



# **WECP GREEN ECONOMY BEST PRACTICE**

## **ANNUAL GENERAL MEETING**

### **CAPE TOWN**

### **NOVEMBER 2016**

**An Outcome of the WECP Environment Committee**  
**Prepared by the City of Cape Town in collaboration with the City of Calgary**



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## Aberdeen, Scotland UK

### H2 Aberdeen



<b>Member City Name</b>	Aberdeen	
<b>Name of government responsible for implementing the project</b>	Aberdeen City Council in partnership with Van Hool, Stagecoach and First Bus	
<b>Thematic Area of the Project</b>	Energy Generation Transport	Energy Efficiency Supply chain development
<b>Status of Project</b>	Full implementation	
<b>Description of the Project</b>	<p>The H2 Aberdeen (Hydrogen Bus) project was launched in March 2015 when 10 hydrogen powered buses were rolled out across Aberdeen's bus network. Led by Aberdeen City Council, the project has brought together Belgian-based bus manufacturer Van Hool with two of the UK's largest bus operations, First Group PLC and Stagecoach North Scotland. Supported by a range of partners working to successfully deliver a green public transport option in Aberdeen, the partnership has helped to tackle Aberdeen city's air quality issues, provide new bus technologies and raise awareness of hydrogen applications, notably in the transport sector focussing on their potential and reliability.</p> <p>The project has put Aberdeen on the map as a leader in green transport and set the scene for the rest of Scotland and beyond. It is helping to secure a hydrogen economy in Aberdeen, and is a clear example of what can be achieved when organisations with a range of obligations work together in pursuit of a shared cause.</p> <p>To date, the buses have clocked up in excess of 500,000 kilometres of journeys with over 650,000 passengers, with an anticipated carbon saving of over 1,000 kg. The project cost £21million and plans are now well advanced to extend the network further, with an additional 10 buses on order and a number of fleet vehicles also being converted.</p>	

<b>Economic Outputs and/or Outcomes of the Project</b>	<p>The Aberdeen Hydrogen Bus Project has created new training and development opportunities for bus drivers and technicians employed to support the maintenance and operations of the vehicles.</p> <p>The Aberdeen Hydrogen Bus Project is also supporting the city's key challenges in terms of improving air quality and providing supply chain opportunities in an emerging sector at a key time in Aberdeen's history, with the recent oil downturn. The focus has now moved on from the piloting and business as usual phase to the economic growth agenda. The forthcoming purchase of a further 10 H2 buses will bring an element of 'critical mass' to the use of hydrogen fuel in Aberdeen and enable the city to establish and promote itself as a global leader in this technology. With this in mind, inbound trade and civic missions from the Far East have been delivered during 2016.</p>	
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>The project has major environmental benefits in terms of reduction in diesel fuel pollution in the city area which will, in turn, contribute to the mitigation of climate change and importantly have implications for the health of city residents.</p> <p>A key future challenge will be to make the entire supply side zero emissions for the hydrogen technology. The manufacture and storage of hydrogen for the fuel cells is particularly energy intensive and currently this energy sourced from the National Grid (albeit on green tariffs) rather than being directly sourced from green energy generation, which is our future aspiration.</p>	
<b>City powers and functions used to implement this project</b>	Procurement mechanisms By-laws and regulation Own Budget Properties and buildings	Policy and Strategy Communications Partnerships Facilitation
<b>Relevant partners</b>	Provincial / State government International institution Research institution	National / Federal Government Business
<b>Challenges</b>	<p>The project value of £21 million shows that a significant public subsidy is required to deliver on the infrastructure (fuel generation / refuelling / maintenance) for new technologies and on the buses themselves. Aberdeen City Council has effectively de-risked the programme by investing its own resources and securing additional grants from UK and EU funding streams. Commercial partners have supported the roll-out of H2 buses but would be unlikely to have done so without the significant public sector subsidy, as there is limited commercial gain from the H2 bus project that can be directly attributed to the bus operating companies.</p>	
<b>Learning</b>	<ul style="list-style-type: none"> <li>• Infrastructure requirements for new energy sources are critical (and costly)</li> <li>• Roles and responsibilities need to be clearly assigned in contracts and projects with multiple partners</li> <li>• Manage expectations for new technology, especially in a commercial environment</li> <li>• Creating a critical mass around the supply chain and maintenance opportunities is difficult and a long-term objective</li> </ul>	

## Calgary, Canada

### *Corporate Energy Strategy and Plan: From Vision to Action*



<b>Member City Name</b>	The City of Calgary	
<b>Name of government responsible for implementing the project</b>	The City of Calgary, Corporate Analytics and Innovation	
<b>Thematic Area of the Project</b>	Energy Generation Water Management Green Buildings	Energy Efficiency Transport
<b>Status of Project</b>	In Implementation	
<b>Description of the Project</b>	<p>The City of Calgary has initiated a Climate Program to reduce the infrastructure, financial, and reputational risks to the Corporation and community. In 2014, The City's Administrative Leadership Team approved the Corporate Energy Strategy: From Vision to Action. The Strategy and the energy vision identified priorities to direct The City's energy decisions and future planning. The Corporate Energy Plan takes climate policy into account and aims to complement the goals of The City's Climate Program.</p> <p>With the planned addition of several large-scale projects, as well as natural growth of municipal services, the City of Calgary's energy use in 2026 is projected to be 54 per cent higher than 2014. Current energy sources include diesel, gasoline, natural gas, and renewable electricity (mostly from wind farms). The impacts of continued growth will be felt with a 30 per cent increase in energy required on a per citizen basis to deliver City services. In the environmental context, the 2020 target for greenhouse gas emissions looks to be in jeopardy, with continually rising emissions forecast over the next ten years.</p> <p>The 10-year Corporate Energy Plan identifies a total of 38 major opportunities to</p>	

