

## Carbon Neutral Cities Alliance (CNCA) Innovation Fund 2016 Annual Report

**Document Contents.** This document introduces the Carbon Neutral Cities Alliance<sup>1,2</sup> (CNCA) and describes: 1) its purpose; 2) member cities; 3) the Innovation Fund; and 4) fostering the next wave of carbon neutral cities leaders.

**Purpose.** CNCA (or “the Alliance”) is a collaboration of leading global cities working to cut greenhouse gas emissions (GHG) by 80% or more by 2050 or sooner (“80x50”) — the most aggressive GHG reduction targets undertaken by any cities across the globe. The Alliance aims to address what it will take for leading international cities to achieve these deep emissions reductions and how they can work together to meet their respective goals more efficiently and effectively.

**CNCA Member Cities.** The Alliance was created in January 2015. Current members include:

Adelaide, Australia	London, UK	Portland (OR), USA	Sydney, Australia
Berlin, Germany	Melbourne, Australia	Rio de Janeiro, Brazil	Toronto, Canada
Boston, USA	Minneapolis, USA	San Francisco, USA	Vancouver, Canada
Boulder, USA	New York City, USA	Seattle, USA	Washington DC, USA
Copenhagen, Denmark	Oslo, Norway	Stockholm, Sweden	Yokohama, Japan

These cities collaborate to share lessons in planning for and implementing deep carbon reductions and agreed upon opportunities to accelerate best practices in deep decarbonization by:

- Advancing “transformative change” in key urban sectors
- Creating a CNCA “Innovation Fund” to invest in high-potential, city-led projects that develop, test, implement, and amplify deep decarbonization strategies and practices
- Speaking with a common voice to demonstrate global thought leadership on the need for carbon neutrality
- Developing common approaches, analysis, and tools to support urban carbon neutrality and measurement and verification methodologies for tracking progress
- Creating key partnerships with external stakeholders in sectors not directly controlled by cities to more quickly and effectively advance cities’ success
- Fostering a “next wave” of carbon neutral city leaders, by facilitating the sharing of lessons learned between CNCA members and other leading and next wave cities around the world - to ultimately foster a broader global movement toward urban carbon neutrality

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<sup>1</sup> CNCA is staffed by the Urban Sustainability Directors Network (USDN), in partnership with the C40 Cities Climate Leadership Group (C40), Innovation Network for Communities (INC) and others.

<sup>2</sup> CNCA is supported by The Kresge Foundation, Barr Foundation, MacArthur Foundation, Summit Foundation, Rockefeller Brothers Fund, V. Kann Rasmussen Foundation, and Bullitt Foundation.

**CNCA Innovation Fund.** The CNCA Innovation Fund was created in 2015 to invest in high-potential, city-led projects that develop, test, implement and amplify deep urban decarbonization strategies and practices, building a portfolio of tested tools for cities to use to achieve deep carbon reduction goals. Projects are selected by the CNCA Innovation Fund Project Selection Committee (comprised of CNCA member cities) and approved by the CNCA Steering Committee.

CNCA Innovation Fund projects target carbon emitting transportation, energy-supply, buildings, and waste systems. Examples include development of fueling infrastructure for hydrogen vehicles, and scaling of models that allow for the affordable, energy-efficient refurbishment of buildings. These projects seek to accelerate deep global urban decarbonization by showing what is possible for cities to accomplish in terms of achieving their carbon reduction goals.

To date, the Alliance has invested \$1.7 million in 17 early-stage innovation projects. They are listed in Tables 2 and 3 (in the Appendix). Project descriptions and products are available [here](#). Details on lessons learned to-date in overcoming deep decarbonization challenges are summarized in Table 1.

