

C40 CITY SOLUTIONS PLATFORM

ATHENS



ORGANIZED BY



Athens is the challenge owner led by the Deputy Mayor of Urban Nature, Resilience and Climate Change Adaptation.



C40 is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change.



CLEAN is a world-leading cleantech cluster with an international focus that is based in Denmark. Our mission is to accelerate the green and sustainable transition while realizing growth for the cleantech sector.

SUPPORTED BY



Realdania is a modern philanthropic association that works to create quality of life and benefit the common good by improving the built environment: cities, buildings and the built heritage. Realdania has supported the City Solutions Platform pilot project since its inception 2015.



C40
CITY SOLUTIONS
PLATFORM

Table of Content

| | |
|--|-----------|
| About the City Solutions Platform | 5 |
| <i>City Solutions Platform Process</i> | 5 |
| Terms & Conditions | 7 |
| Athens Challenge | 8 |
| <i>Project KPIs</i> | 8 |
| <i>Additional Documents</i> | 9 |
| <i>Key Dates</i> | 9 |
| Scoping Document | 10 |
| Appendix | 12 |
| <i>A. Provisional Workshop Agenda</i> | 12 |
| <i>B. Questions & Answers</i> | 13 |

About the City Solutions Platform

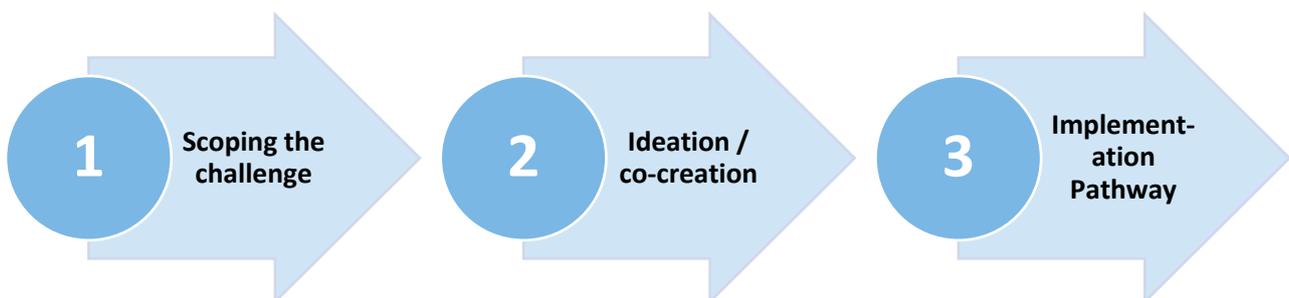
The C40 City Solutions Platform (CSP) is a not for profit programme which enables cities and the private sector (solution providers) to engage through an unbiased, neutral platform to co-create innovative solutions to the key climate challenges the city's face.

The CSP gives solution providers access to:

- Decision makers in 90+ of the world's largest cities (the C40 City Network) with the desire to engage with other non-state actors to develop climate solutions
- An ecosystem of local and international start-ups, knowledge institutions, established companies and cleantech clusters.
- An unbiased and neutral platform where technology and solutions can be discussed with relevant representatives from cities in the C40 network
- Co-create durable and innovative climate solutions with the potential to be scaled to the rest of the C40 network and beyond.

City Solutions Platform Process

The CSP is a tailored process aimed at supporting the city's pre-procurement process. As a solution provider you have the opportunity to be part of the process, thus providing inputs and guidance for investable solutions that the city could implement. The process revolves around the expert input and guidance from the solution providers together with the city. The process is a 3-step approach aiming to reach a potential investment / procurement by the city.



1. Scoping the challenge

The challenge is presented to a wide audience through online promotion and a webinar. During the webinar solution providers have the opportunity to ask their initial questions and comments to the city's vision and KPIs. This is the first point of engagement between the city and private sector and has a strong focus on presenting the various solution providers and creating trust between the various stakeholders.

Following the webinar, solution providers have the opportunity to give input to: what is needed to solve the challenge? Who are the key stakeholders? Are there other perspectives to be considered? Further scoping is then conducted through an offline document which is to be filled out by interested solution providers. The further scoping document will be used to frame the workshop and provisionally group the solution providers in terms of their interest, thus ensuring that they will get the most out of the workshop.

