Organised by:

In collaboration with:

#ThisIsCool Webinar Series

Not Passing on Passive Cooling

Date: 4 March 2021 **Time:** 2:00pm to 3:15pm CET **Virtual running time**: 75 mins

Organised by: Cool Coalition, SEforALL, K-CEP, CEA Consulting

Session Report

Welcoming remarks, by Brian Dean, Head of Energy Efficiency and Cooling, SEforALL

- Sustainable cooling is an issue of equity: cooling should not be a luxury.
- Passive cooling offers effective and affordable solutions for individuals, for households and for communities to gain access to cooling benefits, without hurting the environment.
- Sustainable Energy for All's #ThisIsCool campaign, of which this webinar is part of, aims at showing what can be done across the world to make net-zero cooling for all a reality.
- Join the conversation on sustainable cooling solutions on social media with #ThisIsCool or go to thisiscool.seforall.org to learn more about our campaign.

Presentation of Passive Cooling Brief, by Forrest Lewis, Research Associate, CEA Consulting

- CEA is an environmental consultancy in San Francisco that assists K-CEP, a philanthropic collaboration supporting the Kigali Amendment to the Montreal Protocol and the transition to efficient climate-friendly cooling solutions for all.
- This webinar marks the release of a new report "*Not Passing On Passive Cooling And How Philanthropy Can Help Accelerate Related Climate Benefits*", written in collaboration with many cooling experts, some of whom will speak today.
- Passive cooling is the practice of using non-mechanical technology design elements and nature-based solutions to keep a space cool without using energy
- Passive cooling is fundamental to ensuring climate-friendly cooling for all, reducing cooling emissions, helping bring local cooling solutions to the most vulnerable regions of the world
- Many passive cooling solutions can be incorporated into building and environmental design and adapted to local climates
    - These can be simple passive technology additions, like external shading or cool roofs or nature-based solutions such as green roofs and also corridors
    - These features can drastically reduce the amount of energy used in greenhouse gas emissions produced from mechanical cooling
    - Reducing the heat gain of buildings, sidewalks and streets and the resulting UHI effect can also increase the comfort health and safety of community residents
    - These benefits are felt greatest by the most vulnerable populations who often lack access to regular mechanical cooling
- The primary benefit of passive cooling is seen in the reduction of emissions from mechanical cooling
    - Globally cooling accounts for nearly 20% of the electricity used in buildings and this is set to increase significantly as more countries industrialize in the future and people can start to afford mechanical air conditioning units
    - Improvements to the building envelope work in tandem with efficient cooling and could provide an additional 1300-terawatt hours of energy savings in 2050 according to the international energy agency

    - Passive cooling can support health well-being and comfort and help meet many of the 17 SDGS. This includes improving food security and also helping to improve access to medicine and vaccines through a passive cooling cold chain.
- Philanthropy is uniquely positioned to help scale passive cooling beyond a business-as-usual trajectory
    - In 2019 less than 2% of global philanthropic giving was dedicated to climate change mitigation and only a small fraction of that 2% went towards cooling related efforts
    - More funding and philanthropic effort is needed
- Our first recommendation from this report is for philanthropy to support the development of building codes that incorporate passive design elements
    - Building codes are simply the primary policy lever for increasing the adoption of passive cooling solutions
    - The levels of implementation and enforcement vary around the world: two-thirds of the 130 billion square meters of new code of new buildings that will be constructed in the next two decades will occur in countries that did not currently have mandatory building energy codes put in place
    - Cooling needs are not often prioritized in energy efficiency considerations for building codes and philanthropy can play a role in pushing for the inclusion of passive cooling elements in baseline building codes around the world
- Our second recommendation is to promote access to cooling through passive solutions focusing on heat waves and net zero cold chains
    - Over 1 billion people are at risk from a lack of access to cooling, and cooling poverty extends to regions of some of the wealthiest countries including the US.
    - An equitable passive cooling strategy could include designing passively cooled buildings for social housing or prioritizing the construction of passively cooled buildings and communities with energy property with urbanization trends
    - Three billion people will need new housing by 2030 requiring over 300 million new housing units while much of this work may take place in low-income countries
    - Incorporating green spaces into community design can lower ambient temperatures and provide significant physical mental and productivity benefits
- Our third recommendation for philanthropy is to raise awareness of passive cooling solutions through awards challenges and education
    - Philanthropy can leverage its resources to work on improving the capacity education and training necessary to enforce efficiency standards in building energy code compliance, design awards such as the Ashden cooling by nature award, and also scaling programs like the Million Cool Roofs initiative can help elevate the narrative around passive cooling and encourage innovative solutions as an example of the effects of these awards and challenges
    - Medellin, Colombia implemented 30 green corridors in 2016. This was a 16.3-million-dollar initiative which involved planting over 8 000 trees and 350 000 shrubs these green corridors have reduced the city's average temperature by 2 degrees Celsius, decreasing the need for mechanical cooling in many residential and commercial buildings and the associated emissions. The project won the 2019 Ashden award supported by K-CEP.
- Our fourth and final recommendation is to create financial mechanisms to fund and de-risk passive cooling projects.

