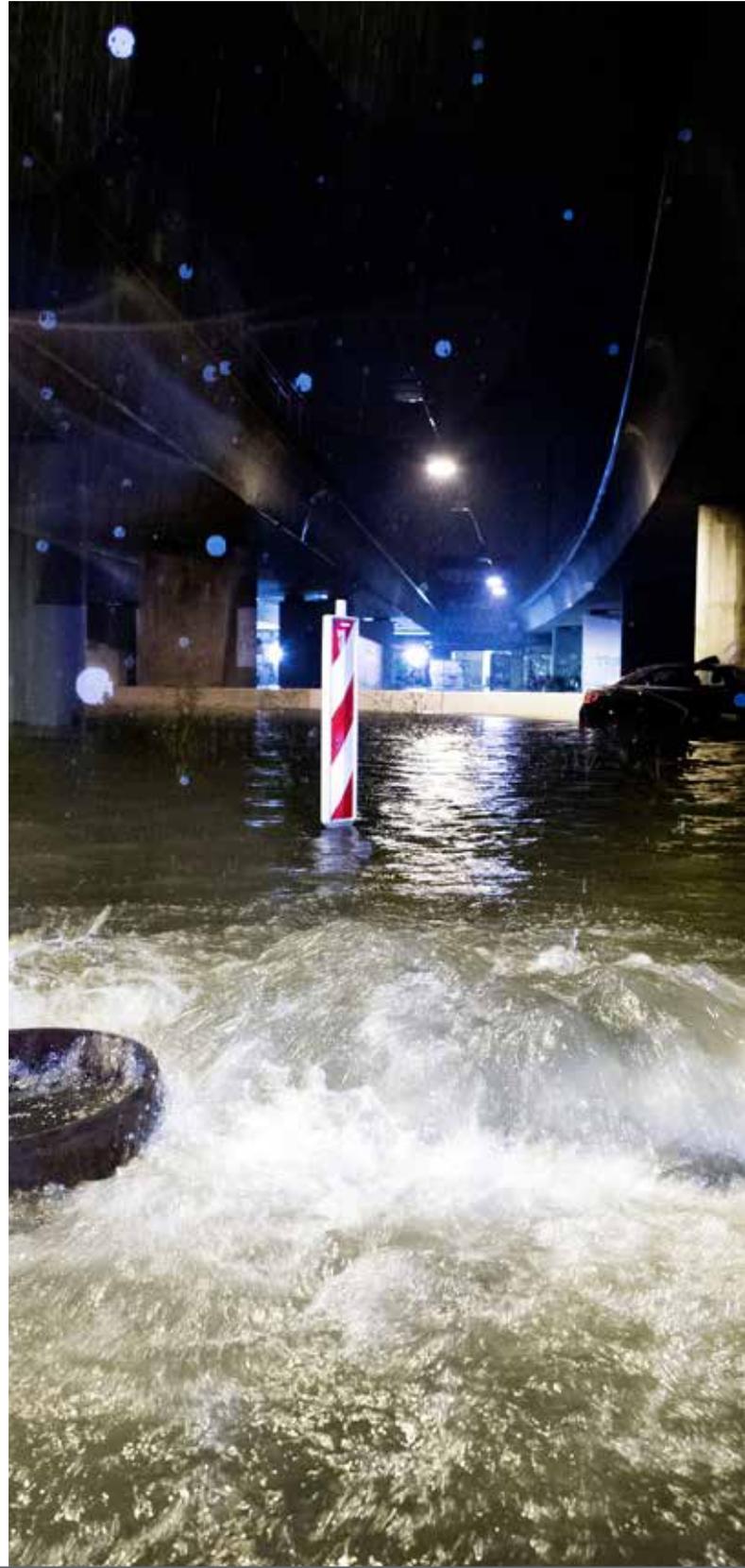
NEW JOBS

Total employment of more than 13,000 full-time equivalents with DKK 1.6bn in tax revenues can be created in the construction phase. The tax revenue created as a result of additional employment in the building and construction industry always accrues to the municipality in which the employee is resident. It has therefore not been possible to calculate the effect in the City of Copenhagen alone. If the construction of facilities for urban space improvements is additionally included, the number of new full-time equivalents will rise to more than 15,000 and tax revenues to around DKK 2bn.

DEMAND FOR NEW SOLUTIONS

The City of Copenhagen can create growth and commercial development through demand for new solutions as cloudburst and stormwater management is being implemented throughout the city. The solutions adopted in Copenhagen can be applied in other cities facing the same problems. In that way, climate change adaptation solutions have great international market potential.

► Cloudbursts struck Copenhagen on the night of Sunday 31 August 2014. The Lyngby motorway is blocked at Hans Knudsens Plads in Copenhagen, and a sewer cover is forced up by the water pressure.