2. Ideation / co-creation

The co-creation phase focuses around a two/three-day workshop in the city. Depending on the challenge, the workshop will also include a potential site visit to see areas of the city related to the challenge. During the workshop solution providers will engage directly with decision makers and representatives for the city, thereby creating a common understanding of the challenge, an understanding of the barriers to implementation, and what needs to be done in order for successful solutions to be developed. The aim of the co-creation workshop is to develop a number of potential solution ideas for the challenge(s) presented.

3. Implementation Pathway

The final part of the City Solutions Process includes an implementation pathway. C40, CLEAN and the city will in close collaboration and under guidance from solution providers, determine the critical path to potential procurement and implementation of a solution(s). Based on the input and guidance from solution providers during the workshop, an implementation pathway document will be formulated. The solution providers will have the opportunity to give input to this document.

Terms & Conditions

To be a part of the CSP, you will:

- Understand the complexity of sustainable urban development and support the future proofing of cities through innovative climate solutions
- Embrace open standards of communication and collaborate/co-create with other solution providers on the CSP
- Collaborate with the CSP team to deliver an outcome that can be implemented within the city
- Cover your own costs of attendance to all CSP activity including travel to, and accommodation during, CSP workshops.
- Help to assess the social, environmental, and economic benefits from any climate solutions developed

The information you provide us will be used to facilitate your participation in the CSP Programme. This will include sharing your contact information with our partner organization, CLEAN. For more information about C40 uses your information, please review our [Privacy Statement](#). CLEAN will abide by the C40 Privacy Statement for activities relating to the CSP Programme.

Athens Challenge

The City of Athens is looking for climate solutions which will reduce the urban temperature and mitigate urban heat island effect within the city. To achieve this, Athens would like to utilize existing municipal buildings e.g. schools and abandoned building lots to improve the city's microclimate. Ultimately the solution should be fully integrated, incorporating multiple aspects such as increasing climate resilience. This project is in line with the objectives of Athens' Climate Action Plan and Resilience Strategy, which both aim to improve the municipality's capacity to respond to climate change risk and create more liveable neighborhoods. Athens wants to:

- Exploit the most optimal, climate resilient and sustainable solution (green spaces, green roofs, open water features, nature-based solutions, use of suitable materials and bioclimatic design) for municipal owned areas
- Reduce the overall energy consumption (in cooling and heating needs by greening most of the free space)
- Improve the city's overall microclimate and reduce the impact of rising temperatures and alleviate the urban heat island effect.

Project KPIs

The City of Athens is looking for climate solutions which will reduce the urban temperature and mitigate urban heat island effect within the city. To achieve this, Athens would like to utilize municipal school yards and abandoned building lots to improve the city's microclimate by introducing green infrastructure, including innovative materials/technologies.

In this project the following is required:

- There must be a transparent and clear process of solution development
- The solution must be specific to Urban Heat Island Effect
- The solution must include clearly measurable success – KPIs (specific from [Athens' Resilience Strategy](#))
- Expropriation and greening of abandoned lots in Athens
- The solution should adhere to the goals of Athens Climate Change Adaptation Action Plan:
 - Enhancing green infrastructure
 - Improving the built environment – e.g. the % of local temperature reduction & surface area of new 'cold' materials
 - Public health protection – number of 'cool' places to go to

- Public information and awareness of these campaigns #coolathens
- Capacity building for municipal employees of the solutions
- The solution must include the ability to be rapidly prototyped
- The solution must include information on ongoing maintenance
- The solution could provide additional benefits. For example, community engagement, job creation, circular economy, waste management/organic waste for composting, renewable energy inclusion

Design Parameters

For the ideas to be a success, it must follow these design parameters:

- The solution should be an enabler for further activity – scalable across Athens and replicable in other cities
- The solution could include large investors as anchors or leverage funding and private investment opportunities
- The solution should have a clear narrative that the community understands
- The solution should promote horizontal collaboration (public/private/academia)
- Short, medium and long-term public benefits should be described

Additional Documents

| | |
|-----------------------------------|---|
| Athens Resilience Strategy | http://www.100resilientcities.org/wp-content/uploads/2017/06/Athens_Resilience_Strategy_-_Reduced_PDF.compressed.pdf |
|-----------------------------------|---|

Key Dates

| | |
|--|----------------------|
| Deadline to register for the workshop | 31/08/2018 |
| Deadline for scoping document | 31/08/2018 |
| Athens workshop | 25–26/09/2018 |
| Implementation Pathway | TBC |

Scoping Document

(To be filled in by solutions providers)