  - One barrier to the widespread adoption of passive cooling can be just upfront costs: even small additions of investment for energy efficient buildings can be a barrier despite leading to long-term costs and CO2 savings.
  - The early design decisions of a building can determine up to 80% of the building's long-term operational costs and environmental impact. However, short-term motivated financiers do not always see passive cooling as a priority investment.
  - Philanthropy can step in by de-risking investment in passive cooling solutions through co-financing and helping to prove business models that use passive cooling.
  - Two examples are energy service companies that have a focus on passive cooling solutions or cooling as a service models, which integrate nature-based solutions into their basic program structure.
- In sum, philanthropy can play a pivotal role in elevating passive cooling into the mainstream of climate-friendly cooling solutions by supporting passive cooling building codes, promoting access, building awareness and creating financial vehicles.
- Philanthropy can collaborate with governments development agencies and the private sector to lock in passive cooling wins.

Panel Discussion

Moderator: Brian Dean, Head of Energy Efficiency and Cooling, SEforALL

Kurt Shickman, Executive Director Global Cool Cities Alliance

Q: You founded the Global Cool Cities Alliance in 2010 with the goal of promoting solutions to mitigate the urban heat island effect. Do you think the conversation around urban heat has since changed? Do you think city officials, developers and planners are now more aware of mitigation strategies and passive cooling options?

- There's definitely more awareness and a desire to act now, but we still have a long way to go
- The Million Cool Roofs challenge teams, now working in 10 countries where there is acute lack of access to cooling, are still dealing with pretty substantial awareness gaps about passive cooling and cool roofs in particular
- For certain passive cooling solutions, there's still a lack of local availability: nature-based solutions are a little bit easier to implement in some countries, but for solutions that are more technical in nature, that can be a real access challenge
- Then there's still a lack of local performance data: when we're advocating for policy change in a local context, we need to have the underlying performance data available to demonstrate that it's important to do. This is growing slowly but that's still a gap.
- Generally, we're seeing officials paying more attention to the dangers of unchecked rising temperatures and there's a greater understanding of just how broad the economic health and psychic benefits, and the dangers of heat both in urban and rural contexts
- We are seeing cities incorporate heat resilience into their planning, strategy documents and goals and targets, some to a greater degree than others.
- While there's certainly a lot of advanced understanding now about how passive cooling must fit into integrated multi-solution strategy, we are still seeing a lot of opportunistic approaches to passive cooling.
- This is good to get it started, but we need to have more integrated, comprehensive, multi-solution approaches going forward if we want to see real change.

- At the international community level, there has been big changes over the last 10 years, largely thanks to KCEP, one of which is the linking of passive cooling, its benefits and challenges with the broader conversation around sustainable cooling
- There has been a much longer term and robust conversation on active cooling and on placing passive cooling appropriately as the first step, making sure we have thermal comfort in buildings, and that we're adding active cooling only after passive cooling interventions.
- Incorporating passive cooling into the broader conversation has been a very important change and something that will bring a wave that passive cooling can ride going forward.

Sara Ibrahim Elhag, Head of Unit, SE Projects Implementation & Private Investment Promotion, Regional Center for Renewable Energy and Energy Efficiency

Q: RCREEE is an intergovernmental organization that aims to enable and increase the adoption of renewable energy and energy efficiency practices in the Arab region. Can you tell us about ongoing passive cooling efforts and activities that RCREE is supporting, especially in Egypt?

- RCREE is a technical arm for the League of Arab States. As such, we have developed the Arab Sustainable Energy Strategies for a number of countries in the region.
- The Center works with countries in the region for the development of National Renewable Energy and Energy Efficiency Action Plans, where passive cooling is incorporated.
- In Egypt in particular, currently we're working on a Mediterranean Investment Facility project where we're working on a project that focuses on the reduction of cooling needs for buildings in the residential sector.
- We're working with a number of international partners, including the Italian Ministry of Environment, Land and Sea, UNEP and national stakeholders including the Egyptian Minister of Housing, to reduce cooling needs in the residential sector via utilization of passive techniques.
- The project has a number of deliverables, first of which was the creation and development of a voluntary ordinance to regulate the energy needs in residential buildings
- Another deliverable is creating a compliance tool that's user-friendly to help the Minister of Housing in verifying that the buildings are in compliance
- The project works toward building a number of projects as prototypes and pilot for demonstration of the proposed solution that will be implemented in this project
- A number of activities have been already ongoing including climatic zone study market survey to identify best available technologies in the Egyptian market, thermal building modelling and all of these have been done in order to identify the most suitable and optimal solutions.
- All of these activities focus on passive solutions, and are related to the building envelope, shading, materials and usability, design and structure.