	set the course for improved energy use, ranging from conservation and efficiency in street lighting retrofits and driver behaviour to energy supply from wastewater biogas and on-site photovoltaics. Many of these opportunities have been applied to future capital and operating plans of City businesses to determine their potential impact. The Corporate Energy Plan provides a starting point for departments to create their business-specific plans in the future.						
<b>Economic Outputs and/or Outcomes of the Project</b>	<p>The Corporate Energy Plan strengthens The City's energy management practices. It goes beyond simply managing business as usual and proposes actions that will deliver services more efficiently, lower energy costs, and lower carbon emissions. It supports Council Priorities of being a green and well-run city. And it provides a view to the future, allowing informed decisions while balancing complex energy priorities over the next ten years.</p> <p>The projects identified in the Plan have a total of \$340 million of potential energy savings between 2016 and 2026. A high-level estimate includes \$174 million capital cost for full implementation, beyond current plans.</p>						
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>To measure environmental performance, GHG emissions will be tracked relative to The City's existing targets. A mix of corporate and community goals include reducing The City's emissions 20 per cent below the 2005 level by 2020, 50 per cent below 1990 level by 2036, and 80 per cent below 2005 level by 2050.</p> <p>Without taking action, the trend is forecasted to exceed the 2020 target in 2023 and continue upward, largely due to service growth. However, the total collection of actions would keep emissions well below the upcoming target and allow The City to get within reach of its 2036 target. Turning the curve toward the 2050 target would require another set of actions based on the options available at that point.</p> <p>The Corporate Energy Plan, if fully implemented, has the potential to mitigate emissions by 1.25 megatonnes between 2017 and 2026, and to reduce The City of Calgary's exposure to the provincial carbon levy beginning in 2017.</p>						
<b>City powers and functions used to implement this project</b>	<table border="0"> <tr> <td>Procurement mechanisms</td><td>Policy and Strategy</td></tr> <tr> <td>Communications</td><td>Own Budget</td></tr> <tr> <td>Properties and buildings</td><td></td></tr> </table>	Procurement mechanisms	Policy and Strategy	Communications	Own Budget	Properties and buildings	
Procurement mechanisms	Policy and Strategy						
Communications	Own Budget						
Properties and buildings							
<b>Relevant partners</b>	<table border="0"> <tr> <td>Business</td><td>Research institution</td></tr> </table>	Business	Research institution				
Business	Research institution						
<b>Challenges</b>	<p>The organisation had an incomplete understanding of energy trends and future direction. A new approach to forecasting was developed to provide an accurate view of the coming 10 years.</p> <p>A second challenge was developing the appropriate energy performance measures to provide clear and simple communication on corporate energy use to senior management, Council, and the public. The three measures will allow The City to report on the effectiveness of the services we deliver, track the affordability of energy in our services, and provide accountability toward the</p>						

	organization's environmental commitment.
<b>Learning</b>	<p>In reality, developing a plan is one of the last steps in a successful energy management program. To begin the process, there are two important motivators. First, having the data to understand the scope and impact of the energy and carbon challenge at hand. Then, establishing a vision for the organisation's ideal future state. This leads naturally to identifying guiding principles that are constant and long-term. An effective strategy can then focus on the main priorities, and inform energy decisions and future planning.</p> <p>Finally, the plan identifies specific opportunities, and assigns resources and a schedule for implementation. The resulting actions benefit greatly from a set of effective performance measures that tell the story clearly and keep goals in sight.</p>

## Calgary, Canada

### *City of Calgary, Water Energy Management Strategy*



<b>Member City Name</b>	City of Calgary
<b>Name of government responsible for implementing the project</b>	City of Calgary, Water Services
<b>Thematic Area of the Project</b>	Energy Efficiency                      Water Management
<b>Status of Project</b>	Early stages of implementation
<b>Description of the Project</b>	<p>In 2015 the City of Calgary - Water Services, the largest consumer of electricity and natural gas among the City's business units, implemented the Water Energy Management Strategy. The Strategy set direction and targets for energy management addressing issues of increasing energy consumption, volatile energy costs and the environmental impacts in the water, wastewater and drainage systems.</p> <p>The targets captured in the Strategy are:</p> <ul style="list-style-type: none"><li>• Water Treatment Plants: Reduce the Energy Performance Indicator (EPI, in kWh/ML) by 25% by 2038;</li><li>• Potable water Secondary Facilities: Limit the annual increase in total energy consumption to 1% (water demand growth of 1.35%); thereby reducing the EPI of potable water Secondary Facilities by 28% by 2038;</li><li>• Wastewater Treatment Plants: Increase energy efficiency and rate of energy recovery from wastewater resources to make Bonnybrook WWTP net energy neutral by 2025 and Pine Creek WWTP by 2038.</li></ul> <p>The Water Energy Management team has identified numerous opportunities for improvement, including:</p>