In order for the CSP Team to best frame the workshop and provisionally group the solution providers in terms of their interest, we invite you to fill in this document as detailed as possible.

| |
|--|
| Name of organization/company? |
| |
| Location (city and country)? |
| |
| Name of person/s attending the workshop? |
| |
| Are there aspects of the challenge that you think needs particular attention? Why? |
| |
| Are the crucial aspects of the challenge that are currently not covered by the scope and design parameters? How could these aspects be included? |
| |
| Is there additional information that would be important in order for you to respond adequately to the challenge? |
| |
| Is the challenge and the scope feasible, given the timeframe and budget? If not, what would need to be addressed to make it feasible? |
| |
| What current developments (solutions, trends etc.), in the context of the challenge, are important to be aware of when developing a solution? |
| |

| |
|---|
| What kind of solution providers (skills and competencies) do you envision is needed (apart from yourself) to solve the challenge? |
| |
| What local stakeholders would you like to see engaged in the co-creating process? |
| |
| Any additional input about the challenge? |
| |

Appendix

A. Provisional Workshop Agenda

| Monday 24 th September (optional activity) | |
|---|---|
| Morning session (time and location TBC) | Site visit |
| Tuesday 25 th September | |
| 08.30 am | Welcome teas and coffees |
| Morning session | Contextual Presentations by the City of Athens and the key stakeholders <i>Light lunch</i> |
| Afternoon session | Group Activities: Unpacking the briefing material and design questions |
| Evening session | Networking drinks |
| Wednesday 26 th September | |
| 08.30 am | Morning teas and coffees |
| Morning session | Group Activities: Narrowing down your main solutions <i>Light lunch</i> |
| Afternoon session | Presentation of your solutions to the key city decision makers Next steps and concluding remarks |

B. Questions & Answers

Below are initial questions and answers based on Athens challenge description and the webinar on July 26th. Questions have been put forward by solution providers and answers are provided by the Office of Resilience and Sustainability at the City of Athens.

Q1: Why go through an innovation process such as this and not to a normal tender or competition for the solution?

We would like to innovate and inspire; both others and ourselves. Athens is a city that has gone through a lot and which has found ways to be resilient in the face of much adversity. Now the city is realizing that it's going to bear a heavy burden relating to high temperatures in the years to come.

Athens will have to change the ways it understands and designs its public spaces, and seriously make temperature one of its main considerations. It's also very important to showcase to the municipal staff what is possible, what is desirable and what is the future.

The process of going out to tenders and a procurement competition is not a desired path as it is very time consuming, especially when it introduces new ways of doing things and new materials (12 months minimum from tenders to beginning of implementation). We would like to minimize the design and implementation time through an alternative to a normal tender process. This project should proceed either as a company donation (showcasing project: design and implementation) or as a partial donation (i.e. design) co-founded by some Donor Institution. The City of Athens has established a very efficient and effective managing body as well as procedures set in place for processing donations without legislative or administrative complications.

Q2: What is the expected timeframe for possible solutions developed through the C40 City Solutions Platform?

Ideally, we would like to have completed the pilot design of the 2 spaces by the end of October and go through the internal municipal processes for accepting the design and donation (either from the company or from a foundation) by December 2018. Ideally, implementation should start by January 2019.

Q3: What does City of Athens need to achieve for community in regards to Urban Heat Island mitigation? How will community resilience benefit through access to open space opportunities? How will the community's perspective be included in this city solutions platform process and be included in the potential solutions?

The main goals include raising awareness regarding the UHI effect and its impact on everyday quality of life, promoting public health and cool areas, educating citizens on soft actions regarding mitigation and promote replication of actions on the local level. Creation of new open, shady and cool spaces can enhance social cohesion and provide meeting spaces for the local communities.

Athens has a strong outdoors element in its social life. High temperatures tend to lead people indoors, separating groups and communities as public spaces become too hot and unwelcoming, allowing only the ones who have the means to congregate at air-conditioned cafes.

The Office of Resilience and Sustainability has acquired important experience regarding inclusive procedures. The solutions can be co-developed/implemented with the local communities via a range of tools such as online surveys, thematic workshops, focus groups and other outreach activities. The preferred mix should be designed with all the relevant partners.

Q4: What will be the city's key success criteria for the project? What would a successful project look like?