Dr. Sameer Maithel, Director, Greentech Knowledge Solutions

Q: You have been closely involved in the development of the Eco-Niwas Samhita, the Energy Conservation Building Code for Residential buildings in India. Can you tell us how does this program foster the integration of passive cooling in buildings in India?

- In India like we have a population of almost 1.3 billion people, and almost 95% of it lives in warm and hot climates. At the same time, less than 10% of that population has access to air conditioning: almost 90% of the population lives in naturally ventilated housing.

- We know that India is likely to double residential building footprint in next 1 or 2 decades, so we are going to construct a lot of new housing.
- The challenge before us is how do we construct this new housing with lower demand for cooling? That was the idea based upon which the work on the energy conservation building code for residential buildings started.
- We were looking at two things: first how do we reduce heat gains from the building envelope, and second how do we enhance natural ventilation so that, whenever the outside conditions are fitting, we are able to utilize that air for ventilating or to remove accumulated heat.
- This code was released in December 2018, focusing on these two main issues.
- We have defined a residential envelope transmittance value that takes into account the orientation, thickness of walls, wall properties, glazing properties, and shading.
- Then, using a simple equation, a value is given for what is the net heat gain from the building envelope - this heat gain lower would be the demand for cooling - and the maximum value has been set 15 watts per meter square.
- The code also provides a minimum insulation level for roofs, and defines a minimum openable area of windows, different for different climate regions, to ensure that we are able to get adequate ventilation
- The emphasis in a country like India is to have a simple code that can be easily implemented, as it has to be implemented by thousands of local governments.
- Through the application of this code, we are able to achieve reduction of cooling demand by 20-25% compared to business-as-usual construction
- In hot and humid climates, like large coastal regions in India, heat indoor can be reduced particularly through roof solutions, either with energy reflection or by implementing green roofs. The second solution is still ventilation, as once the sun sets there is good outside condition that allows for ventilating.
- When we were developing our building code, we looked at some of the earlier work done in Singapore and some of the other places that helped us.
- If I look at the developing countries and tropical places, I think it is possible to develop specific guidelines which would be helpful for others to embark in a similar process, to avoid having to go through a burdensome repetition of some avoidable steps.

Maria Chiara Pastore, Associate Professor, Politecnico di Milano, Scientific Director, ForestaMi

Q: The City of Milan is implementing a very ambitious project to develop an urban forest with 3 million trees by 2030. Can you tell us why the city decided to invest in ForestaMi, of which you are the scientific director, and what "cooling" benefits this will bring to the community?

- The choice of implementing ForestaMi project was closely linked to the need to tackle air pollution.
    - Because of the physical topography of the Pianura Padana area where Milano is located, there is little wind and in winter the heating of houses, car traffic and industrial production make air pollution in the city very bad.
- The City of Milan, together with its metropolitan area, asked the University Politecnico di Milano to come up with some solution that would address this issue, and other larger policy objectives.

    - The City of Milano is in fact part of the C40 network, and Mayor Sala is among those mayors that signed all climate protocols and now aims to become carbon neutral by 2040.
- The whole City of Milan, its metropolitan area and the two main major parks, decided to work together in order to tackle air pollution and then embarked into research that helped consider additional issues, such as the urban heat island (UHI)
    - In this process, we mapped out the UHI, water runoff, permeable impermeable surfaces and we provided for the first time the map of the city's tree canopy cover, both in public and private spaces, for the entire metropolitan area of Milan.
    - This helped identify where trees were already contributing to cooling the city and to clean the air, and where we should have worked in order to increase the number of trees to bring most benefits in specific hotspots
- One of the greatest challenges that we face now is to build additional tree canopy.
    - It seems to be very simple, as everybody loves trees in principle, but people prefer really having a parking lot in front of their house rather than a tree.
    - This makes implementation a matter of prioritization, a matter of changing all our minds in order to provide space for the trees, and this is a huge challenge.
- To get to effective implementation, we need to create awareness, disseminate information and have all the people aligning behind the same goal: plant more trees.
- Another challenge is that trees grow in a long time, and then roots and leaves don't stay where you put them: people need to adjust their expectations and keep in mind that trees are living species and that building an urban forest is a long-term process.
    - Ensuring city officials understand this process and the patience it entails is key to scale up nature-based cooling strategies.

Anna Dyson, Director, Center for Ecosystems in Architecture, Yale University
Q: At the Yale Center for Ecosystems in Architecture that you lead, cutting-edge research is being conducted in the fields of thermal comfort. This includes innovative building designs and solutions related to construction materials. Can you tell us about the main findings of this research? How can your research support the mass deployment of passive cooling strategies?