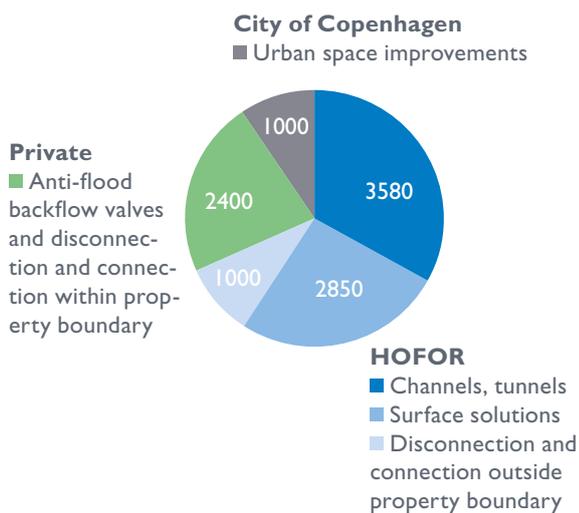


ECONOMICS OF CONSTRUCTION

Construction economics is calculated in relation to what it would cost to establish a system for cloudburst and stormwater management in Copenhagen if it was built tomorrow. The total estimate of construction costs consequently differs from socio-economic costs by measures where the costs are calculated in terms of present-day value over a longer timeframe with a supplement of 37% in charges and tax distortion.

It will cost DKK 9.8bn to construct the combined solution. In addition there are urban space improvements of approximately DKK 1bn. The estimate is calculated at 2013 prices and covers the total costs incurred by the City of Copenhagen, HOFOR and private landowners.

CONSTRUCTION COST ESTIMATE FOR THE COMBINED SOLUTION IN COPENHAGEN (DKK MILLION)



▲ The items of expenditure are explained on page 15

INVESTMENTS ON PRIVATE LAND

Private landowners have to protect their buildings against flooding from the sewers and against water penetration from surface runoff during heavy rains. This can be done, for example, by installing an anti-flood backflow valve on the private service pipe, disconnecting stormwater; protecting basements against penetration of water through light wells, basement entrances etc.

IMPACT ON CHARGES

Collective flood prevention solutions can be financed through the water charges. For a family living in an apartment with annual water consumption of 100 m³ (apartment), the annual water charges will rise by an average of DKK 715. For a family living in a house with consumption of 170 m³, the annual water charges will rise by an average of DKK 1100.

HOFOR

HOFOR stands for Hovedstadsområdets Forsyningsselskab (Capital Area Utility Company). HOFOR supplies Copenhagen with water and sewerage services, and has the option of financing the collective infrastructure that manages stormwater by levying charges.



LEVEL OF SERVICE – PROTECTING THE CITY AGAINST 100-YEAR RAINFALL

The economics of the combined solution is based on the level of service adopted in conjunction with the Copenhagen Cloudburst Management Plan, where it was decided that Copenhagen should be protected to a level at which damaging floods do not occur in a 100-year rainfall event.

'Damaging floods' means that there is water to a depth of more than 10 cm on the ground, for example on streets or cycle paths. Pavements in some areas will be flooded with up to 10 cm of water, and there is therefore also a need to protect buildings.

RISING LEVEL OF DAMAGE

Copenhagen has experienced four major rainfall events in the past six years. The largest, in 2011, caused damage totaling more than DKK 6bn. This does not include direct costs of repairing municipal infrastructure or indirect costs such as loss of earnings, loss of business operation, rising insurance premiums or companies choosing to move away from the City of Copenhagen.

This leads to a reassessment of the overall economics, particularly in view of the calculation of the costs of damage in the Copenhagen Climate Adaptation Plan if nothing is done of around DKK 16bn over 100 years.