The success criteria for the project are:

- Enhancing green/blue infrastructure targeting heat and flood reduction (increase number of trees, tree canopy coverage, surface permeability, biodiversity, sustainable water use, etc)
- Improving the built environment – e.g. the % of surface area covered by cold and/or permeable materials i.e. the % of local temperature and flood reduction
- Capacity building for municipal employees
- Provide additional benefits for the city (community engagement, job creation, circular economy).
- The ability to be rapidly prototyped
- The solution would preferably include investors as anchors or leverage funding and private investment opportunities.
- Public information and awareness raising of these campaigns #coolathens – total number of people reached.

Q5: Has there been any mapping of areas it will be most beneficial to test out the potential new solutions? Have the level of Urban Heat Island been identified around the city area? Have the abandoned lots been evaluated in terms of suitability to provide efficient mitigating solution to support the reduction of urban heat island effect?

The Office of Resilience and Sustainability, in collaboration with the National Observatory of Athens and with the assistance of the Bloomberg Associates, conducted a spatial analysis to identify areas in Athens most susceptible to heat risks. UHI effect affects Athens most severely in its center-west and western districts. Much of the vulnerable populations (children, elderly and low-income households) overlap with these hot zones, particularly in the west. Interventions that help cool the city should be focused in these areas to maximize their effectiveness.

The selected lots for the CSP are located in city districts that suffer the most by extreme heat and elevated temperatures (3rd and 4th city district). The land availability in Athens is limited and the idea is to make the most we can from the land that is available.

There is also rich literature on the UHI effect in the city of Athens and the Greater Athens area. Several seminal academic studies regarding the UHI phenomenon and its effects have used the City of Athens as their main case study. Professor Manthos Santamouris (University of Athens & University of New South Wales, Sydney) is a worldwide expert on the subject with a great number of studies and measurements of the UHI in Athens.

Q6: How have you assessed the impact of climate change? For instance, changes in rainfall intensity, temperature increase?

Our Resilience strategy and Climate Action plan as well as numerous academic studies indicate that the future of Athens will be characterized by short intense rainfall and flash floods interrupting long periods of drought, while temperatures projections demonstrate an average increase of 2 degrees Celsius by 2050 which become 4 degrees by 2100.

Q7: Is this project an open call for integrated urban design ideas or are you asking for tested technical solutions? What type of skills are you looking for from the solution providers? Do you have a preference or requirement in the material used in any potential solution?

This is an open call for a wide range of possible providers that can include integrated urban design ideas and tested technical solutions. As referred in the presentation, a combined creation solution is required to tackle and monitor the challenge efficiently.

Solution providers need to be thinking out of the box, have experience with design and implementation of nature-based solutions in other settings (ideally in the Mediterranean climate), be inspiring, have some working knowledge of local Athenian conditions, able to collaborate efficiently with other solution providers and be flexible and creative to tackle issues arising from city administrative and legal processes.

The materials among others could include shading elements, planting and phytotechnologies, cool materials, RES, monitoring equipment, etc. We also would like to consider nature-based solutions as far as these would be optimal for the sites.

Q8: Have Blue-green solutions for mitigating UHI been identified as possible solutions? How important is the rainwater collection solutions in the overall plan?

Blue-green solutions for mitigating UHI effect have been identified as possible solutions in the Climate Adaptation Action Plan (CAP) and are of great interest for the City of Athens. Green infrastructure can limit urban temperature increase and improve city's microclimate. Most significant, actions for UHI mitigation for the city of Athens are: the creation of green corridors that will connect green areas in the city as well as the creation of blue corridors by reviving existing water streams. Rainwater collection solutions would be of great interest as well, especially if used in a circular way.

Q9: How do you envision scaling the solutions in the future? Will there be agreements for this or a business model?

The solutions could be prototyped and applied to a number of such sites (school yards and expropriated lots) already identified. There could be agreements or a business model drawn for scaling up based on the specifics of the solution provided. Scalability is an important consideration that should affect the solutions themselves to some extent (financial, legal, etc requirements). Our

wish is that the solutions become prototyped and streamlined in the processes of design and implementation of such public spaces by both the department of Urban Nature and that of Public Works. We have experience with such processes (including creating a document that is voted by City Council) through the Athens Resilience Strategy and Climate Action Plans.

Q10: What level of meteorological information are available, when starting to review the urban island problem and potential?

- a Local solar gain
- b Wind measurement across the city
- c Temperature data across the city
- d Albedo factors
- e More ?