- We work on building and districts designs: a good example of our recent work is the first on-site net zero energy school for the North-East of the United States
- Passive cooling is absolutely critical towards transitioning the built environment, but this is a very complex area. In fact, there is no one-size-fits-all solution, and it requires us to work on integrative system strategies. This also means working at every scale on the integration between both passive and active strategies.
- To shift built environments and cities towards greater energy self-sufficiency and possibly on-site net zero energy and water, we have to look at the nexus between different challenges and at multifunctional benefits of passive cooling.
    - For example, when integrating plants within our built environment, there is a huge impact on human health and well-being in terms of air quality, access to green outdoor areas, and also in terms of biodiversity.
    - In this framework, I want to echo the importance of integration and the necessity for policy to mobilize action.

- In hot-humid climates, where many do not have access to active cooling means, it is fundamental to implement building codes and to create districts where there is access to needed resources for passive cooling.
    - It is important to study/map where climatic flows come from, where to, what is their intensity, and how is the flow shaping.
    - If an individual building or a district gets cut off by larger buildings that are upstream, then they will be disenfranchised in terms of their access both to clean air and passive cooling strategies.
    - There are other examples rampant that put obstacles to passive cooling development, such as the choice of materials and the shaping of the buildings, which will not only affect what the energy consumption profile and requirements of a building are, but also the requirements of all of its neighbours
    - If we're choosing materials that sink a lot of energy and then hold on to it at night, in a hot humid climate we'll have some very serious cooling loads at night that are intractable and that we can't really deal with using passive ways
    - This is a multi-scale and an urban problem that has to be tackled with building codes at all of those different scales simultaneously
- Lastly, I would just say the connection to active systems is important: it's not an all or nothing situation.
    - A lot of the regions go from heating requirements to cooling requirements, sometimes in the course of the same day but certainly over the course of the year, which means that we need systems that are adaptive and dynamic.
    - Plants are a great example of solutions that have both cooling and heating benefits: they drop their leaves largely in winter, and allow for passive heating or heat sinking through the trees, then turn into passive cooling solutions and shading in the hotter months. This, while cleaning the air, changing their morphologies, and providing healthy microbiome.
- In his framework, I think the terminology of passive sometimes is a bit problematic: plants action, but even changing the shades angling to let light in or let heat in or turn it are active things. Maybe, it would be better to speak of integrated solutions?

Dr. Sameer Maithel, Founder Director, Greentech Knowledge Solutions
Q: Your firm provides advisory services for the decarbonisation of buildings. What do you think are the biggest obstacles for owners and developers in implementing passive designs and sustainable cooling solutions?

- In the last 2-3 years there was good traction with adopting some of the building code recommendations in low mid-rise affordable housing projects
    - There have been projects having thousands of houses which have gone ahead and adopted the basic recommendations in terms of choice of materials, having better insulating properties, like lightweight concrete blocks, to fix shading adequate size of windows etc.
    - In this process, it has been shown that there is no increase in the in the cost of construction.
- For this particular segment of developers' reception has been good, but In India we have different kinds of developers on different scales.
- Where we are really having lot of issues is the high-rise new housing:

    - now, bigger cities housing generally is 20 to 40 storeys high, but what is happening is that the builders are shifting to construction technologies like monolithic concrete construction or pre-fabricated concrete technologies and as we know concrete not very good for providing thermal insulation
    - Moreover, there is increasing traction towards having larger windows because that have a modern/western look, which increases the use of glass
    - This means ending up with the thick shades not being used, having concrete houses with lot of glazing, no fix shading
    - This kind of construction is being pushed and done by big private developers, and requires active cooling: inhabitants tend to buy and use air conditioning
- So, while there are solutions that are available to provide a certain level of insulation on the walls, external movable in shading, better glazing, these are getting a lot of pushback
- Challenges are at several levels, one is that this code is still not mandatory
- Then, we need to have a dialogue on what the modern western look entails, and why there is an aspiration of people to have certain types of houses, and whether that is really what is required in this climate:
    - we need to find a way to educate and change consumer preferences
- Then we need to discuss if and how we achieve the same amount of density with low mid-rise construction instead of going for this high-rise construction, which has a lot of other issues with operational energy with the amount of embodied energy that goes into them, which is a wider planning issue.

Sara Ibrahim Elhag, Head of Unit, SE Projects Implementation & Private Investment Promotion, Regional Center for Renewable Energy and Energy Efficiency
Q: You work specifically to mobilize private sector investments in RE and EE solutions. Are there any obstacles you have encountered in this process? Do you think policy acts as a catalyser to increasing the uptake of passive cooling in the region?