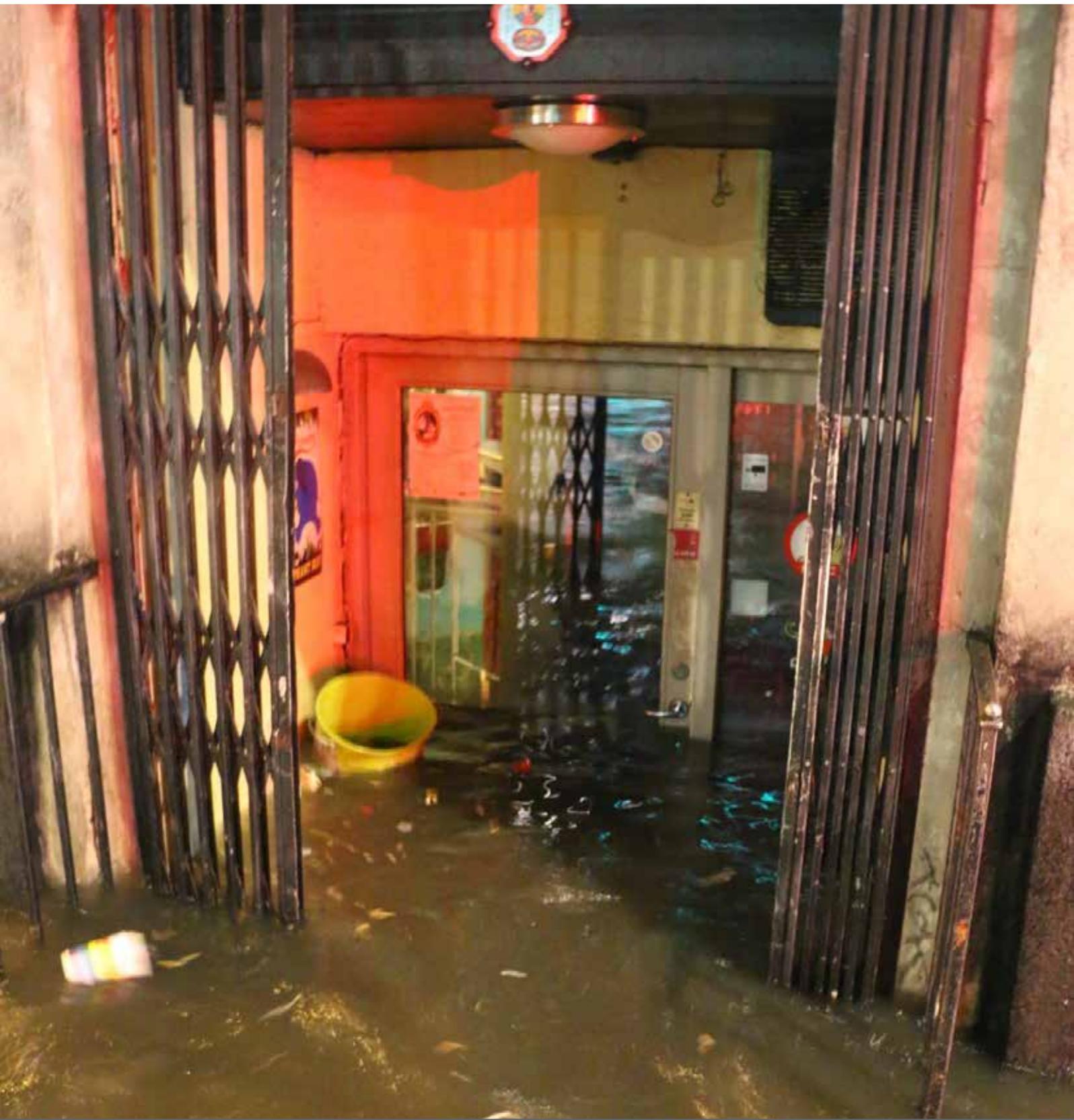
Assessment Report 5 of the IPCC (Intergovernmental Panel on Climate Change) on development in the global climate was published in Copenhagen at the beginning of November 2014. It is apparent in this report that the risk of more intense and more frequent rains will increase over the years. This projection is in agreement with what we have seen in Copenhagen in recent years, with a greater number of and heavier downpours, where the trend appears even to be ahead of the IPCC's projections.

The City of Copenhagen will therefore review the Copenhagen Climate Adaptation Plan in 2015 on the basis of the IPCC's Assessment Report 5 and climatic events in the past few years. Among other things, the review will contain a reassessment of the extent of damage and the significance of the timeframe for implementation of the Climate Adaptation Plan for damage in the city.

Due to the uncertainty around the magnitude of future extreme rainfall events, Copenhagen works with combined pipe-based and surface solutions, which are far more flexible than pure pipe-based solutions.

IT APPEARS VERY UNLIKELY THAT THE TOTAL LEVEL OF DAMAGE (WITHOUT ACTION) AS A RESULT OF EXTREME RAINFALL EVENTS WILL TOTAL ONLY DKK 16BN OVER THE NEXT 100 YEARS, WHICH IS THE ESTIMATE MADE IN THE 2011 CLIMATE ADAPTATION PLAN. WE HAVE ALREADY "USED" DKK 6-9BN OF THAT SUM TODAY.

▶ A basement-level shop in Vesterbro under water following the cloudburst on 31 August 2014



SOCIO-ECONOMIC ASSESSMENT

A socio-economic assessment has been carried out to ascertain whether cloudburst and stormwater management can pay off for society as a whole. The analysis shows what it costs society to protect Copenhagen against high-intensity rains and what benefits can be expected for society as a whole.

The socio-economic assessment consists of:

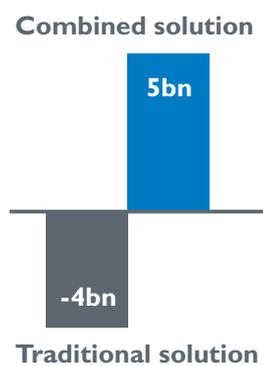
- An assessment of the risk of flooding from heavier and more frequent rainfall and the damage costs this can cause over the next 100 years if we do not do anything ("business-as-usual"),
- A calculation of the capital and operating costs of the traditional solution (sewers) and the combined solution.
- A comparison of the costs of the two solutions and the benefits to be made from reducing damage in the city in comparison with "business-as-usual" (social cost-benefit analysis). This calculation provides an answer to the question of whether the solutions are advantageous from a societal perspective compared with doing nothing ("business-as-usual").
- A comparison of the traditional solution and the combined solution in relation to the municipal service level targets (cost-effectiveness analysis), which answers the question of which solution is most advantageous if there is a wish to meet the City of Copenhagen's service targets for stormwater.

