



**PUBLIC-PRIVATE PARTNERSHIPS:
LOCAL INITIATIVES 2007**

THE CLIMATE GROUP



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STEVE HOWARD, CEO
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ALLISON HANNON
THE CLIMATE GROUP

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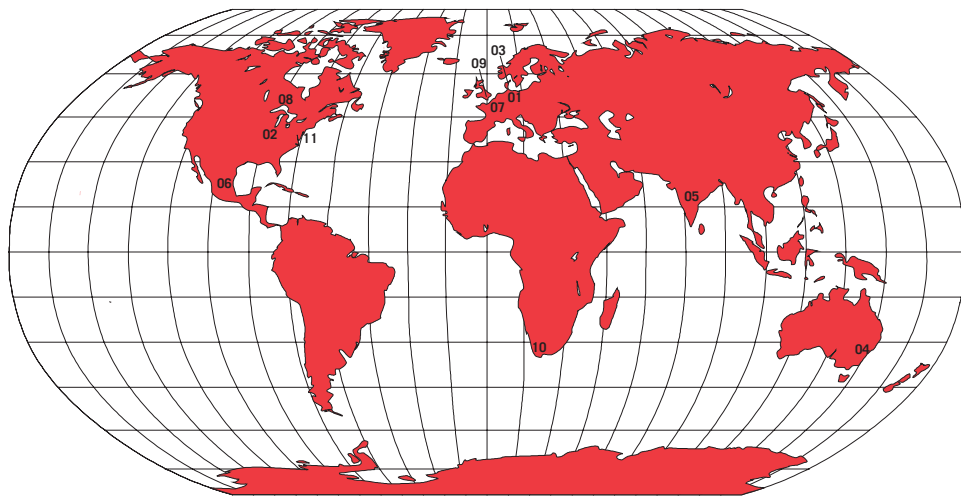
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FOREWORD

Climate change is a predominantly urban challenge. Over one-half of the world's population now lives in urban centres and these centres are growing at a rate of 75 million residents per year; the vast majority of this growth is happening in developing countries. Critically, cities account for three-quarters of the world's total energy use, either directly through the combustion of fossil fuels in power generation and transport, or indirectly through electricity use.

In response to this challenge, cities around the world are making strides in mitigating greenhouse gas emissions from sectors they have direct control or influence over—typically power generation, transport, and buildings. This publication includes examples from these sectors and also looks at the synergies that can be achieved through dedicated climate change agencies and communication initiatives that target the wider community.

What sets this publication apart from other climate change case studies is its focus on initiatives that have been delivered through city and business partnerships. It clearly shows that there are significant opportunities available for cities and businesses working together to reduce carbon dioxide emissions, that these partnerships deliver results for the climate, and that they are financially rewarding for the city governments and businesses involved.

The scale and impact of climate change is global and must be addressed concurrently at the international, national, and local levels if the threat is to be stabilized. Partnership efforts between public and private entities at the city level are an invaluable contribution to the many efforts currently underway.

STEVE HOWARD
CEO, THE CLIMATE GROUP

PARTNERSHIPS

INTRODUCTION

Over the past few years, city governments and businesses around the world have become increasingly attuned to the growing environmental and economic threats posed by climate change. As illustrated in previous publications by The Climate Group, many governments and businesses—not content to retreat from the challenges presented by this critical issue—have adopted and continue to adopt a range of measures that seek to address the problem. While these individual efforts have frequently been examined, climate change mitigation efforts established collectively between city governments and businesses have not yet received the same level of attention.

Public-private partnerships are joint initiatives developed, executed, and managed by a public-sector agency and a private-sector entity for the purpose of attaining both a commonly shared goal and the partners' respective individual objectives. While each public-private partnership is unique, all contain three basic characteristics:

1) shared goals; 2) shared or complementary resources such as financial capital, political influence, knowledge and expertise, human capital, or time; and 3) shared risks and benefits. Public private partnerships have long existed throughout the world and have gained prominent attention in certain sectors, such as public works. Yet it has been a relatively recent phenomenon that the public-private partnership model has been applied to help local governments and private businesses combine efforts and expertise to fight climate change and promote environmental sustainability.

Climate change poses a number of challenges to both city government and businesses. Local governments struggle to adapt to the myriad effects of changing and unpredictable weather patterns, and the resulting impact on sectors ranging from agriculture to tourism. Businesses see a present and future threat to their profitability as core products and services are affected by—and threaten to

exacerbate—climate change. While the challenges faced are of a different nature for local governments and businesses, many have begun to understand that what they can proactively do together to reduce climate change is more powerful—and often more innovative—than what they can accomplish working separately.

The 11 examples of public-private partnerships outlined in this publication represent a wide range of strategies and techniques developed by city governments and businesses to help reduce the threat of climate change. They are reflective not only of the unique needs of local governments and businesses in different parts of the world, but also of the creative ingenuity utilised to implement new solutions. These examples—which reflect 'Established', 'Recent', and 'Up and Coming' partnerships—demonstrate the continuum along which partnerships continue to be part of the portfolio of international solutions to combat climate change.

Enabling reductions in carbon dioxide emissions is just one of the many positive outcomes afforded by the case studies highlighted here. For example, the new Darling Wind Farm near Cape Town, South Africa, will reduce over 635,000 tonnes of CO₂ emissions over the next 20 years and provide area residents with clean energy. It will also create 15-19 jobs per MW of power produced during the construction phase, with an additional 30 jobs created indirectly from activities related to the wind farm. The partnership between BASF and LOGIREP to retrofit low-income housing outside Paris reduces the primary energy consumption of the units from 400 kWh to 50kWh per square metre, while also helping to improve the living conditions of the building's residents.

This publication demonstrates not only the positive economic advantage of reducing greenhouse gas (GHG) emissions, but also the many other benefits of addressing climate change for city governments and businesses, including job creation, clean air, increasing energy independence, reduced traffic congestion, improved business continuity, and improved general quality of life.