- There are a number of challenges and obstacles in the region:
    - First, the countries vary greatly in their socio-economic situation. For example, you'll find countries where there is not even a clear investment roadmap.
    - If you would like to take up any project within the sustainability field, including renewable energy, energy efficiency and passive cooling, you will find that there is no regulation, no codes that are set in place very few countries have even set even voluntary codes, let alone talking about mandatory codes.
    - This will not encourage investors to go into this sector, especially if when they're looking at specific aspects for example like if they're going into public partnership with public and government there's no big companies as ESCOs energy companies that would help in sharing the risk of big projects.
    - Another obstacle is that within the region governments have been really generous relatively in giving subsidies and providing subsidies for electricity tariffs for fossil fuel and conventional fuel price
    - This makes any sustainable project not really competitive and makes small and medium enterprises not very interested to go into the sector
    - There are other obstacles and challenges related to technology and know-how: in the region we don't have this skilled and very much experienced companies and labour and even the market you wouldn't find the solution at feasible prices

    - Plus, the banking system doesn't have the capacity to assess and evaluate a special energy efficiency project for funding and for their feasibility and eligibility
- Policies of course set in the right policies can be a great catalyser that would help the uptake of passive cooling
    - To start with we can start with setting mandatory energy building codes and have a monitoring verification and enforcement system that would help ensure that buildings are in line with the standards
    - The it would be useful to have financial mechanisms to help and encourage investors and building developers and owners who would like to incorporate passive cooling and massive solution into their developments
    - Then, governments could move toward electricity tariff reform, price reform for the energy sector: this would also help the developers to find alternative solutions and to go for more sustainable solutions
- In terms of the MIF project in Egypt, the project currently has a number of pilot projects:
    - We work in different climatic zones, so the solution differs based on where the location and the orientation of the building is.
    - We have one building that's related and owned by the Ministry of Housing, another project is on a private building so the solution completely differs.
    - We have chosen these two different types of buildings because of replicability: we tried to do something that would be easy and most likely to be replicated.
    - Solutions for now mainly focus on natural ventilation, shading and orientation.
    - We are also working with building thermal modelling and insulation of the building envelope.

Kurt Shickman, Executive Director Global Cool Cities Alliance
Q: Speaking about policies and incentives, Kurt. What do you think cities can do to accelerate the deployment of passive cooling solutions and strategies? How do you think philanthropy and international donors can help?

- There is a lot of individual policies and measures that we could talk about: they're summarized in the ESMAP Primer From For Cool Cities and its e-learning course, which digs in on some of these policy options.
- Beyond building codes, we have two real needs with policy everywhere, developed and developing world.
- The first is doing a better job at valuing the broad set of benefits of passive cooling
    - Mostly, benefits are looked at in terms of energy efficiency, but even for the solutions that are integrated into buildings, like reflectivity, energy makes up about 25% of the benefit: 75% is really not recognized in any meaningful way
    - There's a role for policy in either shifting the recognition of the benefits to those that are making the decisions at the building scale and at the city scale, or through building codes and other measures requiring its implementation
- Second, we need to make a shift in how we view decisions in our cities, beyond passive cooling, even beyond cooling, and adding heat resilience as a lens through which we make all of our decisions
    - Cities approach this challenge and get interested in doing work on heat resilience and passive cooling through different and varied entry points

    - We have some cities that aren't interested at all in the energy benefits, but are focused on reducing childhood asthma and they see heat reduction as a key mitigation strategy
    - We need to start to recognize that because there's broad benefits to heat mitigation, there are multiple entry points to deploy passive cooling solutions:
        - we need to create these lenses and show that cities are making decisions not only based on the heat lense
- Then, we need to look at how we procure services:
    - how do we procure assets at a municipal regional and even national level
    - what impact will those services and assets have on heat resilience
    - what can be done to mitigate a negative impact
    - how to recognize the positive impact of those services for cooling and beyond
- This would lead us towards a more integrated way of thinking about what we're doing:
    - not just integrated in terms of passive cooling measures and how we mix and match these to meet the existing needs of the particular city we're in, or the particular climate we're, in but even more broadly in the multi-hazard planning
- Philanthropy can come in by funding policy action needed for transformative change.
    - It can contribute to supporting capacity building and supportive activities of specific champions, such as community-based organizations, universities, companies, organisations. Champions can then go into their communities and work to develop passive cooling.
    - Philanthropy can also help develop markets from the ground up, to help recognize the local value and help create a community of practice where these groups talk to each other and collaborate to bring about transformative action
- For example, initiatives like the million cool roofs challenge competition, we're seeing much more cooperation and interaction between teams.
    - This kind of programmes helps actors on the ground in sharing best practices, what's worked, what hasn't worked, which supports passive cooling development
    - Philanthropy is already doing really great work by building up these local champions and then connect them to each other, to build robust pathways
- The other action for philanthropy is to support investments that the private sector may not invest in, that really need to be there to do passive cooling right.
    - This includes evaluating and monitoring changes in local environments after passive cooling is implemented, such as sensor networks, that we can measure both the temperature change but also the human scale metrics
    - This would allow to unlock additional funding and hopefully more traditional funding sources, both at development banks level and through private funding
    - It can also increase the interest from credit rating agencies in valuing some of these resilience measures as part of how cities are preparing for future challenges and recognizing that in in credit risk assessments.
- In terms of competition for roof spaces, there are obviously a number of passive cooling solutions that can be integrated (reflective roof and green roofs), and that can also be integrated with other technologies, such as solar panels
    - This applies also for transportation systems, as we are seeing in Los Angeles, Phoenix, Paris and Guadalajara.
    - These cities are looking at where they have pedestrians and really investing in passive cooling, including in terms of water infrastructure for cooling purposes,