The City of Athens has signed an MoU with the National Observatory of Athens and any available information will be provided to the solution providers. EXTREMA APP and the <http://treasure.eu-project-sites.com/> are also useful links for climate projections and data. Some more can be found at the links below:

<https://www.metoffice.gov.uk/holiday-weather/europe/greece/athens>

<https://en.climate-data.org/location/1642/>

<http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=495>

<http://www.meteo.gr/ClimaticData.cfm>

There is as well a plethora of academic and technical studies and data that can be readily available on line on international, European and national sites.

Q11: What if the extent of the current UHI is much larger than can be addressed from the abandoned lots?

It is larger. The city of Athens has an UHI phenomenon that reaches up to 10 degrees Celsius difference with nearby suburbs. Creating small neighborhood parks and thus a limited radius of comfort by the microclimate produced therein is one way to mitigate the UHI effects in Athens, the other has much larger and more beneficial for the city effects and that is the creation of green corridors.

The sites that have been selected for the CSP project will be pilots to be monitored and results will be evaluated. Innovative and replicable solutions will be the main targets of the project. Increasing green areas in the city is one of the objectives of the Climate Adaptation Action Plan. We have to demo and assess every possible solution.

Q12: Is the overall strategy to mitigate the UHI within Athens? Like breathing path towards city center region? Have the forms of the mitigation options for the UHI been addressed?

The Athens Climate Action Plan that has been developed with the support of C40 and is an inalienable part of the Athens Resilience Strategy testifying to the unique collaboration forged between C40 and 100RC, identifies actions and measures to achieve the goals set for the city for 2030. In the Blue & Green Infrastructure priority axes, the creation of green corridors that will connect green areas in the city has been described both on a more municipal/local level and in a more regional/metropolitan scope. We consider those extremely important for Athens Resilience.

Q13: Has there been identified a combined effect of air pollution and the urban heat island?

Yes, we know there is connection between air pollution and the urban heat island, elevated temperatures can directly increase the rate of ground-level ozone formation. The Athens Resilience Strategy acknowledges this fact. However, our office has not yet studied their correlation or taken any relevant steps.

Q14: What are the energy plans for Athens to move to sustainable energy (solar, wind, ...) and over what period and to what extent ?

The City is adhering to Mayors' initiatives such as the Compact and the Covenant of Mayors and actively joining global efforts to mitigate climate change and reduce greenhouse gas emissions in the City. The Athens Climate Mitigation Action Plan focuses on actions that aim at reducing energy consumption of municipal infrastructures, but also of the city overall. The reduction target set is 40% for the GHG emissions until 2030. The measures that fall under the authorities of the municipal administration include the energy upgrading of the buildings and public lighting, as well as the installation of more RES (natural gas, PVs) systems on public buildings.

Q15: Concerning co-creation, do you establish a procedure specifically for climate change adaptation (UHI mitigation)?

Athens Climate Change Adaptation plan includes measures and actions for the city to implement in order to maximize its ability to adapt to heat. KPIs, used to monitor the UHI mitigation after the solution implementation, are suggested in one of the appendices of Athens Resilience Strategy.

We also have established three co-creation processes for enhancing existing and creating green areas in the city together with the residents.

Q16: Could you tell us about the geotechnical characteristics (permeability) of the "soil" on which Athens is built?

<http://floods.ypeka.gr/index.php/23-ydatika-diamerismata/gr06/295-analysi-gr06>

In this webpage of the Ministry for Environment and Energy, you can download useful maps regarding hydrolithology, soils etc. such as at the links below:

http://thyamis.itia.ntua.gr/egyfloods/gr06/gr06_maps_jpg_p01/GR06_P01_S5_hydrolithology.jpg

http://thyamis.itia.ntua.gr/egyfloods/gr06/gr06_maps_jpg_p01/GR06_P01_S2_hydrology.jpg

http://thyamis.itia.ntua.gr/egyfloods/gr06/gr06_maps_jpg_p01/GR06_P01_S4_geology.jpg

http://thyamis.itia.ntua.gr/egyfloods/gr06/gr06_maps_jpg_p01/GR06_P01_S4_geology.jpg

http://thyamis.itia.ntua.gr/egyfloods/gr06/report/I_1_P01_GR06.pdf

We could try to find more data if needed through our collaborations with the National Observatory of Athens as well as other research and academic institutions.