**Table 1. Lessons Learned from Funded Projects**

Project Description	Project Lessons Learned
<p><b>London, UK: New Financial and Delivery Models for Retrofitting Buildings.</b> Provides an assessment of the extent to which the Energiesprong retrofitting model is transferable to London. Deliverables include: (1) London Energiesprong Transferability Assessment; (2) Energiesprong UK Finance Model Introduction; (3) the Finance Model; and (4) the Post Workshop Report<sup>3</sup></p>	<p>London learns Energiesprong is viable to scale, because:</p> <ul style="list-style-type: none"> <li>• The energy performance guarantee, delivery timescales, and affordability make it attractive to the market</li> <li>• Each city has unique planning, financial and regulatory issues, opportunities and constraints</li> <li>• Cities can template outcome-based procurement and contractual frameworks to share</li> <li>• Scaling is impacted by supply chain readiness / maturity</li> <li>• London prototype properties were suitable for trial</li> </ul>
<p><b>Boulder, CO: Natural Gas, Fuel Oil &amp; Related Thermal Energy De-Carbonization Strategies.</b> Develops strategies for decarbonizing thermal energy systems in different building types in two cities: residential and commercial/light industrial buildings in Boulder and municipal buildings in San Francisco. Products include: (1) the thermal decarbonization executive summary; (2) the Boulder decarbonization full report; and (3) the San Francisco decarbonization full report</p>	<p>Using tools from by this project, cities learn how to:</p> <ul style="list-style-type: none"> <li>• Work with partners to pilot natural gas replacement</li> <li>• Discuss a public-private collaboration with heat pump manufacturers to scale heat-pump adoption programs</li> <li>• Utilize an assessment process to open lines of communication between City and Utility to develop thermal decarbonization strategies</li> <li>• Understand challenges around how to specify technology or performance requirements into capital planning</li> </ul>
<p><b>Copenhagen, DK: Up-scaling Green Vehicles.</b> Presents “Upscaling Green Vehicles in Northern Europe”, a workshop that explores opportunities for new collaborative projects between CNCA cities, car industry companies, energy companies, interest groups, and mobility operators with a clear interest in promoting green vehicles</p>	<p>Four projects<sup>4</sup> are Identified to pursue, including:</p> <ul style="list-style-type: none"> <li>• Develop disruptive business models for car sharing</li> <li>• Improve charging interoperability across borders</li> <li>• Develop existing environmental zones into Ultra Low Emission Zones (ULEZ) or Zero Emission Zones (ZEZ)</li> <li>• Establish a purchasing cooperation across borders<sup>5</sup></li> </ul>

<sup>3</sup> London has received a Round 2 CNCA grant to take this work to the next level by trialing the first 10 net-zero energy Energiesprong refurbishments in the UK (currently underway)

<sup>4</sup> Four proposals to scale electric, biogas and hydrogen vehicle projects in Northern Europe were submitted for EU funding (pending)

<sup>5</sup> Copenhagen has received a Round 2 CNCA grant to develop a Scandinavian Purchasing Cooperative.

<p><b>Sydney, AU: A Blueprint for Development Approval of Hydrogen Re-fueling Stations.</b> Describes (1) the key activities involved in the process of developing hydrogen refueling stations, (2) roles and responsibilities of key stakeholders, and (3) a detailed process describing all the key activities to be undertaken at each stage of the licensing and permitting process</p>	<p>By creating a flexible guideline tool, the City can:</p> <ul style="list-style-type: none"> <li>• Initiate approval for 3 new hydrogen refueling stations</li> <li>• Develop a library of technical documentation templates designed for ready applicability in the Australian context</li> <li>• Understand that two key elements are key to refueling station success: 1) a strong focus on stakeholder engagement; and 2) an early public-private partnership</li> </ul>
<p><b>Vancouver, BC: Carbon Neutral Buildings: Accelerating Market Transformation to High Performing Building Envelopes in North American Cities.</b> Leverages European success with building envelope performance to accelerate market transformation towards carbon neutral buildings in North America. Deliverables include: (1) A high performance buildings barriers and best practice report; (2) Zero Emissions Building Targets Report and Council presentation; and (3) North American Passive House Network outcomes report</p>	<p>Learns that Market transformation can be accelerated by:</p> <ul style="list-style-type: none"> <li>• Applying “<i>Passive Haus</i>” and other European models for significantly enhancing building envelope performance in Vancouver and other parts of North America</li> <li>• Applying lessons from international policy, program, and regulatory approaches to high performance building envelopes can fundamentally change the direction of building energy efficiency regulation in cities.</li> <li>• Adopting an aggressive “Zero Emissions Building Plan” (<a href="#">here</a>) and commit to providing incentives to developers and builders to pursue zero emissions</li> </ul>
<p><b>Sydney, AU: Accelerating Net-Zero Energy High-Rise Residential Buildings in Australia.</b> Examines the technical and economic feasibility of moving towards net-zero high-rise residential buildings and identifies pathways to accelerate their commercialization. Developed a strategy for accelerating market transformation to net-zero energy high-rise (6 floors and above) residential buildings in Sydney and other Australian cities. Designed to inspire Federal and State Government policy makers and the development industry to move rapidly toward buildings that go well beyond current code requirements. Deliverables include: (1) an article describing the importance of the work, and (2) a presentation providing an overview of the work.</p>	<p>Using Sydney and Melbourne buildings, demonstrate that:</p> <ul style="list-style-type: none"> <li>• Differences exist in terms of cost, benefit, comfort and other indicators between meeting the current building code, Australian and Global best-practice, and net-zero</li> <li>• Net-zero can be achieved, but at a cost premium</li> <li>• Current regulations and incentives are insufficient, highlighting the need for strong leadership by the State and Australian governments, together with industry</li> <li>• Cities can work closely with a range of developers, industry stakeholders and other jurisdictions to advance higher targets in state and national building codes</li> <li>• Cities can be stricter when negotiating voluntary planning agreements for major new local developments</li> </ul>
<p><b>London, UK: Accelerating the Transition to 4th Generation District Heating Systems.</b> Develops a roadmap to transition buildings to “4th Generation” district heating networks supplied by local, renewable heat sources. Deliverables include: (1) an evaluation of the technical and financial elements of retrofitting London’s most common building typologies, and (2) a determination of the level of energy efficiency retrofit required for buildings to have hot water and space heating efficiently supplied by 4<sup>th</sup> Generation DH</p>	<p>Because of this work:</p> <ul style="list-style-type: none"> <li>• There is a detailed typology assessment of buildings, and a special district heating (DH) retrofit “opportunity map” to better understand DH retrofit potential across London</li> <li>• London is now identifying up to 4 priority areas in which to develop demonstration projects</li> <li>• Other cities provided feedback on the replicability of the building typology assessment undertaken</li> <li>• This feedback increases the typology’s relevance to other jurisdictions</li> </ul>