SOCIO-ECONOMIC ASSESSMENT OF COSTS OF AND BENEFITS FROM CLOUDBURST AND STORMWATER MANAGEMENT IN COPENHAGEN (DKK BN)

CLOUDBURST AND STORMWATER MANAGEMENT	TRADITIONAL SEWER SOLUTION	COMBINED SOLUTION	COMBINED SOLUTION (Ministry of Finance method of calculation)
Costs of damage without action	16	16	18
Costs of action	20	11	10
Reduction in costs of damage	16	16	17
Net benefit	-4	5	7

▲ Note: The table is calculated at market prices. A net charge factor of 17% and a marginal cost of public funds of 20% have been added to the capital cost estimate (see previous analyses of the climate adaptation and cloudburst management plans). The solutions have been gradually implemented over 20 years and 0.5% has been added in operating costs. However private disconnection of rainwater and connections within the private property boundary are implemented over 70 years. Figures in the first two columns are discounted by 3%. The column on the right indicates the results for the combined solution if the Ministry of Finance guidelines from 2013 concerning a declining discount rate are applied instead of 3%.

The assessment shows that under present-day circumstances we can expect an overall benefit of DKK 5bn from the combined solution in Copenhagen in comparison to a situation in which the City does nothing. The socio-economic benefit by choosing the combined solution compared to the traditional sewer solution is around DKK 9bn.



The damage from climate change related to stormwater and heavy rains is calculated to cost DKK 16bn over a period of 100 years. This was calculated in 2010 in connection with the 2011 Climate Adaptation Plan, based on a cautious appraisal of the IPCC's possible scenarios for future climate change.

To illustrate the uncertainties in the economic assessment, a supplementary calculation of the combined solution has been carried out based on the Ministry of Finance guidelines from 2013 concerning socio-economic discounting. The calculation shows that the total damage rises from DKK 16bn to DKK 18bn over 100 years, and that the net benefit likewise rises from DKK 5bn to DKK 7bn. This result is due in particular to the Ministry of Finance discounting procedure giving greater emphasis to reductions in damages far into the future.





CONSTRUCTION COST ESTIMATES

The capital cost estimate is calculated on the basis of what it would cost to establish a solution for the management of cloudbursts and stormwater in Copenhagen if it was built tomorrow.

Total capital costs thus differ from socio-economics, which calculates the costs over a longer period. The estimates are based on calculations made in the Copenhagen Climate Adaptation Plan, the Copenhagen Cloudburst Management Plan and HOFOR's capital cost estimates.

The neighbouring municipalities are also part of the solution in Copenhagen, because cloudburst management in the municipalities of Frederiksberg, Gladsaxe and Gentofte is mutually dependent on Copenhagen's solution. However, the neighbouring municipalities are not included in the table.

CAPITAL COST ESTIMATE FOR THE COMBINED SOLUTION IN CITY OF COPENHAGEN

CONSTRUCTION	PRICE ESTIMATE IN 2013 PRICES (DKK M)	DESCRIPTION
Canals, tunnels (HOFOR)	3,580	Canals and tunnels are the large pipes and canals HOFOR constructs as traditional sewer projects.
Surface solutions (HOFOR)	2,850	Surface solutions are stormwater and detention roads and detention areas that transport or detain the water. They are co-financing projects, where the Municipality of Copenhagen or private individuals are project owners, but where HOFOR co-finances. The project owner determines when the construction is to be carried out and how it is to be designed.
Disconnection and connection outside property boundary (HOFOR)	1,000	Connection on public area is the connection of everyday rain to cloudburst management solutions. This involves, for example, conveying disconnected stormwater from the property boundary to the cloudburst management solutions. The expenditure is borne by HOFOR.
Anti-flood backflow valves (private)	1,200	Anti-flood backflow valves etc. are an investment by private individuals to protect their own homes, including anti-flooding valves on the sewers and protection of light wells, basement entrances etc.
Disconnection and connection within property boundary (private)	1,200	Connection to private areas is conveying disconnected stormwater within the property boundary.
I alt	9,830	The capital cost estimate comprises the total costs to be paid by HOFOR and property owners.
Addition of urban space improvements	1,000	Urban space improvements are what are added to the hydraulic solutions, and the price depends on the quality of urban space improvement chosen on a political basis. Paid for by the Municipality of Copenhagen

▲Note: Based on HOFOR memorandum dated 27.08.2014. The capital cost estimate is calculated at 2013 prices and contains 10% for maturing the project and 20% for unforeseen expenses. The estimate does not include depreciation and operating costs. Anti-flood backflow valves do not have the same lifetime as sewer pipes, for example, and have to be replaced several times over a 100-year period. The total private investment under the item of "anti-flood backflow valves etc." will therefore be greater than stated over a 100-year period. The lifetime of the units is, however, expected to increase and prices to fall in the near future. Private includes municipal properties

FINANCING AND DISTRIBUTION OF EXPENDITURE

The combined cloudburst and stormwater solution in Copenhagen will cost a total of DKK 9.8bn. The part of the solution concerned solely with managing water (hydraulic function) can be financed through the water charges, while the money for urban space improvements can be found on an ongoing basis through the municipal budget. The combined solution additionally necessitates private individuals investing in anti-flood backflow valves etc. and local drainage of stormwater.