	<ul style="list-style-type: none"> <li>• operational savings through analysis in billing and operating mode,</li> <li>• operational adjustment to avoid new peak generation,</li> <li>• improved operation of HVAC systems,</li> <li>• energy efficient lighting upgrades at plants,</li> <li>• solar PV power generating projects on roof at both water treatment plants, and</li> <li>• embedding energy management considerations into planning and design activities.</li> </ul> <p>Between 2016 and 2018, energy audits will be conducted at the treatment plants, and within the water transmission and sanitary collection systems. The audits will provide recommendations in energy management, along with an estimation of financial savings resulting from each recommendation.</p>				
<b>Economic Outputs and/or Outcomes of the Project</b>	<p>The economic result will be a cost savings to the City of Calgary, Water Services as guided by the long term energy targets.</p> <p>To date, the improvements have netted savings of \$356,000 in 2015, with an additional savings of \$215,700 per year anticipated from solar PV, once implemented.</p>				
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>The strategy is currently focused on reducing electricity consumption which will contribute to efforts of mitigation of climate change. Further development of the strategy will consider additional mechanisms to reduce the carbon footprint throughout Water Services.</p>				
<b>City powers and functions used to implement this project</b>	<table> <tr> <td>Policy and Strategy</td><td>Own Budget</td></tr> <tr> <td>Properties and buildings</td><td></td></tr> </table>	Policy and Strategy	Own Budget	Properties and buildings	
Policy and Strategy	Own Budget				
Properties and buildings					
<b>Challenges</b>	<p>The most significant challenges with implementation of the strategy are a lack of funding available and where this work ranks in terms of business priorities. It is typical for pure energy efficiency projects to be upstaged by “essential” projects such as those addressing regulatory compliance or accommodation of growth. To make large gains in energy efficiency, there needs to be a culture shift for ongoing identification of efficiencies and not just as part of a particular project. Sustained education or awareness of energy conservation is required internal to the business and needs to be visibly supported by senior management.</p>				
<b>Learning</b>	<p>The most important learning has been the value in more detailed data acquisition. Prior to implementation, there was only one energy meter being utilized for each treatment plant. In order to identify opportunities for energy efficiency, energy usage data must be obtained at the subsystem or key equipment level in treatment processes. Installing metering throughout the processes is a significant task in and of itself, but also how to monitor and capture this data on a real time basis to truly scrutinize operations as well as how to store this data for further analysis.</p>				

## Cape Town

### Atlantis Green Technology Park

#### Atlantis Industrial Area



<b>Member City Name:</b>	City of Cape Town
<b>Name of government responsible for implementing the project</b>	City of Cape Town Western Cape Government GreenCape
<b>Thematic Area of the Project</b>	Biodiversity Land management
<b>Status of Project</b>	Full implementation
<b>Description of the Project</b>	<p>Atlantis was identified as a location with significant potential to host the green economic drive for the City and Western Cape province. It is strategically located in the West Coast development corridor with lower land values, existing functional infrastructure, a large skilled but unemployed labour pool, and a pressing need to uplift and empower the local population.</p> <p>The underpinning objectives of the Atlantis Green Technology Park are to attract job and business opportunities to the area through building and enabling the green economy. The key project goals are the removal of barriers to growth of the green economy; the realisation of employment and manufacturing potential; and the establishment of Atlantis as an investment destination of choice.</p> <p>The City has designated land in the Atlantis Industrial Area for the development of the technology park. Non-financial incentives such as a one-stop-shop for investment facilitation and the fast-tracking of development applications, as well as financial incentives such as a waiver of scrutiny fees for building plans and land use applications, free biodiversity offset, and substantial discounts for development</p>

	<p>contributions and electricity tariffs have been put in place to encourage investment.</p> <p>A number of supplementary services such as broadband and a MyCiti route are already in place to support investors.</p> <p>It is intended that the Green Technology Park will become a national government designated special economic zone (SEZ), which if achieved, will open up a further set of financial incentives.</p> <p>In October 2016 this project was awarded a Silver Star Rating in the <i>Mayor's Portfolio of Urban Sustainability</i>.</p>	
<b>Economic Outputs and/or Outcomes of the Project</b>	The Atlantis Green Technology Park has attracted numerous new investments. The largest investor has established a wind turbine tower factory that employs over 220 workers. Other investments have been into a further wind tower component manufacturing facility, and expansions of existing facilities producing geotextiles and doubleglazed windows.	
<b>Environmental Outputs and/or Outcomes of the Project</b>	Manufacturing facilities are producing outputs that contribute to increased renewable energy uptake in the economy, and other goods that enhance resource efficiency.	
<b>City powers and functions used to implement this project</b>	Procurement mechanisms Policy and Strategy Communications Partnerships Facilitation	Tariff regulations By-laws and regulation Own Budget Properties and buildings
<b>Relevant partners</b>	Provincial / State government Business Research institution	National Government Civil Society Organisation Special Purpose Vehicles
<b>Challenges</b>	There are multiple line function departments within the City administration required to make this project a success. Key to creating an enabling environment is effective and quick troubleshooting. This is not always fast enough. In order to overcome this the Atlantis Investment Facilitation Office was formed to be a one-stop-shop facility for potential investors and existing investors. This office assists with coordinating responses from the relevant line function departments.	
<b>Learning</b>	The Atlantis Green Technology Park is an example of what can be achieved when multiple stakeholders and spheres of government work together. The Western Cape Provincial Government, GreenCape, the City and the national Department of Trade and Industry have all contributed in various ways to establishing this initiative.	