01: ENERGY-SAVING PARTNERSHIPS

PARTNERS: Johnson Controls and the City of Berlin

PROJECT SECTOR: Energy efficiency and conservation

LOCATION: Various public buildings (Berlin, Germany)

TIMEFRAME: 1999-2013

GOAL: To promote energy savings within public buildings to reduce energy costs for the City of Berlin and address climate change

PRIMARY BENEFITS:

- Cumulatively, the partnerships reduce carbon dioxide emissions by 60,000 tonnes per annum in Berlin; the contract with Johnson Controls reduces CO₂ emissions by 2,500 tonnes per annum.
- Berlin accumulates total savings of approximately €5,923,000 (US\$7,514,513) per annum; accumulated savings in Berlin's Pankow District are €502,000 (US\$636,887) per annum.
- Savings from cost reductions are shared between Berlin and the private contractor.

PROJECT DESCRIPTION:

In the early 1990s, the City of Berlin was facing fiscal constraints and undertook a variety of efforts to reduce public expenditures. Berlin had also committed to ambitious targets for climate protection and new strategies were needed to tackle this challenge in light of the fiscal situation. The Energy-Saving Partnerships were developed to help achieve Berlin's targets for climate protection while also helping to reduce energy costs for the city.

Through the Energy-Saving Partnerships, energy provision contracts with private sector ESCOs are selected through a competitive bidding process. The contracts specify a clearly defined commitment on behalf of the ESCOs to ensure that adequate investments in building renovation are made in order to

guarantee energy savings. Thus, the contractor provides the knowledge and experience needed to reduce energy consumption and the capital needed for the renovation, while Berlin retains ownership of the entire building, including all new capital investments. The capital investments are paid back to the ESCO from the City of Berlin with the financial savings accumulated with reduced energy cost; remaining returns on the energy cost reductions are shared between the two partners.

Berlin's public buildings are grouped into 21 building pools, with each pool consisting of up to 73 buildings and representing a borough of Berlin. Individual contracts are signed for each pool. This allows the city to diversify its contracts and engage in a variety of energy-saving partnerships that can be tailored according to the specific needs of the boroughs. To date, approximately 1,300 public buildings in Berlin have been renovated through the Energy-Saving Partnerships. The average financial saving per building is a 25% reduction in energy costs. Such energy reductions also avoid emissions totalling 60,000 tonnes of CO₂ every year.

For example, the District of Pankow, known as Housing Pool 4, entered into an Energy-Saving Partnership with Johnson Controls in 1999. Covering 56 public buildings within

the District, the contract has a value of €2,075,000 (US\$2,632,553) per annum for baseline energy consumption of 49,513MWh per annum. Johnson Controls has committed to making investments of €1,771,000 (US\$2,246,868) and has guaranteed overall energy savings of 24.2% or €502,000 (US\$636,887) to the City of Berlin. These efforts will lead to CO₂ reductions of approximately 2,500 tonnes per annum.

When the contract between Johnson Controls and the City of Berlin expires in 2013, a final audit will be conducted to guarantee that all technologies have been properly maintained by the contractor. At this point, Berlin will have the option to renew the contract or start a new competitive bidding process.

The Berlin Energy-Saving Partnerships represent a powerful solution to both budget constraints and environmental concerns. The concept can be easily transferred and applied to all sizes of buildings (small buildings can be successfully integrated into building pools or a selection of further modified models). In addition, the concept can and has already been successfully applied to other cities in Germany as well as outside of Germany.

“BERLIN HAS CREATED A MODEL THAT HAS BECOME AN EXAMPLE FOR THE REST OF EUROPE AND OPERATES AT A PROFIT. CLIMATE PROTECTION CAN INDEED BE ECONOMICAL”. KLAUS WOWEREIT, MAYOR OF BERLIN

02: CHICAGO SOLAR PARTNERSHIP

PARTNERS: Exelon Corporation and the City of Chicago

PROJECT SECTOR: Solar power

LOCATION: Various building sites (Chicago, Illinois, USA)

TIMEFRAME: Since 2000

GOAL: To reduce peak load electricity use and advance development of the solar energy industry in the Chicago metropolitan area

PRIMARY BENEFITS:

- Has reduced CO₂ emissions by 1,361 tonnes per annum to date and is expected to reduce CO₂ emissions by 1,814 tonnes per annum starting in 2008.
- Helps Exelon avoid costly alternatives for managing peak demand and improves the reliability of the power grid during peak times.
- Improves air quality, attracts new industries and technology, creates jobs, and promotes tourism for Chicago.

PROJECT DESCRIPTION:

Chicago Mayor Richard Daley's goal is to make Chicago "the most environmentally friendly city in America". Mayor Daley's 2005 'Environmental Action Agenda' promotes green buildings, the use of alternative fuels and hybrid vehicles, the harnessing of solar energy, the education of residents about renewable energy, and improvements to the overall quality of life for Chicago citizens. The Chicago Solar Partnership is helping the city to increase its solar power generating capacity as well as to attract the photovoltaic (PV) industry to Chicago.

Founded in 2000 with the assistance of the Illinois Solar Energy Association, the Chicago Solar Partnership is a public-private consortium with members from business, government, and civil society, which is focused on helping Chicago meet its goal of obtaining 20% of its energy from renewable resources. Development of the partnership began in 1998, when Chicago received a grant from the US Department of Energy at the same time it was concluding its existing franchise

agreement with the energy company, Exelon. During negotiations for the new energy agreement, Exelon committed US\$12 million to purchasing and installing PV power systems.

Two of the partnership's feature installations are the Exelon Pavilions in Chicago's award-winning Millennium Park, which opened in 2004. In addition to serving as an educational resource while promoting solar power, the four PV pavilions provide enough solar electricity to power 14 energy-efficient houses in Chicago annually. Small-scale installations such as this are not intended to be one-time-only initiatives. Rather, the purpose is to continue to replicate PV projects throughout the city.

The partnership's efforts have yielded close to 2MW of solar installations in the Chicago metropolitan area—many of which are located on buildings—which helps to preserve open space. These efforts have helped Chicago to reduce CO₂ emissions by 1,361 tonnes per annum, the equivalent of taking 275 cars off the road, as well as to reduce SO₂ emissions by between 10 and 20 tonnes per annum.