THE CO-FINANCING MODEL

The co-financing scheme gives the City of Copenhagen the option of 100% co-financing of water management through the water charges, if the surface solution is more cost-effective than a pipe-based solution. The water rates must not, however, be used for urban space improvements, which have to be paid for from the municipal budget and decided on an ongoing basis in the budget negotiations in the Municipality of Copenhagen.

- HOFOR finances all the tunnel solutions, including the cost of conveying disconnected water from the property boundary to the stormwater system.
- HOFOR can co-finance joint cloudburst management measures with private property owners as well as the municipality if the property is included in the combined solution for the cloudburst management of Copenhagen.

INVESTMENTS ON PRIVATE LAND

Private landowners have to protect their properties against flooding from the sewers in areas with joint sewerage during heavy rains. This can be done, for example, by installing anti-flood backflow valves on the private service line, disconnecting stormwater, protecting basements against penetration of water through light wells, basement entrances etc.

URBAN SPACE IMPROVEMENTS

When the cloudburst projects are implemented on the surface, it is appropriate to examine whether urban space improvements can be made at the same time. Expenditure on urban space improvements is borne by the municipality. Urban space improvements are estimated to cost around DKK 1bn during the whole implementation period. The assessment is based on a lower price per m² than is normally applied in calculating expenditure on urban spaces in Copenhagen. This is due to a large number of items of construction expenditure normally associated with the establishment of new green facilities being borne by HOFOR in establishing the basic hydraulic function of these areas.

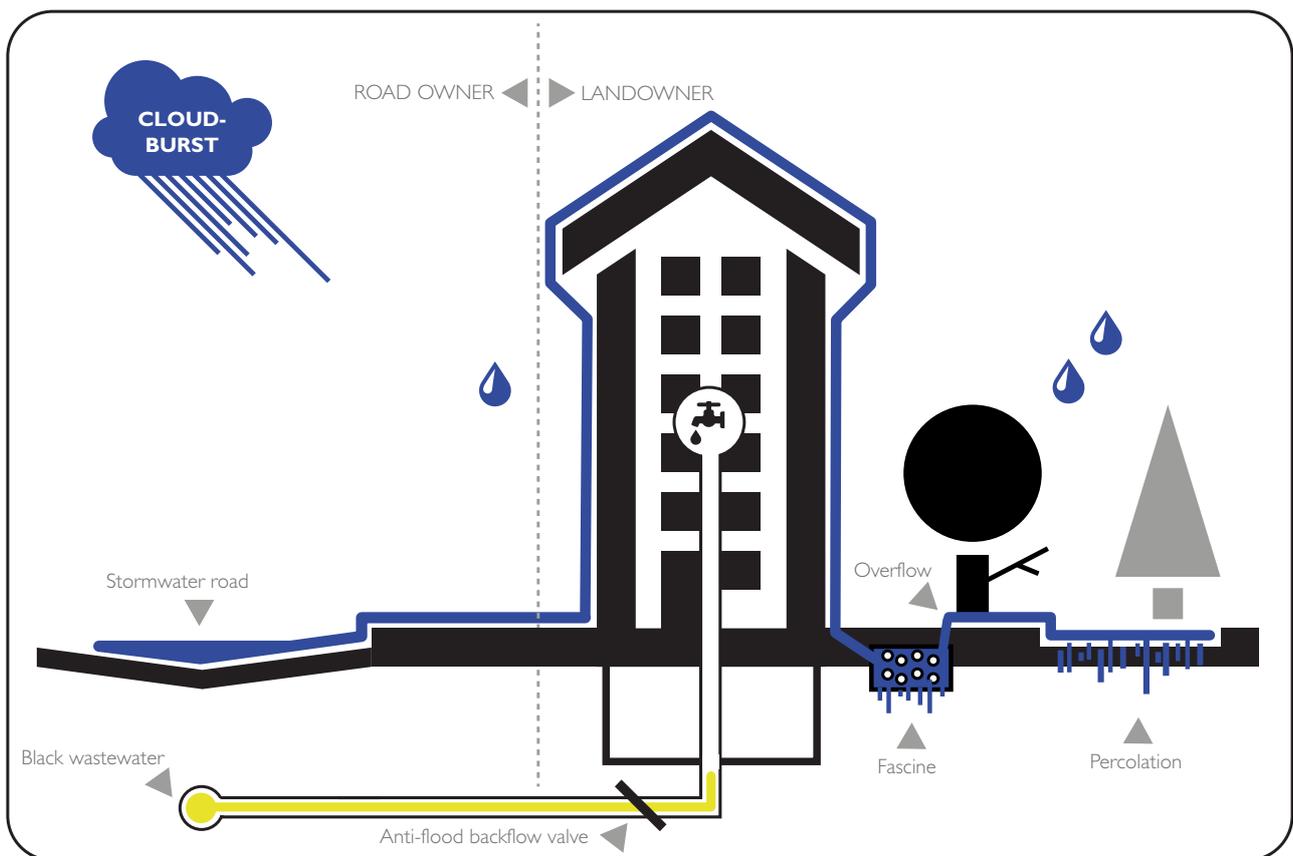
► The visualisations show the future project in Enghave Park, where urban space improvements and cloudburst management are integrated (produced by Tredje Natur).