Q17: Do you anticipate additional activities in the school yards during summertime when schools are normally closed?

There is a program that includes a wide variety of courses, games, lectures, and other cultural events, established the past few years, opening up around 30 different schools and school yards in the afternoons, weekends and during the summer to the residents of each of the neighbourhood. This is an expanding program run by the Municipality of Athens in collaboration with the Athens Partnership and the Niarchos Foundation called Open Schools to the Neighbourhood. The schools that we are proposing for the C40 CSP are not yet part of this program but might be in the future.

Q18: How will you manage the choice between alternative solutions provided by different solution providers? At the Athens workshop are you expecting providers to showcase their solutions and fields of expertise covered?

During the Athens workshop we are expecting providers to showcase their solutions and fields of expertise covered as well as collaborate in order to produce “new” solutions more tailored to the conditions and needs of this particular city. Our Office will decide on the best solution by evaluating the solutions based on the criteria provided above in Q4 and presented in the webinar.

Q19: Would you say that the mitigation of heat stress and improvement of outdoor thermal comfort for the Athenians is a basic challenge from your concept?

The enhancement of Green/Blue infrastructure and the improvement of built environment (the % of local temperature reduction) are the primary design parameters and a success criteria for the solution provided for Athens. The improvement of outdoor thermal comfort is definitely the main challenge that we are targeting here.

Q20: Could you provide information regarding rain? Average daily rainfall? Frequent events of heavy rains? How much does it rain in extreme situations?

Some descriptions of extreme phenomena can be found at NOA site on the page below:

<http://www.meteo.gr/weatherEvents.cfm>

Some research that you can additionally read is stated below.

<http://www.hellenjgeosci.geol.uoa.gr/45/Nastos%20&%20Zerefos.pdf>

<https://www.adv-geosci.net/10/59/2007/adgeo-10-59-2007.pdf>

<https://www.adv-geosci.net/23/37/2010/adgeo-23-37-2010.pdf>

https://www.researchgate.net/publication/228075523_Characteristics_of_precipitation_in_the_Athens_area_Greece

Q21: Typically, how much energy (or money) is spent for energy needs (cooling)?

Total energy consumption per capita was 2.2 toe in 2016 (lower than the EU average), including close to 5000 kWh. We've had a significant decrease in consumption since 2008 as a result of the county's economic crisis.

Meanwhile, in 2017 the mean rate for Greek households was 19.4 euros per kwh (higher than the EU average and up 76% the lasts 10 years).

We also know that electricity use increases 4.1% per degree of temperature increase.

Q22: Will the selected solutions be included in a larger scale green network/corridor for the city?

One of the design parameters for the solution is to be able to be rapidly prototyped, disseminated to other spaces and thus provide additional benefits for the city. So, yes they will be included in a larger scale green network and/or green corridors planned for Athens.

Q23: They are going to municipal elections in Athens in May 19 – which means that no contracts can be signed after March 1 and until a couple of months after the election. So, they wonder if this has been taken into consideration in the planning of implementation of solutions?

Yes, we have taken this into consideration and we're working around it. We're very conscious of the challenges the election period might bring to our work and this is to a large extent why we do not want to go forth with the normal procurement/tender procedures.

Q24: How will the administration in Athens proceed with making contracts with solution providers? Can they do that without a proper tender? Or is it going to be a PPP type of engagement? And is there a time schedule for this procedure?

As mentioned above (see Q1 and Q2) the ideal process for going forth with the particular solution for Athens would be through a donation rather than a contract procedure: either a company's donation (as a showcasing project: design and implementation) or as a partial donation (e.g. a company donates the design) co-founded by some Donor Institution (for e.g. implementation). In this case we do not have to deal with tenders or private/public contracts.

Q25: Another question is about the expectations to the presentations of solutions for the pilot projects. Is it expected that they are illustrated and pre-calculated – cost/effect, etc. or is it enough to list and describe ideas?

The better illustrated the ideas are prior to the workshop the better. During the workshop the attendees will work in groups to come-up with the solution ideas. However, the more information you have from your perspective the more concrete the idea development can be.

Q26: What stage do you think we are at:

- general ideas to try to get interest from politicians, the public, other stakeholders, and potential funders;
- typical ideas for costing/ scoping;
- specific solutions for implementation!
- somewhere else?

We thank you for your interest, attention and time! Hope to see you in Athens in September!



www.c40.org/programmes/city_solutions