“WE ARE COMMITTED TO MAKING CHICAGO THE MOST ENVIRONMENTALLY FRIENDLY CITY IN THE COUNTRY. THIS MEANS NOT ONLY CREATING GREEN SPACES LIKE MILLENNIUM PARK, BUT ALSO UTILISING TECHNOLOGY THAT IS GOOD FOR BOTH THE ENVIRONMENT AND THE OVERALL QUALITY OF LIFE OF OUR RESIDENTS”.
MAYOR RICHARD M. DALEY



Beyond providing environmental benefits, solar power can serve as an effective energy management tool to help companies like Exelon address peak electricity demand problems. During the hottest days of the summer, energy demand skyrockets due to the widespread use of air conditioning which, in turn, increases the risk of blackouts. In Chicago, solar power proved a useful tool for improving the reliability of the power grid during the 2005 heat wave.

In addition to the current installed PV capacity, Chicago has commitments to install an additional 150 solar energy systems and private partners are continuing to provide funds to develop clean energy. These initiatives are moving forward one step at a time. By leveraging private funding, Chicago has made bold first steps to help foster the growth in clean energy, bringing the city closer to meeting its sustainability goals.



03: FREE CITY BIKE PROGRAMME

PARTNERS: City Bike Foundation of Copenhagen and the City of Copenhagen

PROJECT SECTOR: Alternative transport

LOCATION: Old medieval city centre (Copenhagen, Denmark)

TIMEFRAME: Since May 1995

GOAL: To reduce vehicular pollution, traffic congestion, and bicycle theft, and provide an efficient means of transportation within Copenhagen

PRIMARY BENEFITS:

- Reduced carbon dioxide emissions by reducing vehicle use.
- Company logos on bikes provide advertising for sponsors throughout Copenhagen city centre.
- Decreased maintenance costs for city centre streets and reduced demand for downtown parking spaces.

PROJECT DESCRIPTION:

During the 1980s, Copenhagen residents Morten Sadolin and Ole Wessung had their bicycles stolen. This experience motivated them to address increasing bicycle theft in the city. They developed a business plan for providing free bikes for general use around the city. Along with Niels Christiansen, a friend and bicycle shop owner, they founded what is now known as the City Bike Foundation of Copenhagen.

In 1995, the foundation gained public and private support to place 1,200 bicycles in Copenhagen's city centre. The city installed bicycle racks around the city centre for the foundation's bicycles, which are specifically designed to be durable and weather resistant. In turn, a host of private companies supported the programme by sponsoring bicycles. The logos of sponsoring companies are placed on the solid core wheels and on a horizontal panel along the bicycle's support rod.

To use a bike, one deposits a DKK20 coin (US\$3.25) into one of the 110 City Bike racks. The coin is refunded when the bike is returned to one of the other racks around the city centre. The cost for a company to serve as a City Bike sponsor is proportional to the number of bikes being sponsored. To have a logo on 50 bikes, which is the minimum number required for sponsorship, the cost to a sponsor is DKK1,500 (US\$256). The sponsor price covers the life of the bicycle, while the foundation covers maintenance costs and replacement in the event of theft of the bicycle.

If City Bikes break down, they are either fixed on the spot or, for more complicated repairs, are picked up by the Copenhagen Road Department and taken to a local penitentiary where they are repaired by inmates. Prisoners are reportedly supportive of the programme and take pride in the work. Bycykelservice, a department in the Copenhagen rehabilitation agency, also helps to maintain the bikes. Bycykelservice trains around 30 rehabilitees through a six-month programme.

The Free City Bike Programme now includes 2,000 bicycles and more than 40 companies have sponsored bicycles in the past 10 years. Statistics from the Danish Statistics and Insurance Information Organisation support the idea that the presence of City Bikes has lowered bicycle theft in Copenhagen. The programme has also decreased the need for vehicle parking and helps make the city a safer place to work and live. Because there are more people riding bicycles to commute to work every day, fewer cars circulate in the city centre. In acknowledgement of these positive benefits, the Danish Design Centre awarded the Free City Bike Programme the 'Danish Design Prize' in 1999.

The Free City Bike Programme is an innovative approach to promoting the use of alternative transport. As the programme has grown over the years, it has enhanced mobility in the city centre by motivating bicycle use while reducing the cost of road maintenance and the need for downtown parking. This, in turn, has translated to a reduction of vehicle use and, therefore, a reduction in GHG emissions for Copenhagen. Similar programmes could be replicated and implemented in any city centre with a relatively small budget. Helsinki has already established its own programme and other cities are set to follow.

04: CLIMATECAM®

PARTNERS: City of Newcastle, Energy Australia, Hunter Water, NSW Roads and Traffic Authority, NBN Television

PROJECT SECTOR: Communicating climate change to the public

LOCATION: City of Newcastle (Australia)

TIMEFRAME: Since 2000

GOAL: To establish ClimateCam®, a city-wide GHG speedometer which allows the community to see that their individual actions make a collective difference



ESTABLISHED

PRIMARY BENEFITS:

- NBN Television sponsorship of AU\$1 million (US\$795,200) per annum will provide ClimateCam® updates and feedback to over 750,000 households and businesses on a nightly basis; NBN is helping to broadcast a consistent message to help individuals make more confident decisions.
- Establishment of a nonprofit business and community environmental enterprise that supports the creation and implementation of regional climate change initiatives which will stimulate demand for products and services that assist consumers to reduce GHG emissions.
- Establishment of an international testing ground for climate solutions that includes hourly measurement and reporting of city electricity consumption across 15 geographic zones.

PROJECT DESCRIPTION:

ClimateCam® allows the City of Newcastle to demonstrate to its community that through their collective actions, the city is on track to achieve its 2008 GHG mitigation target, which is to stabilise the city's emissions at 2000 year levels—a reduction of 300,000 tonnes of CO₂e per annum.

The City of Newcastle, Australia is located 150 kilometres north of Sydney. Since 1995, the city has reduced its greenhouse gas emissions by 23% and returned community

GHG emissions back to 2001 levels. Notably, the majority of this mitigation has been achieved through improvements in energy efficiency and behavioural change.

In 2000, the Newcastle City Council held its first Energy Town Meeting. The 900 attendees asked for three things: 1) assistance to reduce GHG emissions from their homes and businesses; 2) a detailed greenhouse action plan for the city; and 3) a feedback mechanism so that they could understand if their individual actions were making a collective difference. Items one and two have been addressed through council-led initiatives and the development of a greenhouse gas action plan.