- They are focusing deployment in places where people stay outside a lot.
- We need to do a lot more of those integrated solutions, especially because the hottest parts of our cities are the most paved areas, and tend to be where lowest income and most marginalized parts of communities live.

Maria Chiara Pastore, Associate Professor, Politecnico di Milano, Scientific Director, ForestaMi

Q: In your experience, are the thermal benefits of nature-based solutions for cooling well understood by city officials? What do you think is needed to support their deployment at a larger scale?

- To support the development of these solutions, we need to have more information and dissemination for the public and city officials to help everyone understand the effects of these interventions and allow for budget allocation
  - We really need to build up a solid understandable data set, to ensure we know how to demonstrate that trees are good, from the existing huge literature that shows the benefits for life quality, health, obesity, and from a cost point of view
  - This is very hard and a matter of scale: one huge city such as Milan has more information, but if you if we go to a smaller city, that information is not very evident and available.
  - This means that there is also an important job that needs to be done in order to provide the same kind of information and spread it
- We know that trees cool down cities and decrease the need for air conditioning, but the information is not yet effectively disseminated so that people know about it
  - And if you do not know about it, you also do not ask the local administration to implement it, and you don't want to have this kind of change
  - If you don't know the benefits, you cannot evaluate how much money the city and the government put on this kind of intervention.
- In terms of budget, natural-based solutions are normally budgeted under greenery activities, but if the benefits are coming also in terms of health, why not having the health system also providing some of the money for the for the green systems?
  - If the benefits are better understood, then the interventions wouldn't suffer from sectorisation by competencies, but would be shared by the different system they are contributing too, and possibly collect additional budgets
- Moreover, it's important not to consider public and private as two different parts:
  - we need to consider that everybody needs to provide data, information and have the different stakeholders all aligned behind the intervention's benefits.
  - This is important because if you have a political agenda but then the citizens do not want the change, you will not be able to implement your agenda
- The effort that we are trying to make is to have the public sector, the private sector, the citizens, the different institutions, aligned in order to have everybody on the same page
  - All need to agree that the challenge is to have more trees, that we need to raise money to provide space, to provide comprehensive governance, and to know that we really need we need to seek for that change otherwise
- To scale up, you really need to have all the stakeholders aligned, but also you need to provide the information data evidence to this change, to very diverse audiences and to different levels.

Anna Dyson, Director, Center for Ecosystems in Architecture, Yale University
Q: What do you think needs to change for developers, owners and planners to accelerate the deployment of passive cooling solutions and technologies in buildings and built communities? Are technology, affordability, awareness obstacles?

- With the pandemic, we have seen the power of comparative metrics, how they can be used in both very positive and in nefarious ways
    - The pandemic has shifted appetite for the general public to understand that science is an ongoing evolving process and sometimes a very uncertain process, even at the highest levels.
    - This can help us start to actually contextualize our data in ways that different stakeholders can understand what do we know, what do we don't know, what are we less certain about and so forth.
    - Data can help mobilize action, but for example cities like Addis Ababa had much greater success than New York City with its million trees movement to mobilize and really effectuate change
- When we talk about building codes, we're usually talking about municipalities and then countries and then states, but certain regions like the Sahel region with the great green wall movement have shown leadership in really looking at this as massive regional conditions and creating cooperative agreements and goals to shift both macro climate and the microclimate conditions with reforestation
- We need to approach this issue as a multi-scale condition where we need to start to consider our building codes in the same way that we've looked at life cycle analysis.
    - Energy modelling plays into this to understand how much energy we are using over the course of a whole building from the extraction of materials, its behaviours, maintenance energies, and so forth
    - The decisions that go towards passive cooling start at the very beginning of schematic design, and hence we also need think about where we're going to get the materials, where we bring them from, etc.
- If we're talking about passive cooling, ultimately action on one building can do something, but if everything around it is not taking those decisions as well, then it will be tricky for passive cooling to function effectively.
- We need buildings that include the regional ecosystem services and the whole macro climate within which cities sit
    - our building codes have to be transnational, regional, international
    - we have to start looking at cooperative agreements as climate obviously does not respect borders
- Another issue is that if we effectuate passive cooling strategies to take care of those really hot days throughout the year:
    - how does that potentially disenfranchise other aspects of the system, like heating in the wintertime?
    - There are some solutions, such as heat pumps, that might solidify other types of strategies.