PRIVATE INVESTMENTS

How Copenhagen's landowners have to protect their property depends to a large extent on the design of the buildings, local sewer conditions and local cloudburst solutions.

SCHEMATIC DIAGRAM OF THE CLOUDBURST MANAGEMENT OF A BUILDING:



▲ In this example water from both everyday rain and cloudbursts can be drained to the stormwater road.

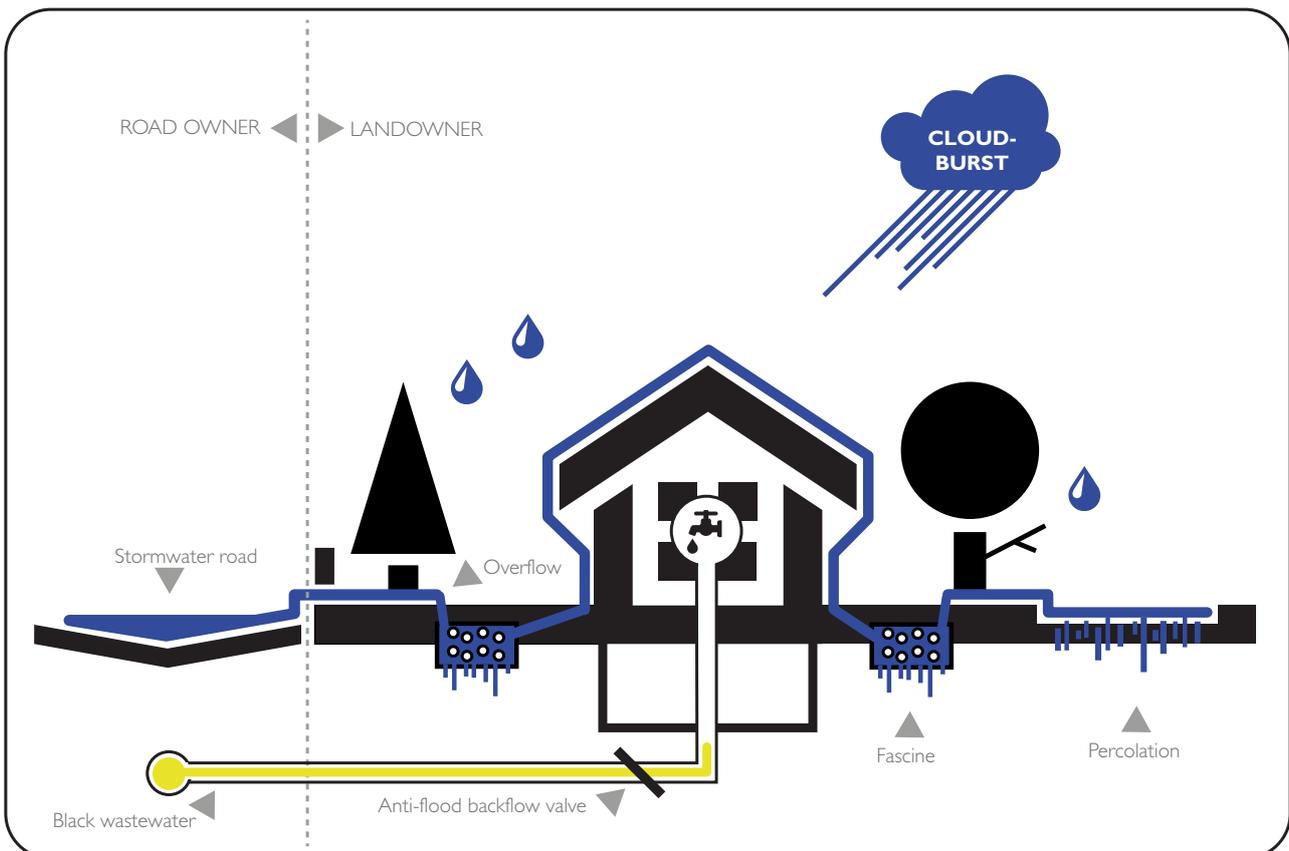
PRIVATE LANDOWNERS CAN DEAL WITH THEIR OWN STORMWATER:

- Disconnection of stormwater, so that the water is managed on a property owner's own land with a connection to the municipal stormwater management system. The stormwater can be connected to a public stormwater line, if the area has a separate sewer system, by landowners establishing a connection on their own land. Alternatively the stormwater can be completely disconnected from the public solutions and managed within landowners' own property, which gives rise to a partial repayment of the connection charge.