In response to the request for a feedback mechanism, the council developed ClimateCam®, an accurate web-based measuring and reporting tool that tracks GHG emissions for the community of Newcastle. ClimateCam® has been gathering city-wide electricity, gas, waste, and transport GHG emissions data for the past six years.

To strengthen ClimateCam® the City of Newcastle developed a public-private partnership with Energy Australia, Hunter Water, New South Wales Roads and Traffic Authority, and the local television broadcaster, NBN Television.

In April 2007, this partnership enabled the City of Newcastle to launch its electronic ClimateCam® billboard. The billboard is located in the city's town square and provides hourly updates of actual electricity consumption from the city's 15 zone substations. The billboard has one hand that shows hourly consumption and a second that shows progress against city targets.

The ClimateCam® website shows electricity consumption from each substation, allowing the community to compare consumption against the 15 zones. Competition is being stimulated between zones to encourage the uptake of low carbon products and services. Results are being reported nightly on the NBN Television's News Hour.

“CLIMATECAM IS THE WORLD'S FIRST GREENHOUSE GAS SPEEDOMETER. WITHOUT CLIMATECAM IT WOULD BE LIKE TRYING TO STOP PEOPLE FROM SPEEDING IN A WORLD WHERE CARS DON'T HAVE SPEEDOMETERS”.
CR JOHN TATE, LORD MAYOR OF NEWCASTLE



05: ENERGY-EFFICIENT STREET LIGHTING IN INDIA

PARTNERS: Renewable Energy & Energy Efficiency Partnership, Econoler International of Canada and State of Madhya Pradesh

PROJECT SECTOR: Energy efficiency and conservation

LOCATION: Cities of Bhopal, Gwalior, and Jabalpur (Madhya Pradesh, India)

TIMEFRAME: Since May 2005

GOAL: To reduce energy consumption from street lighting by 30-40% and reduce energy consumption for three cities in the State of Madhya Pradesh

PRIMARY BENEFITS:

- Implementation of demand-side management technologies has reduced the peak load of the street lighting network from approximately 35MW to 24MW, with a total energy savings of 43.2 GWh.
- Cities benefit from reduced electricity expenses.
- Energy efficiency measures offer promising means of reducing the use of fossil fuels.

PROJECT DESCRIPTION:

Energy efficiency improvements made at a local level can play a significant role in helping to reduce the use of fossil fuels for power generation and address climate change. Approximately 5% of electricity consumption in India is from municipal street lighting and in some municipalities the electricity consumed is not metered. Further, since utilities are required to provide electricity for street lighting at an inexpensive rate, there is little incentive to invest in improving inefficient systems.

In May 2005, the Renewable Energy & Energy Efficiency Partnership (REEEP) joined efforts with Econoler International of Canada (Econoler) to establish a project in the state of Madhya Pradesh focused on developing a sustainable financing mechanism to support energy efficiency improvements in the street lighting system in the cities of Bhopal, Gwalior, and Jabalpur. REEEP,

a global public-private partnership conceived at the Johannesburg World Summit on Sustainable Development in 2002, works to facilitate policy and regulatory initiatives that promote clean energy as well as provide direct financing for energy projects. Econoler is one of the world's leading ESCOs and a pioneer in the field of energy efficiency. This partnership, which also includes the Madhya Pradesh State Electricity Board (MPSEB), Central Discom (its subsidiary), and other local municipal corporations, aims to reduce energy consumption from street lighting in the order of 30-40% in these three cities.

To achieve the energy savings targets established, Econoler developed two comprehensive demand-side management technologies for street lighting: an energy-efficient fluorescent light tube and a load monitoring system that offers a range of supporting energy-efficient functions—voltage adjustment, power factor correlation, automatic on/off switches for the system, and an automatic 10% reduction of the lighting level during low circulation time. The implementation of these technologies has reduced the peak load of the street lighting network from approximately 35MW to 24MW and produced energy savings of 43.2GWh.

The financing of this project—which is based on a ‘shared savings’ structure—has played a unique role in its success and offers a promising model for other municipalities interested in implementing energy efficiency measures, but which do not have the up-front capital to finance such projects. The partnership contract was structured so that REEEP supported the consulting fees of

Econoler, and Econoler recoups 80% of the efficiency savings over a maximum payback period of 5 years, while the cities keep 20% of the savings. After the payback period ends, the cities will continue to realize energy savings as a result of the implemented technology.

The partners in this project hope to continue building upon the success achieved in Madhya Pradesh by replicating the energy efficiency financing model employed by ESCOs in other cities across India and around the world. In particular, REEEP believes that the key to obtaining the needed investment is to bundle efficiency projects together—a strategy which helps to provide more attractive investment portfolios, with profits shared among investors. With the support of public-private partnerships, this model for increasing energy efficiency in cities throughout the world has the potential to make very important and timely sustainability improvements.

06: SUSTAINABLE TRANSPORTATION IN MEXICO CITY

Partners: The World Resources Institute Center for Sustainable Transport (EMBARQ) and Mexico City

Project Sector: Transportation

Location: Mexico City Metropolitan Area (Mexico City, Mexico)

Timeframe: Since 2002

Goal: To reduce traffic congestion, traffic accidents, and air pollution, and improve the mobility of residents

PRIMARY BENEFITS:

- Metrobus transports 6,000 passengers per hour in each direction along Insurgentes Avenue, one of Mexico City's busiest thoroughfares, for less than one-tenth of the cost of an equivalent light-rail metro system and in one-half the time of a conventional bus.
- Metrobus is estimated to reduce 35,000 tonnes of carbon dioxide emissions per annum, in addition to reducing traffic congestion and air pollution.
- Retrofit of diesel buses with ultra-low-sulphur diesel and catalytic converters has reduced particulate matter emissions by 90%.

PROJECT DESCRIPTION:

With 18 million residents living in the Mexico City Metropolitan Area, over 4 million private vehicles and about 100,000 taxis, the city ranks among the top five in the world for congestion and pollution problems. In addition, traffic accidents are estimated to be responsible for at least 2,500 deaths in Mexico City each year and are the leading cause of death for children between the ages of 5 and 14.