**Esbjerg, Denmark**  
***Tjæreborg – a city of energy***



# TJÆREBORG

- en by med Energi

<b>Member City Name</b>	Esbjerg Municipality
<b>Name of government responsible for implementing the project</b>	DIN Forsyning – (utility company)
<b>Thematic Area of the Project</b>	Energy Efficiency                      Waste Management Green Buildings
<b>Status of Project</b>	Pilot
<b>Description of the Project</b>	<p>Tjæreborg is a city with 2.568 inhabitants and 1.070 households, located only 8 kilometers from Esbjerg. The project “Tjæreborg - a city of energy” aims at creating a better city in a broad and sustainable perspective.</p> <p>Esbjerg Municipality leads the project through a steering committee consisting of representatives from the local council, the utility company and Esbjerg Municipality.</p> <p>By using the latest techniques in climate considerations and sustainability, different initiatives are applied. For instance, the city has tested different kinds of organic waste collection, and these tests will be the basis for the model chosen for the entire municipality.</p> <p>Some of the initiatives aim at educating and changing peoples’ behaviour. The local school and day-care facility are also involved and one of the projects will be to see, if they can access data from the world’s largest onshore wind turbines, which are not far away.</p> <p>There are eight project groups working under three headlines:  <u>Behaviour</u></p>

	<ul style="list-style-type: none"> <li>- New habits</li> <li>- Learning about climate and sustainability</li> <li>- Digital portal</li> </ul> <p><u>Better town</u></p> <ul style="list-style-type: none"> <li>- The heart of the town</li> <li>- Coherence in the town</li> <li>- Energy in the town</li> </ul> <p><u>Energy</u></p> <ul style="list-style-type: none"> <li>- Next Step Village (on hold)</li> </ul> <p>The aim is to develop and test climate and sustainability initiatives, which will reduce the CO2 emission by 30% before 2020.</p>
<b>Economic Outputs and/or Outcomes of the Project</b>	The economic outcome is long-term and concerns the city's continued attractiveness for newcomers.
<b>Environmental Outputs and/or Outcomes of the Project</b>	<ul style="list-style-type: none"> <li>• Reduce energy consumption in public buildings and reduce CO2 emissions by 37 tons per year by 2020.</li> <li>• Reduce energy consumption in private houses and reduce CO2 emissions by 786 tons per year by 2020.</li> <li>• Reduce CO2 emissions by 50 tons per year by 2020.</li> </ul>
<b>Challenges</b>	The project regarding Next Step Village had to be put on hold, because the local energy and telecommunications company could not be part of the project.
<b>Learning</b>	The overall project is not completed yet but so far, the organic waste collection project quickly reached the goal of a 50% recycling percentage.

## Halifax, Canada

### *Solar City Halifax*



<b>Member City Name</b>	Halifax Regional Municipality
<b>Name of government responsible for implementing the project</b>	<p>Halifax Regional Municipality is responsible for administering. Halifax does not purchase the equipment but works with property owners to install solar energy equipment.</p> <p>The pilot from 2013-15 awarded a contract to Thermodynamics Ltd to provide solar assessments and solar installations for property owners in HRM. The program relaunched in June 2016 and financing is offered to an eligible property owner based on a set of terms and conditions that the property owner and solar contractor must meet.</p>
<b>Thematic Area of the Project</b>	Energy Generation                      Water Management (yes, in pilot) Green Buildings
<b>Status of Project</b>	Full implementation
<b>Description of the Project</b>	<p>An example of property assessed clean energy (PACE) programs; Solar City Halifax offers property owners the benefit of financing the capital costs of solar energy systems onto their property through a local improvement charge (LIC). This allows the system to stay with the property and mitigates one of the barriers for implementing these systems.</p> <p>From the pilot (2013-15):</p> <ul style="list-style-type: none"><li>• 2,500 property owners expressed interest</li><li>• 1,989 offers issued</li><li>• 388 solar DHW installations (designed for 1,000 installs)<ul style="list-style-type: none"><li>• 90% of systems financed through Solar City local improvement charge (LIC) at 3.5% over 10 years – financing set at 3.5%</li><li>• 61% installed WELServer monitoring devices</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>• Total budget spent ~ \$4 million (\$8.38 million originally approved)</li> </ul> <p>The new program:</p> <ul style="list-style-type: none"> <li>• March 31, 2015: 3-year program approved by Regional Council</li> <li>• Objectives: <ul style="list-style-type: none"> <li>– Complete 450 installations/year – 1,350 total</li> <li>– Allowable capital through Municipal Financing Corp <ul style="list-style-type: none"> <li>• \$13,112,700</li> </ul> </li> <li>– Continue to administer program on a cost neutral basis to the non-participating tax payer</li> <li>– Provide property owners with financing to install solar energy systems that improve their environmental footprint</li> <li>– Eligible property owners are private dwellings or not for profit or co-op who own property.</li> <li>– Incorporate 3 solar technologies: <ul style="list-style-type: none"> <li>• Solar Photovoltaic (PV)</li> <li>• Solar Hot Air</li> <li>• Solar Hot Water</li> </ul> </li> </ul> </li> <li>• Financing over 10 years through a local improvement charge – separate bill from property tax.</li> <li>• Financing set at 4.75% and reviewed annually</li> <li>• Monitoring and data collection requirement for all systems through Solar City – will be used to verify system performance and overall energy reductions through Solar City program.</li> </ul>
<b>Economic Outputs and/or Outcomes of the Project</b>	<p>Findings from the pilot (2013-15):</p> <ul style="list-style-type: none"> <li>• Economic impact analysis completed by Sustainable Prosperity found: <ul style="list-style-type: none"> <li>– Direct Benefits <ul style="list-style-type: none"> <li>• \$5.5 million in additional local revenue, and 35 jobs created in direct and indirect economic benefits:</li> <li>• Local suppliers: \$532,000 additional local revenue</li> <li>• Installation labour: \$3,500,000 additional local revenue, 30 jobs</li> <li>• Manufacturing labour: \$300,000 additional local revenue, 3 jobs</li> <li>• R&amp;D services: \$500,000 additional local revenue</li> </ul> </li> </ul> </li> </ul>
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>Findings from pilot (2013-15)</p> <ul style="list-style-type: none"> <li>• Avoided energy <ul style="list-style-type: none"> <li>– ~ 1.3 equivalent gigawatt hours (eGWh) per year <ul style="list-style-type: none"> <li>• ~ 725 megawatt hours (MWh) per year of electricity</li> <li>• ~ 52,000 L per year of oil</li> </ul> </li> <li>– Avoided GHG emissions <ul style="list-style-type: none"> <li>• ~ 650,000 kg per year of eCO<sub>2</sub></li> </ul> </li> </ul> </li> <li>• Expected avoidance for participants over 25 years <ul style="list-style-type: none"> <li>– \$5.5 million</li> <li>– 16.1 million kg eCO<sub>2</sub></li> </ul> </li> <li>• Water conservation measures <ul style="list-style-type: none"> <li>– Enabled research for domestic hot water usage – first of its kind</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>– 1,265 homeowners had measures installed</li> <li>– Could avoid 360,000,000 million liters of water over 20 years</li> </ul> <p>Environmental impact if similar to pilot</p> <ul style="list-style-type: none"> <li>• Avoided energy <ul style="list-style-type: none"> <li>– ~ 4.52 equivalent gigawatt hours (eGWh) per year <ul style="list-style-type: none"> <li>• ~ 2,520 megawatt hours (MWh) per year of electricity</li> <li>• ~ 181,000 L per year of oil</li> </ul> </li> <li>– Avoided GHG emissions <ul style="list-style-type: none"> <li>• ~ 2.26 million kg per year of eCO<sub>2</sub></li> </ul> </li> </ul> </li> <li>• Expected avoidance for participants over 25 years <ul style="list-style-type: none"> <li>– \$19.1 million</li> <li>– 56.0 million kg eCO<sub>2</sub></li> </ul> </li> </ul>	
<b>City powers and functions used to implement this project</b>	Procurement mechanisms By-laws and regulation Partnerships Facilitation	Policy and Strategy Communications Properties and buildings
<b>Relevant partners</b>	Provincial / State government Business	National / Federal Government Research institution
<b>Challenges</b>	<ul style="list-style-type: none"> <li>• Confusion in the pilot how the repayment would work with property owners. Repayment occurs with a separate bill from property taxes but the property owners were under the impression that their property tax bill would reflect repayment.</li> <li>• Collection and ownership of data from data monitoring of the solar energy systems.</li> <li>• Meeting the installation target due to dependent variables of installing a solar hot water system (ie not enough space for a second storage tank, usage of hot water too low to realize a good return on investment, access to energy from the sun)</li> <li>• Communication between various departments</li> <li>• Launching before the program was fully developed.</li> </ul>	
<b>Learning</b>	<p>The number of participants who chose financing in the pilot. This has led to the new program to only offer financing of the projects for property owners.</p> <p>The impact was still exciting for HRM to be the first in Canada to apply LIC to offset the capital costs of a renewable energy project.</p> <p>Improve communication of program and benefits of LIC through social media, print, radio, and the industry.</p>	