PRIVATE LANDOWNERS HAVE TO CONSIDER THE NEED TO INVEST IN:

- Anti-flood backflow valve, which prevents black wastewater from flowing back towards the house in the event of high pressure in the sewer.
- Protection of buildings, particularly where the buildings are vulnerable to water penetration, for example at doors, basement entrances or light wells. The buildings have to be able to cope, for example, with there being up to 10 cm of water on a pavement.

SCHEMATIC DIAGRAM OF THE CLOUDBURST MANAGEMENT OF A BUILDING:



▲ When cloudbursts occur, the normal systems for stormwater management will become full, and excess stormwater will be conveyed to the public solutions for management of heavy rains, for example a pavement.

IMPACT ON CHARGES

Because the cloudburst management of Copenhagen is financed through the water charges, it will increase the water charges.

- With annual water consumption of 110 m³ (an apartment) the annual water charges will increase by an average of DKK 715 over 75 years.
- With an annual water consumption of 170 m³ (a house) the annual water charges will rise by an average of DKK 1100 over 75 years.

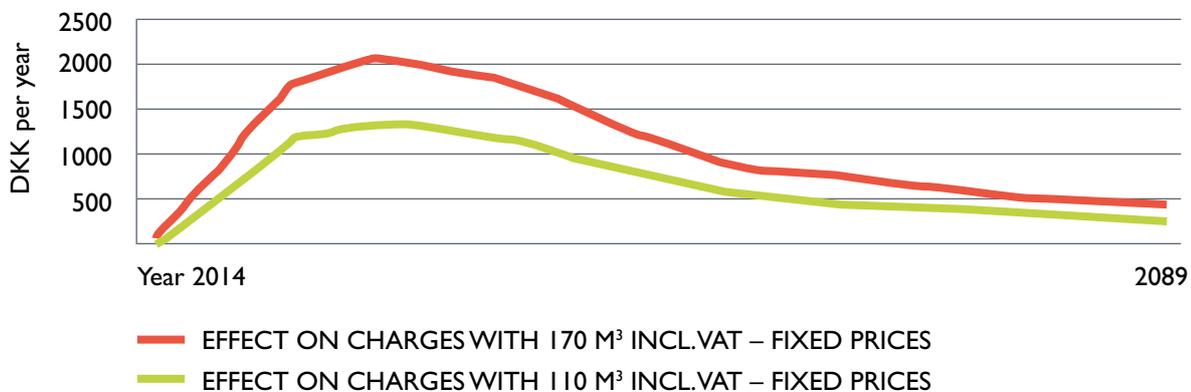
The rise in water charges may vary depending on rate of expansion, choice of projects and other possible savings along the way in implementation. The calculation of the rise in charges does not take account of a projected increase in population in the City of Copenhagen. A possible scenario for increase in water charges over time is shown below.



House 170 m³ = DKK 1100 /year

Apartment 110 m³ = DKK 715 /year

ADDITIONAL ANNUAL COST DUE TO CLIMATE CHANGE ADAPTATION AND CLOUDBURST MANAGEMENT



OTHER BENEFITS

The investments in the combined solution provide a number of potential benefits.

MAINTENANCE OF INSURANCE

Citizens and businesses pay to protect their properties through a combination of climate adaptation measures and insurance. These are investments that can prevent damage to homes, belongings or businesses. At the same time, climate adaptation can contribute to creating more stable frameworks for the Copenhagen property market, which contains 300,000 homes and 355,000 jobs.

THE PROPERTY MARKET IS SENSITIVE TO HEAVY RAINS

The property market may respond negatively to the uncertainty associated with changes to the climate and lack of action to prevent damage. In other words, it can adversely affect the Copenhagen housing market if the city does not have cloudburst management, and this may lead to rising insurance premiums.

The insurance industry emphasises that the insurance companies focus on the risk of damage and the actual risk history (how many claims the individual property has had). This risk is influenced, for example, by inadequate sewerage and climate change. The insurance companies' response to an increased risk of claims will typically be to raise premium levels and/or make the policy terms more stringent. For a very few properties the risk of very high claims will be so great that it will not be possible to insure them or alternatively the premium will be very high.

RISK OF CLAIMS PUSHES UP INSURANCE PREMIUMS

The risk scenario has already changed as a result of the repeated heavy rains in recent years. To take an example, insurance premiums rose by 20% following the intense downpour in Greve, near Copenhagen, in 2007. These areas are now the subject of cloudburst management measures and premiums are back to their original levels.