These pressing issues prompted EMBARQ, a project of the U.S.-based World Resources Institute (WRI), to establish a formal public-private partnership with the Mexico City government to implement new sustainable transportation solutions for the city. In May 2002, this partnership was solidified through the creation of a new advisory body to the city: the Centre for Sustainable Transport (CTS in Spanish).

The four primary projects of EMBARQ and CTS in Mexico City have focused on: 1) implementing Metrobus, the Bus Rapid Transit (BRT) system; 2) retrofitting the existing heavy-diesel bus fleet with catalytic converters and ultra-low-sulphur diesel to dramatically reduce levels of emissions; 3) testing engine and fuel combinations for new high-capacity, low-emission buses for future purchase by the city; and 4) promoting walking and cycling as a form of sustainable transportation.

In June 2005, Metrobus, Mexico City's BRT system, began operating along a 19.6 kilometre corridor of Insurgentes Avenue, one of the city's longest and busiest thoroughfares. The system is equipped with 80 new articulated buses that, on weekdays, can transport up to 250,000 passengers who are picked up and dropped off at 36 different stations along the route. The cost of a trip, 3.5 Pesos (US\$0.33), covers the operating and maintenance costs of the system—including finance payments on the buses—making it financially as well as environmentally sustainable. In addition, Mexico City found that designing and implementing a BRT system was politically feasible, as the initial phase of the system was accomplished within three years. The total cost of the BRT project was approximately 110 million Pesos (US\$10 million) shared by EMBARQ and the Mexico City government, with financial contributions from the World Bank's Global Environment Facility and the Hewlett Foundation. These planning costs leveraged capital investments of US\$47 million made for infrastructure developments and the purchase of buses.



EMBARQ was established in 2002 at the World Resources Institute, a nonprofit environmental think tank focused on developing practical solutions to the world's environmental problems, through a US\$7.5 million commitment by the Shell Foundation. EMBARQ's mission is to utilise the best available technical and financial assistance at a global level to work with city governments at a local level to implement sustainable transportation solutions.

While Mexico City is the site of EMBARQ's first public-private partnership, EMBARQ has since initiated similar sustainable transportation partnerships in other cities within Mexico, Brazil, Vietnam, Peru, India, Turkey, and China.

As cities around the world continue to rapidly expand, the need for efficient and environmentally sustainable transportation systems will only grow in importance. The achievements of CTS, EMBARQ, and Mexico City's government illustrate the part that a public-private partnership can play in effectively shaping sustainable transportation solutions in the world's major cities.



07: GENERATION E BUILDING CONCEPT

PARTNERS: BASF Group and LOGIREP

PROJECT SECTOR: Energy efficiency and conservation

LOCATION: Fontenay-sous-Bois (Paris, France)

TIMEFRAME: Since 2003

GOAL: To renovate a low-income housing building to reduce primary energy consumption and improve the quality of life for residents

PRIMARY BENEFITS:

- Primary energy consumption reduced from 400kWh to 50kWh per square metre per annum.
- BASF displays new building products and develops future market expertise.
- Improved quality of living for residents.

PROJECT DESCRIPTION:

The partnership between BASF Group, a leading chemical manufacturer, and LOGIREP (Logement et Gestion Immobilière pour la Région Parisienne), which operates 50,000 social housing units in France, is focused on the renovation of a building with eight low-income apartments in Fontenay-sous-Bois, a suburb of Paris, for families with household incomes of less than €17,000 (US\$21,567) per annum. The building is owned by LOGIREP while BASF is providing the technical knowledge and products for the renovation. Upon completion, the project will showcase how primary energy consumption in buildings can be reduced from 400kWh to 50kWh per square metre per annum. This will be achieved for a total project cost of approximately €2 million (US\$2,537,401).

The Generation E Building Concept involves the use of raw materials and finished products from BASF and its partners to decrease primary energy consumption. The E represents Environment, Economy, Energy, and Equilibrium. The project includes the use of

energy-efficient construction products which BASF acquires through its own partnerships with other private firms, including: Siemens, Roth, Lafarge, BPB Placo, Isobox, Forbo Groupe Tollens, and Knauf. The project's benefits are being monitored by the Centre Scientifique et Technique du Bâtiment (Scientific and Technical Centre for Buildings), a quasi-governmental institution, for impact on both overall energy savings and living conditions for housing residents.

While the size of this project is relatively small, its impact extends beyond the eight renovated apartments. The project is part of a wider BASF initiative to develop a mass market for raw materials and finished products that enable decreases in primary energy consumption and, as an indirect result, decreases in carbon dioxide emissions. In an effort to expand this market, BASF has developed model housing in Germany, Italy, the United States, and South Korea. The project in Fontenay-sous-Bois allows BASF to showcase this type of housing in France, developing the French market for its various products.

An independent study of the replication of the Generation E Building Concept, conducted by the Passive House Institute Darmstadt, concluded that cost-effective installation of only six inches of roof insulation, six inches of wall insulation, and three inches of perimeter and slab floor insulation, using BASF products, could lead to a reduction in energy consumption and CO₂ emissions of roughly 70% in similar buildings in cities throughout Europe. In June 2006, BASF France was awarded a prize for innovation in chemistry for sustainable development by François Loos, the French Minister for Industry.

This public-private partnership helps BASF to strengthen its competitiveness through the development of a new growth market and ensures the employment of workers at BASF facilities. The partnership also benefits Fontenay-sous-Bois by renovating eight low-income housing apartments while reducing public expenditures for primary energy spending without any additional public subsidies. Ultimately, the French public sector is benefiting from both a decrease in energy costs for low-income housing and better living conditions for residents as a result of the renovations.