CNCA members say the Fund fills a critical need as a deep decarbonization research and development (R&D) tool for cities. The first 2 years provide a solid foundation for building a global, urban network of applied R&D laboratories for climate innovation. In 2017, CNCA will begin to foster greater capacity to implement critical, groundbreaking work that advances the global field of deep urban decarbonization by expanding the CNCA Innovation Fund to \$15-20 million (USD) annually. The expanded Fund will become a significant facilitator of key decarbonization innovations, providing leading cities with tested, practical ways to undertake system transformation more quickly and deeply. CNCA members are

currently developing the Fund’s expansion strategy. Fundraising to expand the Fund is underway. Implementation is anticipated to begin in mid-to-late 2017.

**Fostering a “Next Wave” of Carbon Neutral City Leaders.** CNCA is comprised of the 20 leading global cities listed on page 1. These cities are working to completely decarbonize community-wide. However, dozens of additional cities around the world have adopted similar targets and are actively working to achieve them. To accelerate deep carbon reduction activity in a wider set of cities, CNCA endeavors to foster sharing between CNCA members and other leading cities around the world.

CNCA sponsors several activities that are open opportunities for non-members to participate, including:

- Inviting other leading and “next wave” cities to participate in CNCA Innovation Fund projects
  - Any city in the world can receive funding, if a CNCA member city leads the project team
  - Two of the primary criteria the CNCA Innovation Fund Selection Committee uses to evaluate CNCA Innovation Fund proposals are scalability and replicability.
  - Projects must demonstrate a strong likelihood of being able to scale the proposed initiative in other cities if successful, and must capture and disseminate best practices in ways that other cities can learn from and apply locally if relevant.
  - Further, applicants are strongly encouraged to collaborate with other cities— CNCA cities, other leading cities and “next wave” cities — and receive higher scores for doing so, to foster greater replicability of lessons learned.
- Producing a Deep Carbon Reduction Planning Framework and accompanying “80x50” plan outline available for use by all cities (available [here](#))
- Inviting other leading and “next wave” cities to participate in CNCA lesson-sharing webinars
- Holding “Getting to Carbon Neutrality” workshops for “next wave” cities
- Posting key products and learnings from CNCA Innovation Fund projects on CNCA’s website