## Houston, USA

### *Municipal Energy Efficiency Program*



<b>Member City Name</b>	Houston, Texas
<b>Name of government responsible for implementing the project</b>	General Services Department
<b>Thematic Area of the Project</b>	Energy Efficiency                      Green Buildings
<b>Status of Project</b>	Full implementation
<b>Description of the Project</b>	<p>The Municipal Energy Efficiency Program has utilized energy performance contracts to retrofit 6 million square feet since 2008. Those buildings are achieving energy reductions approaching 30 percent, with average paybacks of less than 10 years. The City has invested \$70 million in retrofitting these buildings.</p> <p>In 2004, Houston adopted a Green Building Resolution which set a target of LEED® Silver for new City construction, replacement facilities, and major renovations of more than 10,000 square feet.</p> <ul style="list-style-type: none"><li>• The Houston Green Office Challenge is a friendly competition for commercial property owners, managers and office tenants that celebrates achievements in greening operations through recognition events. This Houston-wide program will bring local, state and national sustainability experts together with businesses and properties to learn and engage in both introductory and high performance green building practices through free workshops and training. The Challenge also helps participants improve their sustainability and work toward third-party green building certifications such as ENERGY STAR and LEED®.</li></ul>

<b>Economic Outputs and/or Outcomes of the Project</b>	The municipal energy efficiency program has contracted with small businesses, reduced grid demand, has allowed the City to lead by example. The Green Building Resolution helped the City advance green building in the community by utilizing different architecture firms in Houston to help the City achieve LEED certification for their buildings, thus advancing the field of green building experts in Houston. The Houston Green Office Challenge has offered trainings to businesses, both small and large, on sustainability best practices in property management and tenant engagement.	
<b>Environmental Outputs and/or Outcomes of the Project</b>	Retrofitting municipal buildings has helped the City decrease its building energy use, increase efficiency of natural resources, reduce GHG emissions, and improved air quality.	
<b>City powers and functions used to implement this project</b>	Communications Properties and buildings Facilitation	Partnerships
<b>Relevant partners</b>	National / Federal Government Civil Society Organisation	Business Research institution
<b>Challenges</b>	Challenges included lack of measurement and verification on some of the buildings, which has led to a reduction in efficiency from the original baseline. Savings from the energy efficiency retrofits are not reinvested into future retrofit projects. There is also a lack of dedicated funding source for ongoing energy efficiency investment.	
<b>Learning</b>	Educate the financial team from the beginning to help educate them on the importance of energy efficiency projects. That is the key to sustaining more projects in the future.	