“WE WOULD LIKE TO SHOW...THAT SIMPLE, COST EFFICIENT DEVICES CAN LEAD TO MORE COMFORT, LESS CONSUMPTION AND SAVINGS IN ENERGY COSTS. FURTHERMORE THEY CAN HELP REDUCE EMISSIONS OF CARBON DIOXIDE”. DR. JOHN FELDMANN, MEMBER OF THE BOARD OF EXECUTIVE DIRECTORS, BASF GROUP

08: LANDFILL GAS-TO-ELECTRICITY

PARTNERS: Integrated Gas Recovery Services and the Regional Municipality of Peel

PROJECT SECTOR: Landfill gas utilisation

LOCATION: Former Britannia Sanitary Landfill Site (Peel, Mississauga, Ontario, Canada)

TIMEFRAME: 2005-2025

GOAL: To utilise methane gas emissions from the former Britannia Sanitary Landfill Site as a fuel to generate clean electricity for the Region of Peel over the next 20 years

PRIMARY BENEFITS:

- Avoids emission of over 5 million tonnes of CO₂e over the next 20 years (over 250,000 tonnes of CO₂e per annum).
- Produces 5MW of clean energy, which is purchased by the Region of Peel (Region) for a fixed price, displacing power generated from conventional fossil-fuel sources.
- 20-year Power Purchase Agreement (PPA) allows Integrated Gas Recovery Services (IGRS) to recoup financing costs invested in the project.

PROJECT DESCRIPTION:

Municipal solid waste landfills are one of the largest sources of methane gas emissions around the world. Methane, which is 21 times more potent than CO₂ as a GHG, has the potential to be used productively as a fuel source to generate electricity, mitigate climate change, reduce air pollution, and create other economic and environmental benefits. This prompted the Region, which represents three municipalities directly west of Toronto, to construct a landfill gas utilisation plant to generate electricity from the methane emitted from its Britannia Sanitary Landfill Site.

The Britannia Sanitary Landfill Site was established in 1980 and collected more than 10 million tonnes of waste from the Region before it was closed in 2002. In 1999, a 27-hole championship golf course was planned for construction on top of the landfill site. While the Region had been flaring

approximately one quarter of the methane gas collected from the landfill to limit its impact on climate change and reduce some of the odours, government officials were interested in the potential for a landfill gas power plant to enable the Region to more productively use the methane that was being emitted.

The Region specifically sought to attract the best private sector expertise to help it address this challenge and share some of the financial burden that construction of a landfill gas utilisation project would entail. In 2000, the Region solicited proposals from several private companies and selected Ontario-based IGRS as its official project partner. IGRS agreed to provide the up-front financing costs of CAN\$10 million (US\$8.9 million) to construct the plant, while the Region agreed to sign a 20-year PPA to ensure that the capital investment for IGRS would be worthwhile. Thus, the partnership between the Region and IGRS was a crucial element in guaranteeing the success of the project.

“THE GOOD RELATIONSHIP AND TRUST THAT DEVELOPED ON BOTH SIDES WAS A HUGE PART OF WHY THIS IS SUCCESSFUL. IT WAS THE BEST OF THE PUBLIC AND PRIVATE SECTORS”.
MIKE WATT, VICE PRESIDENT OF IGRS



The landfill gas utilisation plant, which opened in September 2005, is located almost one kilometre from the golf-course/landfill site. Forty-five extraction wells have been strategically placed alongside the golf course to draw approximately one cubic metre per second of methane gas from below the surface, which is then piped to the nearby plant. The Region's Lakeview Wastewater Treatment Facility is the largest consumer of this electricity and purchases 4-5MW to power its operations.

The landfill gas utilisation plant has provided the Region with a cost-effective and environmentally sustainable way of productively using methane gas emissions and the design of the project has not interrupted the operation of the championship golf course. The Region and IGRS were awarded the Silver Award for Infrastructure by the Canadian Council for Public-Private Partnerships at its 2005 Awards for Innovation and Excellence.



09: LONDON CLIMATE CHANGE AGENCY

PARTNERS: The Greater London Authority, BP, Lafarge, Legal & General, HSBC, Sir Robert McAlpine, Johnson Matthey, and the Corporation of London

PROJECT SECTOR: Dedicated climate change agencies

LOCATION: London (United Kingdom)

TIMEFRAME: 2005-2025

GOAL: To establish a climate change agency that focuses on reducing emissions from energy, transport and waste, and that helps to achieve London's target of reducing emissions by 60% relative to 1990 levels by 2025

PRIMARY BENEFITS:

- To assist London to meet its 60% reduction in GHG emissions, 7.2MT carbon dioxide equivalent per annum, by 2025.
- To use the flagship projects to demonstrate what emission reduction levels are possible in London.
- To use the London ESCO partnership to enable changes to London's energy supply.

PROJECT DESCRIPTION:

In June 2005, with the financial support of a range of business partners, the Mayor of London, Ken Livingstone, launched the London Climate Change Agency (LCCA). In March 2006, the LCCA was established as a municipal company owned by the London Development Agency and chaired by the Mayor of London. Since its creation, the LCCA has implemented a range of building initiatives, a number of flagship projects, and established the London ESCO.

Two building initiatives are of note—the Green Homes service and the Building Better Partnership. The Green Homes service, developed in partnership with the Design Council, is a domestic energy service targeted at able-to-pay owner/occupiers. This programme aims to motivate them to invest in improving the energy performance of their homes as well as implementing micro-CHP and renewables.

The Building Better Partnership is an initiative with major commercial building owners and occupiers. This partnership requires its members to make a commitment to emissions reductions and offers them a high-level forum for leaders aimed at learning and sharing success, support, and follow-through with middle management, facility management, and energy management employees and provides awards to motivate and reward action.

The LCCA's flagship projects aim to 'show by doing' and to date have included: London Transport Museum Photovoltaic Project; Palestra Photovoltaic and Building Integrated Wind Turbines Project; and City Hall Photovoltaic Roof and Solar Shading. Each project expands the use of renewable energy, reduces carbon dioxide emissions, and benefits from funding awarded under the national government's Major Photovoltaic Demonstration Programme (replaced by the Low Carbon Buildings Programme, as of April 1st 2006).

The following table summarises these three projects:

	RENEWABLE ENERGY GENERATED (kWh)	CO ₂ EMISSION REDUCTION OVER PROJECT LIFETIME (tonnes)	PROJECT FINANCIAL AWARD (£, UK)	TYPES OF RENEWABLE ENERGY
LONDON TRANSPORT MUSEUM	2,136,000	2,075	120,327	PHOTOVOLTAICS
PALESTRA	3,397,000	3,300	155,276	PHOTOVOLTAICS & WIND
CITY HALL	3,100,000	3,012	270,757	PHOTOVOLTAICS

The establishment of the London ESCO, a public/private joint venture, is a key part of the LCCA strategy. The London ESCO will deliver low-carbon decentralised energy solutions in new and existing infrastructure. Initially, the focus will be on cogeneration (combined heat and power), trigeneration (combined heat, power, and heat-fired absorption cooling), and integrated renewable energy in local private wire district energy systems and networks. It will also eventually include special projects such as fuel cells, environmentally friendly waste-to-energy technologies, and renewable gases and biomass fuels.