- In general, these are considerations to make when planning passive cooling interventions and communicate to the general public, stakeholders, property owners and developers
    - they're going to have to start to accept compromise as partners in change
    - they need to be partners in prototyping and changing entire systems/ecosystems
    - they need to support change
- Public-private partnerships need to provide funding streams through the building process, so to be able to prototype new systems, but we've got to have the public to support major public works projects.
    - I do think that the appetite is ripe in a lot of regions for expanding those kinds of partnerships.
- In hot and humid climates and very dense urban environments, passive cooling through ventilation may not be your choice
    - But not going for passive cooling can create a chicken and egg vicious circle as people adopt window units to relieve heat stress, but then they contribute to air quality issues, energy consumption issues, and heat itself.

<u>Closing remarks,</u> by Xiaoyi Jin, Senior Associate, Kigali Cooling Efficiency Program

- Living in the face of climate change, all the anxieties and the daunting challenges ahead, this webinar was a hopeful reminder that we do have the solutions, and that passive cooling works
- Passive cooling is truly a global solution and that can reflect a lot of local needs and characteristics
- Our panel discussion showed that there is the will to drive change, and it's a yes not despite of, but because of the challenges that you all discussed today
- We know that deployment at scale and integration are key: we really need to act on these issues through a concerted effort, all together.
- This is why KCEP partners are supporting the net the race-to-zero campaign led by the COP26 High-Level Champions.
    - This is a global effort to form a master plan around which civil societies governments and businesses can unite ahead of COP26 and as part of that effort
    - Last year in December a first ever pathway to net zero cooling was launched and, in this document, we shared the vision that by 2050 net zero cooling for all will be achieved through three impact areas: passive cooling, super-efficient equipment, and appliances and ultra-low GWP refrigerants
- I want to encourage every partner in the cooling sector to sign up to the race to zero campaign to showcase your commitment, and invite everyone also to take a peek into the net zero future:
    - a world in 2050 where all possible existing buildings are retrofitted,
    - where passive cooling standards being embedded in building codes,
    - where every city's urban planning benefits from passive cooling strategies in a very integrated way,
    - and where access to climate friendly efficient cooling is for all.

Speakers' Biographies

Brian Dean, Head of Energy Efficiency and Cooling, SEforALL

Brian Dean is from the United States and works as the Head of Energy Efficiency and Cooling in the Vienna office. His role focuses on creating and executing the overall strategy for SEforALL's engagement in the space of energy efficiency and cooling.

Brian has spent more than 22 years supporting energy efficiency and cooling from a range of projects, including policy development, building design, energy analytics and software development. He joined SEforALL after spending five years with the International Energy Agency (IEA). As the Lead for Energy Efficiency in Buildings, he and policy tracking, the annual Global Status Report on Buildings and Construction as well as the Future of Cooling report.

For almost 14 years, Brian worked in Washington DC, San Francisco and New Delhi as the Head of Energy Efficiency Analytics and Policy at ICF International, a global consulting and technology services company. He started his career as a building designer and HVAC engineer.

Forrest Lewis, Research Associate, CEA Consulting

Forrest is a Research Associate who joined CEA in 2020 in the philanthropic services practice area. He supports a variety of philanthropic and non-profit clients in the climate and marine conservation sectors, including the Kigali Cooling Efficiency Program (K-CEP), the David and Lucile Packard Foundation, and the Net Gains Alliance.

Prior to joining CEA, Forrest worked as a staff scientist for a small nonprofit in the Peruvian Amazon where he helped research subsistence hunting patterns and assisted with various sustainable development projects. Forrest earned a joint bachelor's degree, cum laude, in Earth and Planetary Sciences and Environmental Science and Public Policy from Harvard University in 2017.

	**Dr. Sameer Maithel, Founder Director, Greentech Knowledge Solutions (GKS), New Delhi** Founder Director, Greentech Knowledge Solutions (GKS), New Delhi GKS provides research and consulting services in the field of energy-efficient & thermally comfortable buildings and low-carbon building materials production. Sameer is the Head of the Indian Project Management & Technical Unit of the Indo-Swiss Building Energy Efficiency Project (BEEP) and is actively involved with the development and implementation of the India's Energy Conservation Building Code for Residential Buildings or Eco-Niwas Samhita. Sameer holds a PhD in Energy Systems Engineering from the Indian Institute of Technology (IIT), Bombay. For his work on reducing emissions from brick manufacturing enterprises in South Asia, he was awarded Climate and Clean Air Coalition (CCAC) award for individual contribution, at COP 23 at Bonn in 2017.
	**Sara Ibrahim Elhag, Head of Unit, Sustainable Energy Projects Implementation and Private Investment Promotion, Regional Center for Renewable Energy and Energy Efficiency** Sara Elhag is a Renewable Energy Expert at RCREEE in Cairo, where she works in achieving the centre's goals of spreading the use of clean energy systems and increasing the adoption of renewable energies in the Arab World region. Her responsibilities include the design, management and implementation of Renewable Energies (RE) and Energy Efficiency (EE) projects. Ms. Elhag's career path extends over more than 14 years of engineering experience, working in large scale power generation projects and thereafter specializing in renewable energy systems' applications. During her work in the National Electricity Corporation (NEC), Sudan, she worked in the National Load Dispatch Centre (NLDC) project where she worked as a senior electrical engineer at first and later as the manager of Khartoum zone. Ms. Elhag has also worked in the consultancy field where she was a Unit Manager in a leading consultancy company (Newtech Consultancy Group). She has just finished the work on a project targeting multiple countries in the MENA region researching on household appliances.