## Karamay, China

### *Jiugongli Ecological Wetland Project*

#### *Karamay infrastructure completion and environmental improving program*



<b>Member City Name</b>	Karamay
<b>Name of government responsible for implementing the project</b>	Karamay Construction Bureau
<b>Thematic Area of the Project</b>	Water Management
<b>Status of Project</b>	Pilot
<b>Description of the Project</b>	<p>Located in the Jiugongli area in the south outskirts of Karamay, the project is at the gateway to Karamay and shows the image of our city.</p> <p>The Gobi wetland ecosystem has varieties of vegetation including shrub, ground cover meadow, psammophytes, desert and marsh plants and aquatic vegetation. It has irreplaceable scientific research values because of its particularity of lack of water and dry climate.</p> <p>This ecological wetland project aims to achieve a virtuous circle of water ecosystem and guarantee sustainable use of water resource. Through the natural purification function of the constructed wetland, the first level A-standard reclaimed water discharged by city sewage treatment plants can be improved in water quality and be reused in greening irrigation. The wetland and lakes can also reserve a certain quantity of water and solve the storage problem of reclaimed water in Karamay in winter.</p>
<b>Economic Outputs and/or Outcomes of the Project</b>	After completion, the Jiugongli Ecological Wetland will become a modern landscape combining wetland, streams, gobi and vegetation with local characteristics. It will

	<p>become the nearest wetland tourist attraction from the urban area of the city.</p> <p>This project will not only help to increase tourism income but also create tourism job opportunities. The constructed wetland will also become a place for recreation and leisure as well as for science popularization on wetland.</p>
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>This project is dominated by water views and wetland plant landscape. The unique urban wetland landscape will become the most intensive population sources for biodiversity of Karamay city, an important part of the city's whole landscape system and an oxygen supply centre. Meanwhile, it will also become a natural habitat for birds. The rich plant communities form an ecological mode organically including songbirds, water fowls and waders, which can further improve the arid climate in Karamay.</p>
<b>City powers and functions used to implement this project</b>	Policy and Strategy
<b>Relevant partners</b>	Provincial / State government                      Banking institution
<b>Challenges</b>	<p>The main challenges encountered in the implementation of this project were the arid climate with strong wind and dust, the governance of pollution sources in the field and the high degree of soil salinity and alkalinity.</p> <p>How were the challenges overcome: First, cut off the main supply source of external sewage in the field, gather and deal with all external water sources inside the field, which significantly improved the environmental and geological problems in the area; Second, amend the saline-alkaline soil through the flow and circulation of water which fundamentally improved the salinity in the field.</p>
<b>Learning</b>	<p>We are very glad to share our knowledge we have learned from the implementation of this project and we are also willing to share our project management experience with other member cities.</p>

## Kuala Lumpur, Malaysia

***Replacement Of Existing HPSV Street Lanterns To LED Street Lanterns And Installation Of Multifunctional Columns In Jalan Ampang (From Renaissance Hotel To Ampang Park), Kuala Lumpur.***



<b>Member City Name</b>	Kuala Lumpur
<b>Name of government responsible for implementing the project</b>	Dewan Bandaraya Kuala Lumpur
<b>Thematic Area of the Project</b>	Energy Efficiency
<b>Status of Project</b>	Full implementation
<b>Description of the Project</b>	<p>In line with the government policy of promoting energy efficiency and the mature LED technology, DBKL has decided to replace the existing 400W HPSV street lanterns to LED street lighting luminaires with the aim to reduce carbon emission and increase energy efficiency.</p> <p>This project started on 1 September 2015 and finished on 2 June 2016.</p> <p>324 220W LED street lights were installed with Correlated Colour Temperature (CCT) of 3000°K</p>

<b>Economic Outputs and/or Outcomes of the Project</b>	Jobs were created for local people.
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>Less energy used and therefore reduces electricity bill.</p> <p>Reduce maintenance cost.</p> <p>Lower emissions.</p> <p>Total Energy Saving per year            = 239,400 kWh            = RM 45,964.00 / USD 11000.00            = 162 Mton of CO2 emission reduction            = 35% energy saving</p>
<b>City powers and functions used to implement this project</b>	Own Budget



## Kuala Lumpur, Malaysia

### *A Development of a Garden Waste Collection and Processing Centre.*



<b>Member City Name</b>	Landscape & Recreation Development Department, Kuala Lumpur City Hall (DBKL).
<b>Name of government responsible for implementing the project</b>	<ul style="list-style-type: none"> <li>• Landscape &amp; Recreation Development Department, Kuala Lumpur City Hall (DBKL).</li> <li>• MIG Green (Partner)</li> </ul>
<b>Thematic Area of the Project</b>	Waste Management                      Agriculture
<b>Status of Project</b>	Full implementation
<b>Description of the Project</b>	<ul style="list-style-type: none"> <li>• Malaysia's first and largest green facility to recycle 100% of garden waste without landfilling.</li> <li>• Daily capacity designed to accept up to 150 Ton/Day.</li> <li>• Converting garden waste into compost, mulch, wood chips and suitable raw material for Biomass pellets.</li> <li>• Easily expandable to cater for new types of waste (i.e. organic wet market waste, construction &amp; demolition waste) through utilization of mobile type machinery and equipment.</li> </ul>
<b>Economic Outputs and/or Outcomes of the Project</b>	<ul style="list-style-type: none"> <li>• Saving on 'tipping fees' cost for the disposal of garden waste at transfer stations (TS) or landfills.</li> <li>• Complimentary free composts and mulches every month for DBKL through the joint venture with MIG Green (a local company).</li> <li>• Reduce transportation and other running cost as distance between facility and workplace is near.</li> </ul>