In March 2006, Mayor Livingstone announced that the LCCA had selected EDF Energy plc as the preferred bidder to set up a joint venture ESCO. EDF Energy is one of the largest energy companies in the United Kingdom and the owner of London Energy and London's public electricity network.

The London ESCO will design, finance, build, own, and operate local decentralised energy systems for both new and existing developments. It was incorporated in September 2006 as a private limited company with shareholdings jointly owned by the LCCA (with a 19% share) and EDF Energy. This partnership is expected to leverage £80 million (US\$108 million) in funds between 2006 and 2025, which will enable accelerated rollout of decentralised energy solutions in London.

“CLIMATE CHANGE HAS NOW BECOME A PROBLEM THE WORLD CANNOT IGNORE. LARGE, MAJOR-ENERGY CONSUMING CITIES LIKE LONDON HAVE BOTH A RESPONSIBILITY TO REDUCE THEIR CARBON EMISSIONS, AND, BY VIRTUE OF A HIGH DENSITY OF POPULATION, THE GREATEST OPPORTUNITY TO TAKE ADVANTAGE OF NEW ENERGY SYSTEMS AND RENEWABLE ENERGY”.
KEN LIVINGSTONE, MAYOR OF LONDON



10: DARLING NATIONAL WIND FARM PROJECT

PARTNERS: Darling Independent Power Producer and the City of Cape Town

PROJECT SECTOR: Wind power

LOCATION: Darling Windhoek Farm (West Cape, South Africa)

TIMEFRAME: 2007-2027

GOAL: To produce 13MW of wind power that will supply Cape Town residents with clean electricity

PRIMARY BENEFITS:

- Will reduce carbon dioxide emissions by 745,312 tonnes over 20 years.
- Will prevent the release of 7,950 tonnes of sulphur dioxide, 7,228 tonnes of nitric oxide, 3,125 tonnes of particulates, 49,668 tonnes of slag and fly ash, and result in the saving of 250,000 tonnes of coal and 150 million litres of water.
- Will create 15-19 jobs per MW of power produced during the construction phase, with an additional 30 jobs created indirectly from related activities.

PROJECT DESCRIPTION:

Due to the abundance of coal, a low-cost fossil fuel resource used in most of South Africa's power stations, Cape Town residents buy electricity at a bargain price. Despite this availability of cheap energy, in November 2003, a White Paper on Renewable Energy from the Department of Minerals and Energy set a target of 10,000GWh, or 4% of total electricity consumption, to be produced from renewable energy sources by 2013. This target is a strong measure of South Africa's ongoing commitment to address the issue of climate change, which formally began when the country ratified the Kyoto Protocol in 1997. It is also indicative of South Africa's desire to combat air pollution and health problems related to the combustion of coal.

Hermann Oelsner, the CEO of the Darling National Wind Farm, has had an interest in wind energy since the early 1990s when he became aware of the great potential for this resource in the Cape Town region and made a personal commitment to provide the inhabitants of the area with clean energy. The town of Darling, located 70 kilometres north of Cape Town, is an ideal site for the installation of wind turbines. When completed, the Darling National Wind Farm will be the first commercial renewable energy power-generating facility that feeds into the South African national power network.

Initial wind resource management and technical studies for the Darling National Wind Farm were conducted as early as 1997 and an environmental impact assessment was carried out between 2001 and 2002. The project will be conducted in three phases and will have an overall life of 20 years. In phase one, which is expected to be operational by mid-2007, four 1.3MW turbines will be installed for a total generating capacity of 5.2MW. In phase two, six 1.3MW turbines will be added to supply an additional 7.8MW of generating capacity. Eventually, another 10 wind turbines may be added on a neighbouring farm.

Darling Independent Power Producer (DarIIPP), which was founded by the Oelsner Group, together with the South African government's Central Energy Fund and the Darling community, contributed one-third of the 70 million Rand (US\$8.9 million) needed for the first phase of the installation. The remaining two-thirds

are equally covered by donor funding from the Danish government's development agency (DANIDA) and a loan from the Development Bank of South Africa.

Overcoming the initial lack of financing for the project was complicated due to the difficulties faced by DarIIPP in finding a partner who would commit to buying the power produced by the wind farm. Finally, in August 2006, the City of Cape Town signed a 20-year PPA to buy the power generated by the first phase of the wind farm, enabling the project to move forward. The city has agreed to pay a premium per kWh of clean energy, which will be sold to Cape Town residents through a voluntary market for green certificates. The city has assumed an important degree of financial risk in this partnership as it may not be able to sell all the green power it will contractually be bound to purchase. However, the agreement will help Cape Town meet its self-imposed target to cover 10% of its energy consumption with renewable resources by 2020.

The importance of this project as a landmark led South Africa's Department of Minerals and Energy to declare it a national demonstration project in 2000 in the framework of preparations for the 2002 World Summit in Sustainable Development in Johannesburg. In August 2006, Stefan Gsänger, the World Wind Energy Association Secretary General, said, "This first IPP wind farm in Africa [is] a milestone for the achievement of a sustainable energy supply in South Africa and on the whole of the African continent".

11: ROOSEVELT ISLAND TIDAL ENERGY

PARTNERS: Verdant Power and the New York State Energy Research and Development Authority

PROJECT SECTOR: Tidal power

LOCATION: East River (New York, New York, USA)

TIMEFRAME: Commercial operation estimated to commence in 2009

GOAL: To produce 10MW of commercialised clean energy from an underwater turbine field

PRIMARY BENEFITS:

- Will displace the equivalent consumption of over 18,000 tonnes of coal, 68,000 barrels of oil, or more than 12 million cubic metres of natural gas per annum.
- Expected to eliminate approximately 150 tonnes of SO_x, 90 tonnes of NO_x, and nearly 30,000 tonnes of carbon dioxide annually, roughly equivalent to taking 6,000 cars off the road.
- Successful implementation will help establish the necessary credentials to catalyze expansion of the tidal power industry, which could directly result in the creation of 800 manufacturing and related jobs in five years.