Insurance conditions for the municipal properties have substantially worsened in the City of Copenhagen following the extreme rainfall event of 2 July 2011. Prior to this event there was an insurance excess for the municipal properties of DKK 25 million in claims per year and an excess per claim of DKK 100,000. An excess per extreme rainfall event of DKK 50 million has now been introduced. Similar changes have occurred for a number of private policy-holders in areas at risk.

Implementing the measures adopted in the climate adaptation plan dramatically reduces the risk of damage to buildings during intense rain. The insurance industry consequently also gains an equivalent reduction in risk in connection with intensive rain events. However, as indicated above it is significant for the insurance companies whether actual claim expenditure falls.

There is consequently a correlation between adapting Copenhagen to climate change and the part of an insurance premium for properties that concerns insurance against damage due to heavy rain. The logical conclusion is that citizens should not have to pay both through the measures taken by the municipality and HOFOR and through rising insurance premiums as a result of the increasing risk of flooding.

The insurance companies will take a close look at the trend in claims in the future. In view of this situation, members of the public can anticipate widely differing premiums. It will generally be the case that when the risk falls this will have an impact on insurance costs and terms.

INFORMATION ON CO-FINANCING

The City of Copenhagen, together with HOFOR, Forsikring & Pension (the insurance industry organisation) and the local committees (for each district of Copenhagen) will form a partnership to inform private landowners about the options for co-financing of measures on private land, and which specific solutions can prevent damage due to heavy rains. The partnership starts in January 2015. In addition,

the City of Copenhagen will continue working to ensure that the municipalities' efforts to deal with heavy rains are included in the insurance industry's risk scenario.

COORDINATION CAN REDUCE CONSTRUCTION EXPENDITURE

If implementation of cloudburst and stormwater management is integrated with other construction projects in the city, a saving of up to DKK 1bn can be made over the period of implementation. An analysis has been made of the options for coordinating construction projects with HOFOR, DONG (energy company) and CPH City & Port Development.

Well performed coordination can reduce the risk of congestion on the roads, but no amount has been set for this item. Further coordination of construction activities in the City of Copenhagen municipality and the rest of the city is required.

POSSIBLE RISES IN PROPERTY VALUES

The detailing of the Copenhagen Cloudburst Management Plan describes the options for making urban space improvements, which are to be paid for by the municipality. These can help mitigate the heat-island effect, strengthen biodiversity, future-proof trees and plants, create space for physical activity and improve quality of life. But urban space improvements can also raise the value of properties nearby.

It is estimated to cost DKK 1bn over 20 years to establish urban space improvements of high quality with recreational value. At the same time, this signifies an expected rise in property prices in Copenhagen of just under DKK 1.4bn. The upgrading of urban spaces may consequently increase municipal land value taxation revenues as a result of the increase in the value of properties adjacent to the urban spaces.

More full-time equivalent jobs and increased tax revenues
Construction work to protect Copenhagen against high-intensity rain and stormwater creates jobs and tax revenues in the construction phase.

The construction period generates total employment of more than 13,000 full-time equivalents and DKK 1.6bn in tax revenues. It has to be said, however, that the tax revenue from increased employment in the construction industry always accrues to the employee's municipality of residence. It has therefore not been possible to calculate

the effect in the City of Copenhagen alone. If urban space construction is included, the number of new full-time equivalents will rise to more than 15,000 and tax revenue to around DKK 2bn.

DEMAND FOR NEW SOLUTIONS

There is a clear expectation of innovation in climate adaptation technologies and the frameworks for climate change adaptation. This innovation creates more effective technologies and more effective implementation, which ultimately leads to cost savings.

Technological innovation may, for example, be warning technologies with better radar equipment, monitoring of more conditions out in the city and integrated solutions. The benefit in product development is expected to be apparent within a few years, for example with anti-flood backflow valves that become far cheaper and last longer.

Innovation can also be created by changing the framework conditions in the area of climate change adaptation. This takes place, for example, when the authorities' requirements for treatment of water or architectural considerations regarding urban spaces challenge the solutions from the outset.

Finally it is possible to achieve benefits by changing the form of tendering, so that it focuses to a greater extent on the function desired in the particular construction. Too many requirements can have an adverse impact on the number of bids and the level of innovation.

The Danish clean-tech cluster "Clean" has pointed out that the businesses involved in the tendered work achieve great competitive advantages. Specific opportunities are created for partnerships in connection with accomplishing tasks, for example between larger businesses, scientific institutions and small and medium-sized enterprises. These partnerships can lead to the partners gaining similar orders in other cities, including cities abroad. The experience from Copenhagen can thus lead to increased market shares for Danish businesses.

Every year the City of Copenhagen will summarise the innovation, which is significant for the combined solution and has practical significance for the roll-out of the investments among both private and public players.



▲ Visualisations of cloudburst management on Sankt Annæ Plads (produced by Schønherr A/S)

This publication provides
an overall assessment of the
costs of and benefits from
protecting Copenhagen
against high-intensity rainfall
and more everyday rain



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City of Copenhagen
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