**APPENDIX**

**Table 2. Round 1 (2015) Funded Projects**

<b>Title</b>	<b>Lead City/ies</b>	<b>Other Participating Cities</b>	<b>Description</b>
<b>New Financial and Delivery Models for Retrofitting Buildings</b>	London & Copenhagen	New York, Stockholm, Oslo, Sydney, Washington DC, Santa Monica	Evaluate the viability of the Dutch “ <i>Energiesprong</i> ” deep building retrofit model in London and three additional cities in the UK, and examine innovative financing mechanisms to support deep building retrofits.
<b>Accelerating the Transition to 4th Generation District Heating Systems</b>	London	Vancouver, Minneapolis, Washington DC, Seattle, London boroughs, Gothenburg, Rotterdam, Cologne and Genoa	Develop a roadmap for London to transition buildings to “4th Generation” district heating networks supplied by local, renewable heat sources.
<b>Natural Gas, Fuel Oil &amp; Related Thermal Energy De-Carbonization Strategies</b>	Boulder	San Francisco, Vancouver, Portland, Boston, Washington, DC, New York City	Develop strategies for decarbonizing thermal energy systems (heating, cooling, process uses) in different building types in two cities: residential and commercial/light industrial buildings in Boulder, and municipal buildings in San Francisco.
<b>Mobility: Up-scaling Green Vehicles</b>	Copenhagen	London, Stockholm, Oslo, San Francisco, Amsterdam, Hamburg, Sacramento	Advance critical green vehicle infrastructure, financing and coordinated demand in Northern Europe by strengthening collaboration between local and national governments and private sector stakeholders.
<b>A Blueprint for Development Approval of Hydrogen Re-fuelling Stations</b>	Sydney	Melbourne, Moreland, Berlin, Copenhagen, London, Oslo, Stockholm, Boston, New York, San Francisco, Seattle, Vancouver, Yokohama	Create a blueprint for facilitating development approvals for hydrogen vehicle re-fuelling stations in Sydney and Melbourne.
<b>Accelerating Net-Zero Energy High-Rise Residential Buildings in Australia</b>	Sydney	Melbourne	Develop strategy for accelerating market transformation to net-zero energy high-rise (6 floors and above) residential buildings in Sydney
<b>Integrated Whole Energy System De-carbonization Strategy</b>	Boulder	Seattle, Minneapolis	Develop a strategy for transitioning to district-scale low-carbon energy systems in 3 communities in Boulder, Seattle and Minneapolis
<b>Carbon Neutral Buildings: Accelerating Market Transformation to High Performing Building Envelopes in North American Cities</b>	Vancouver	New York City, Seattle	Accelerate market transformation toward carbon neutral new buildings in North America by applying “ <i>Passive Haus</i> ” and other European models for significantly enhancing building envelope performance.

**Table 3. Round 2 (2016) Funded Projects**

<b>Title</b>	<b>Lead City/ies</b>	<b>Other Participating Cities</b>	<b>Description</b>
<b>Food and Energy in a Circular Economy</b>	Stockholm	Beijing, Paris	Conduct a feasibility study for a large-scale pilot project at the Stockholm Royal Seaport flagship project to determine the technical preconditions for a source separated wastewater system, how to optimize energy recovery from wastewater, and proposed management structure.
<b>How to Scale Corporate Renewable Electricity PPAs in Australia</b>	Melbourne	Adelaide, Sydney, Yarra	Scale models for aggregating municipal, institutional and commercial customers to enable them to purchase utility-scale renewables and drive new investments in large-scale renewable energy through corporate off-take agreements backed by large corporate and institutional customers.
<b>Scandinavian Green Public Procurement Alliance</b>	Copenhagen	Oslo, Stockholm, Boston, Boulder, Hamburg, London, Minneapolis, New York, Portland, San Francisco, Vancouver	Create a “Green Public Procurement Alliance” for procuring Non-Road Mobile Machinery (NRMM) in the cities of Copenhagen, Stockholm and Oslo to dramatically reduce CO <sub>2</sub> , NO <sub>x</sub> and PM in those cities.
<b>Capitalizing Carbon to Accelerate EV Charging Investments</b>	Portland	Adelaide, Minneapolis, New York, Palo Alto, San Francisco, Seattle, Sydney, Vancouver	Establish a Verified Carbon Standard-accredited electric vehicle (EV) charging station carbon credit methodology to establish a voluntary carbon credit market for EV charging installations and accelerate the spread of EV charging infrastructure.
<b>The Thermal Break Shear Wall: Simultaneous Energy Efficiency and Seismic Resiliency Improvements in Standard Housing Stock</b>	Portland	Auckland, Copenhagen, Oakland, San Francisco, Seattle, Vancouver	Test the use of the emerging “Thermal Break Shear” wall (TBS) approach to improving the energy efficiency and seismic resiliency in older housing stock in wood-framed single family and multifamily dwellings across multiple jurisdictions, climate zones and seismic zones.
<b>Bringing Renewable Thermal Solutions to Scale in New England</b>	Boston	Boulder, Northampton, Portland (ME), Providence, Somerville	Develop and implement pilot programs for five New England cities in the U.S. to expand the early adoption of renewable thermal energy systems in existing residential buildings.
<b>London Energiesprong Trial Project</b>	London	Copenhagen, New York City, Rio, San Francisco, Sydney, Toronto, Vancouver, Washington DC	Build on the Dutch “Energiesprong” concept by trialing the first ten net-zero energy Energiesprong refurbishments in the UK, and sharing data and learnings to other cities interested in exploring the model. (This project builds on London’s Round One-funded project.)
<b>REALIZE: Bringing the Clean Industrial Revolution to Existing Residential Buildings</b>	San Francisco	Ann Arbor, Boulder, Dearborn, London, Madison, Montpelier, Palo Alto, Rio de Janeiro, San Carlos, Toronto, Vancouver, Washington DC	Develop a business model for bringing “Energiesprong” to San Francisco and other jurisdictions in North America.