PROJECT DESCRIPTION:

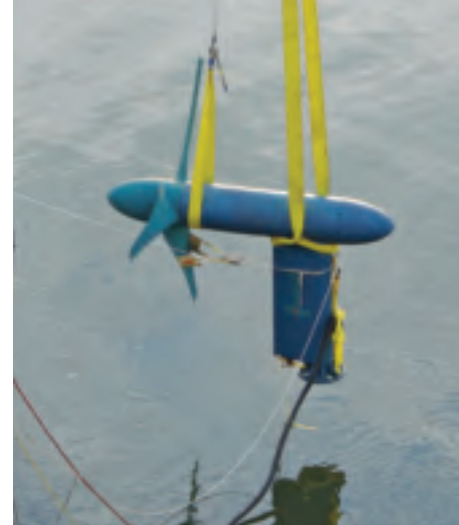
The immediate goal of the Roosevelt Island Tidal Energy (RITE) project is to produce 10MW of commercialized clean energy (enough to power as many as 8,000 households) from an underwater turbine field in the East River. More broadly, the goal is to showcase tidal power and its potential for replication at hundreds of other sites in the US and around the world. The RITE project is a rare example of clean energy being produced in a big city and pursued on its business merits alone. Verdant Power LLC, which is based in New York City, develops commercial hydropower systems. Kinetic hydropower systems, like the ones used in this project, deliver electricity from free-flowing water currents found in tides, rivers, and man-made channels. In the East River, the blunt rotor blades, spanning more than 5.5 yards, will turn at a slow 32 revolutions per minute, generating up to 35kW of electricity per turbine.

Each turbine will operate about 2.5 yards below the river surface, much like underwater windmills, rotating to accommodate shifting tidal currents. In the East River, water moves at up to 10 kilometres per hour, making it one of the fastest bodies of water on the East Coast. Situated away from commercial river traffic, the 1.5 kilometre long, 82 metre wide turbine field will generate power for 16 hours per day.

To comply with regulatory requirements, Verdant must demonstrate that its turbines will not harm fish in the river, which it will do through an 18-month, six-turbine study. During this operational testing phase, power from the turbines will be provided free of charge to consumers on Roosevelt Island, including a supermarket and a parking garage. Following successful completion of the study and issuance of a Federal Energy Regulatory Commission Licence, an additional 36 turbines will be deployed.

The New York State Energy Research & Development Authority (NYSERDA) has supported the RITE project with US\$2.5 million in funding over the past three years through five separate awards of US\$500,000. Investment to date totals roughly US\$7 million. Verdant estimates total costs for the project at US\$20 million.

Tidal power lags behind its renewable energy peers in large part because it was not included on the list of technologies eligible for the US federal renewable energy production tax credit, a 1978 subsidy widely credited with sparking interest in wind and solar power. An industry analysis firm, New Energy Finance, estimates that the tax credit covers more



than 50% of the costs of a typical wind power project. Furthermore, tidal power lacks the economies of scale that wind power enjoys; large numbers of tidal turbines would be required to produce the same amount of power as an average wind turbine. On the other hand, water is much denser than air—832 times denser—and tides are more predictable.

Verdant anticipates receiving approval from the Federal Energy Regulatory Commission for full commercialisation by 2009, at which point it would build out the turbine field to more than 300 turbines. Verdant's intermediate-term goal is to produce power at a cost of US\$0.07-\$0.08 per kWh.

The RITE project is not only an example of commercialized green power; tidal power has potential applications as a sustainable energy solution in developing economies. In North America alone, Verdant projects that there are at least 120 tidal locations that are suitable for deploying its technology, as well as 75,000 existing dams and 9,000 power plants that could be employed to generate electricity from flowing water leaving the facilities. Verdant says it has discussed the applicability of tidal power to future development projects with the World Bank. Capital costs are low and tidal power is both flexible and scalable; a community can install one turbine or 1,000.

CONCLUSION

While the desire to address climate change is an important motivating factor behind all of the partnership examples illustrated in this publication, it is only one of the numerous benefits that local governments and private businesses can achieve through partnership. Many projects also produce improvements in other areas of environmental concern, allow governments and businesses to save money by reducing energy expenditures, help utilities to better manage peak electricity demand, increase employment in growth sectors, and provide a higher quality of life for citizens. Such benefits are major motivating factors behind these initiatives and are influential in securing the support of residents in the communities where projects are implemented.

Mitigating climate change will require large-scale, policy-based efforts at the international and national level. However, city-led initiatives play an important role in the effort to address climate change as well. The examples in this publication are only a few among many local initiatives—some of which have already been established and some of which are in the process of being developed—that are reducing carbon dioxide emissions now and building momentum and popular support for larger-scale efforts in the future. It is exciting to imagine the effect that these initiatives could have if they were replicated 100 or 1,000 times throughout the world. Given the success of these 11 partnerships, as well as the powerful trends motivating more city governments and private businesses to create such partnerships, it is possible to foresee such results.

As city governments and private businesses increasingly consider and implement strategies to address climate change, we hope that many will look to the innovative opportunities and enhanced results that public-private partnerships make possible and seek out partnerships of their own.

Public-Private Partnership Benefits

- Save money for governments and businesses by reducing energy costs
- Improve the health of citizens with cleaner air
- Help utilities address peak electricity demand
- Increase employment in the clean technology sector
- Create a better quality of life for citizens
- Combat climate change by reducing GHG emissions

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GLOSSARY

CO₂

Carbon dioxide

CO₂e

Carbon dioxide equivalent

CHP

Combined heat and power

ESCO

Energy services company

GHG

Greenhouse gases

GWh

Gigawatt hour

KW

Kilowatt

kWh

Kilowatt hour

MT

Megaton

MW

Megawatt

Mwh

Megawatt hour

NO_x

Nitrogen oxides

PPA

Power purchase agreement

PV

Photovoltaic

SO₂

Sulphur dioxide

SO_x

Sulphur dioxide and other sulphur oxides

EQUIVALENTS

The average passenger vehicle emits 5.5 tonnes of CO₂ annually.

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