<b>Environmental Outputs and/or Outcomes of the Project</b>	<ul style="list-style-type: none"> <li>• Improved efficiency of natural resource use.</li> <li>• Turning garden waste into valuable products: compost, mulch, wood chips, and biomass fuel pellets.</li> <li>• Reduce the dependency on current landfill disposal system.</li> <li>• Greener municipality.</li> </ul>
<b>City powers and functions used to implement this project</b>	Partnerships
<b>Relevant partners</b>	Business
<b>Challenges</b>	<ul style="list-style-type: none"> <li>• Without doubt, the first challenge is to estimate the total tonnage of garden waste. As this is the first initiative to process 100% garden waste, the chosen equipment and machinery should be able to match the daily tonnage received. The appearance of garden waste itself is not homogenous compared to woods from logging, thus variable sizes of machinery were needed to cater for the various size of tree parts, especially since we are living in a tropical climate with hard wood trees.</li> <li>• Recycling garden waste produced wood and agricultural products. Compost is the basic form of products but market demand is comparatively low against soil mix. As such, by enhancing our soil mix, which is ready for landscaping use is the most logical way to increase its market value due to the high organic contents and excellent water retention. As for wood chips, it's not in the best form as leaves and other matter are often mixed up. However, a reasonable price for usage in power plant companies should solve the offtakes issue at our facility.</li> </ul>
<b>Learning</b>	<ul style="list-style-type: none"> <li>• Consistency in advancing the end product value has enabled us to realize that shredded garden waste can easily be mixed with food waste to capture methane gas for energy and compost for landscaping use. A system known as Dried Anaerobic Digester (Dried AD) is something we are looking forward to advance. Dried AD is not new, it's even the best solution we have combustible waste source of materials such as garden waste to be easily mix with high moisture food waste, producing methane gas as renewal energy.</li> <li>• A pilot project would be carried out in a month involving SWCorp and the residents of Taman OUG (a Kuala Lumpur suburb). Unique compostable bags shall be distributed thus enabling practical and easy solution for the residents to place their food waste every day. By separating the food waste, we can easily recycle the dry waste materials such as paper, plastics, cans and others. Large food waste producers such as hotels and restaurants should participate thus reducing tonnage disposal at landfills.</li> </ul>



## Perth, Australia

### CitySwitch Green Office Program



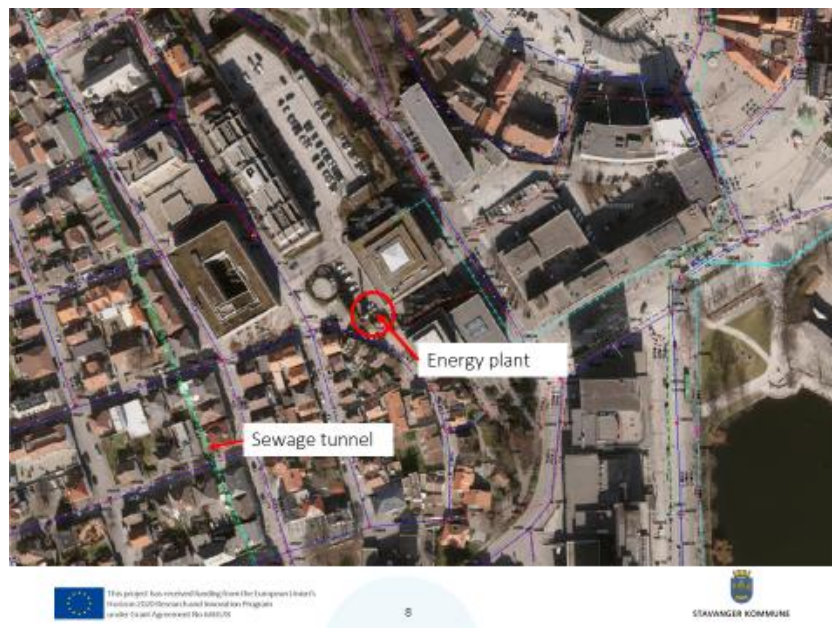
<b>Member City Name</b>	City of Perth
<b>Name of government responsible for implementing the project</b>	City of Perth in partnership with the City of Sydney and New South Wales Office of Environment and Heritage
<b>Thematic Area of the Project</b>	<div>Energy Generation</div> <div>Waste Management</div> <div>Energy Efficiency</div> <div>Green Buildings</div>
<b>Status of Project</b>	Full implementation
<b>Description of the Project</b>	<p>The CitySwitch Green Office Program fosters collaboration and leadership amongst a growing network of nearly 800 business leaders across Australia committed to environmental excellence.</p> <p>The easy to access, no-cost, high-value CitySwitch program supports office-based businesses to improve their energy and waste efficiency, adopt renewable energy, increase productivity, reduce operational costs and foster their commitment to environmental sustainability.</p> <p>Since 2008, the City of Perth has administered the CitySwitch program in Western Australia, employing a CitySwitch Program Manager to provide locally based businesses with tools, resources, events, advice and education customised for the Australian west coast. Through their combined efforts, in 2015, Western Australian signatories won all three national CitySwitch awards for their sustainability achievements.</p> <p>Today, the City of Perth is taking the lead to develop an innovative national campaign that addresses human sustainability in Australian offices, set for launch in early 2017. This campaign links human health with the quality of the indoor work environment and seeks to improve the wellbeing of office workers by addressing air,</p>