Kurt Shickman, Executive Director, Global Cool Cities Alliance

Kurt Shickman is the Executive Director of the GCCA, a non-profit dedicated to accelerating the use of passive cooling solutions in urban and rural communities around the world to enhance their resilience to extreme heat. GCCA works with over 40 global cities as part of the Cool Cities Network, with a focus on knowledge sharing, awareness raising, research, and policy development.

He serves as an expert to the Clean Energy Solutions Center and has led projects for the U.S. Department of Energy, the World Bank, Asian Pacific Economic Cooperation, and the Clean Energy Ministerial. Kurt is the lead author of the *Primer for Cool Cities: Reducing Excessive Urban Heat,* published by the World Bank's Energy Sector Management Assistance Program and the Global Platform for Sustainable Cities program, which details passive cooling options for cities and a roadmap for developing and implementing policy promoting heat resilience.

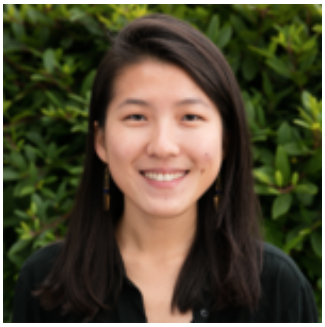
Prior to launching GCCA in 2011, Kurt was the Director of Research for the United Nations Foundation's Energy and Climate Team. Kurt holds an MA from the Johns Hopkins School of Advanced International Studies and a BA from Wake Forest University.

Anna Dyson, Director, Center for Ecosystems in Architecture, Yale University

Anna Dyson is the Hines Professor of Architecture at the School of Architecture and Professor of Forestry & Environmental Studies at Yale. Dyson is also the founding Director of the Yale Center for Ecosystems in Architecture (CEA).

Anna Dyson has been a professor of architecture at Rensselaer Polytechnic Institute, where she founded the Center for Architecture, Science and Ecology (CASE) in Manhattan with Skidmore Owings and Merrill LLP in 2006. CASE hosts the PhD program in Architectural Sciences/Built Ecologies (BE), which has received multiple honors, including an Award of Excellence in pedagogy from the United States Green Building Council (USGBC), and the award for most innovative academic program from the Association for Computer Aided Design in Architecture (ACADIA) in 2012.

Recipient of the Innovator Award from Architectural Record in 2015, Dyson holds many international patents on building systems innovations for the collection and distribution of clean energy, water, air quality and material life cycle.

	**Maria Chiara Pastore, Associate Professor, Politecnico di Milano, Scientific Director, ForestaMi** Maria Chiara Pastore is associate professor at the Politecnico di Milano and the Scientific Director of ForestaMi, a project of the City of Milan that aims at planting 3 million trees by 2030. Her work include the research for the implementation of an improved green system in the Greater Milan 2030, Forestami (Milano 2030), the production of the Water Vision for the Masterplan of Tirana (Albania) 2030, the "Safer house construction guidelines" for the country of Malawi, Ministry of Housing (GFDRR); the "Master plan for the City of Dar es Salaam", in Tanzania, Ministry of Lands Housing Human Settlements Development, the Master plan for EXPO 2015 in Milan (with Stefano Boeri Architetti). She has been consultant to the World Bank, member of the scientific committee of the World Forum on Urban Forests, and currently, visiting professor at TU Graz. In 2018 she published the book "Reinterpreting the relationship between water and Urban Planning. The case of Dar es Salaam", with Routledge.
	**Xiaoyi Jin, Senior Associate, Kigali Cooling Efficiency Program** Xiaoyi Jin joined ClimateWorks in 2018 and serves as a Senior Associate for the Kigali Cooling Efficiency Program (K-CEP). Prior to ClimateWorks, Xiaoyi was a Program Associate at The Asia Foundation where she supported the Foundation's annual plan and budget process and researched on international development aids to Advanced Middle-Income Countries (AMICs) in Asia. Xiaoyi holds a Master of Development Practice degree from UC Berkeley's College of Natural Resources.