	<p>light and acoustic qualities in offices; and the comfort, happiness and activity levels of building occupants.</p> <p>The Healthy Workplaces campaign signals another evolution in green buildings. A growing body of academic research demonstrates the potential for enormous economic productivity gains, a new level of environmental sustainability, and a reduction in health costs incurred by society from chronic disease, all from improved workplace settings. The City of Perth is proud to lead the development of resources for this evolution.</p>	
<b>Economic Outputs and/or Outcomes of the Project</b>	<p>In 2015, the actions of CitySwitch signatories, delivered a massive saving of over \$13.2 million from improvements in energy efficiency.</p> <p>It is however, more difficult to quantify the flow-on effects to the economy from CitySwitch. Signatories benefit from support to develop a well-informed risk-based and strategic approach to environmental innovation. This helps drive investor value, and deliver on evolving customer and staff expectations.</p> <p>CitySwitch also advocates on behalf of business for changes to government policies and funding to improve environmental outcomes and CitySwitch networking events connect the eighty-two businesses, government departments and local governments in WA to develop further partnerships in business and sustainability pursuits.</p>	
<b>Environmental Outputs and/or Outcomes of the Project</b>	<p>Twelve per cent of Australian office space is signed up to CitySwitch representing over three million square metres of net lettable area.</p> <p>In 2015, a total reduction of 347,000 tonnes of CO<sub>2</sub>-e emissions was achieved across this area. Signatories' energy efficiency efforts avoided 50,620 tonnes of emissions, with carbon offsetting abating a further 296,000 tonnes. On average, signatories each reduced their energy use by 29%.</p> <p>In total, there were 1,463 environmental projects undertaken by CitySwitch signatories in 2015. These included renewables and green power; staff health and productivity; heating, cooling and ventilation projects; information and communications technology, and equipment upgrades; lighting upgrades; staff engagement campaigns; waste management initiatives; and strategy and/or policy changes.</p>	
<b>City powers and functions used to implement this project</b>	<p>Policy and Strategy</p> <p>Own Budget</p> <p>Properties and buildings</p>	<p>Communications</p> <p>Partnerships</p> <p>Facilitation</p>
<b>Relevant partners</b>	<p>Provincial / State government</p> <p>Business</p>	<p>National / Federal Government</p>
<b>Challenges</b>	<p>A challenge in delivering the CitySwitch program is to develop campaigns that can adapt to the growing number and diversity of organisations in CitySwitch. Each campaign must cater to SMEs through to government departments and multi-national corporations.</p>	

	<p>To maintain engagement with the signatory base, campaigns contain a ‘call-to-action’: a low or no cost project that every signatory can partake in.</p> <p>The second element to each campaign is an innovation challenge. This element is designed to challenge high achieving signatories to push into new areas of office sustainability and draws on the latest innovations and standards in green buildings.</p>
<b>Learning</b>	<p>The CitySwitch program has demonstrated that given information, resources, structure, targets, and a support network, the business sector can drive a transition to a green economy.</p> <p>The most successful signatories in CitySwitch have been the ones that bring together tenants, building owners, facility managers and the sustainability champions that work within these businesses, to implement change in their buildings. Cooperation and the alignment of visions can create truly impressive results which send market signals to energy providers, waste contractors, the developers of clean energy technology, government regulators, and policy makers.</p>

## Stavanger, Norway

### Triangulum



<b>Member City Name</b>	Stavanger
<b>Name of government responsible for implementing the project</b>	<p>The Triangulum project is supported by Horizon 2020 – the European Union’s largest research and innovation program. Besides the city of Stavanger, the two cities of Manchester (UK) and Eindhoven (The Nederland’s) are also partners in the Triangulum project together with 20 private partners and universities.</p> <p>For the energy plant project, the long term goal is to link private property company with estates close the 3 public buildings to the energy plant.</p>
<b>Thematic Area of the Project</b>	<p>Energy Generation                      Energy Efficiency</p> <p>Green Buildings</p>
<b>Status of Project</b>	<p>Full implementation</p> <p>The building of the plant started in June 2016 and will be completed in March 2017.</p>
<b>Description of the Project</b>	<p>It is a smart cities and communities’ project for solutions integrating energy, transport and ICT sectors through lighthouse (large scale demonstration – first the kind) projects. Within the Triangulum project the City of Stavanger has a special responsibility for a number of projects. The biggest one is an energy project designing and building a new energy plant that will support 3 public buildings with energy from renewable sources and infrastructure for increased energy efficiency.</p> <p>In Norway more than 90 % of energy consumption in homes and public buildings comes from renewable energy – hydro power. This is, however, not the situation for the rest</p>



## Stavanger, Norway

### Mobility Project “Home-work-home”



<b>Member City Name</b>	Stavanger
<b>Name of government responsible for implementing the project</b>	The project is a collaboration between the cities of Stavanger, Sandnes and Sola, the county council of Rogaland, Forus business park and Kolumbus (bus company)
<b>Thematic Area of the Project</b>	Transport
<b>Status of Project</b>	Full implementation  Started in August / September 2015
<b>Description of the Project</b>	<p>The project «Home-work-home»’s main objective is to contribute to a new travel pattern among the cities’ inhabitants that will contribute to a reduction of GHG emissions.</p> <p>More and more people live in the cities. To reduce the pollution and increasingly heavy traffic problems, the government’s policy in Norway is that the growth in passenger transport in urban areas should be taken by public transport, cycling and walking.</p> <p>The project is not about making it impossible for people to use cars when going to the city, but to encourage people to walk, bicycle and use public transport whenever they can and use car only when necessary. The main goal is to achieve that everybody let their car stay at home one or two days per week in favour of public transport or el-bicycle.</p> <p>Private and public companies are offered to join the project. If member, all your employees will be able to buy a monthly ticket at a heavily reduced rate, giving them access to use all public transport (bus, train, boat) in combination with battery el-</p>

