ENERGY VISION

EV

SPECIAL REPORT

THE CITY OF SURREY BC

Setting The Pace for Sustainable Transportation

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Energy Vision is a New York-based, national, non-profit organization that analyzes and promotes ways to make a swift transition in the U.S. and worldwide to the pollution-free, renewable energy sources and the clean, petroleum-free transportation fuels that will be needed for a sustainable future.

EV's program, launched in 2006, has initially focused on ways to wean the transportation sector from its virtually total reliance on petroleum-derived fuels- especially on ways to displace the use of diesel fuel in heavy duty buses and trucks, as these are among the heaviest fuel consumers as well as being major polluters of urban air and generators of greenhouse gases. Energy Vision's research has found that these fleets have the option today to leave their dependence on oil behind. They can shift to conventional natural gas - an abundant resource across North America - or, most recently, to the renewable form of natural gas, called "RNG" or "biomethane," which is made from waste.

Energy Vision's research is published in reports, articles, its quarterly newsletter, EV News, and on its website. EV presents its findings at major national and international conferences, conducts workshops for municipal and waste management industry officials, and actively collaborates with public and private sector leaders in promoting change at the local level.

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THE CITY OF SURREY
SETTING THE PACE FOR SUSTAINABLE TRANSPORTATION

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Foreword

We are pleased to offer this new Energy Vision special report on a municipal transportation initiative – one by the City of Surrey in British Columbia – that is breaking new ground in moving this city toward a sustainable future.

By implementing several steps beginning this October, Surrey will have a refuse and recycling fleet by 2014 that is powered, not by diesel fuel, but by a renewable form of natural gas made from the city's own wastes. These steps include mandating the use of natural gas trucks in its waste management contract, initiating a carefully planned initiative for collecting separated organics from Surrey residents and businesses, and constructing a bio-fuels plant where the organics will be taken to decompose and release biogases that will be collected and refined into fuel for the refuse fleet.

Energy Vision, a New York-based national environmental non-profit, explores and promotes ways to make a transition in the U.S., Canada, and worldwide from the transportation sector's virtually complete reliance on high carbon petroleum-derived fuels to the cleaner and ultimately sustainable fuels of the future. The ambitious and exciting initiative by the City of Surrey is the first we have seen in the U.S. or Canada, in which municipal officials have assumed a leadership role in designing and orchestrating this type of closed loop system. By 2014, while bringing cleaner air to Surrey's residents, the City will have slashed its total municipal waste stream by 75% through recycling (23%) and now by separated organics (51%), while use of these organics – some 65,538 tons a year – to make fuel eliminates reliance on oil and brings the greenhouse gases related to its refuse fleet almost to zero. And the City is undertaking this initiative in a way that will also produce economic benefits.

Two of the greatest environmental challenges facing our world are the overwhelming burden of wastes that human communities create and the dangerous loading of our upper atmosphere with climate-changing greenhouse gases. Canada and the U.S. are among the top five generators of municipal solid waste per capita as well as the top 10 generators of greenhouse gases. These two privileged countries have an opportunity and a responsibility to be leaders in living sustainably. If we are to do our part to pass this planet on in a healthy shape to future generations, this is the scale of change needed in our cities and communities.

We hope that municipal officials, companies in the waste, fuels, and transportation industries, transportation planners, policymakers and environmentalists will look carefully at the Surrey waste management plan. It shows clearly that municipal leaders can become powerful game changers in helping shape a sustainable future for their communities, their countries, and our world.

President, Energy Vision

THE CITY OF SURREY
SETTING THE PACE FOR SUSTAINABLE TRANSPORTATION

Joanna D. Underwood and Michael S. Lerner

The City of Surrey, located in British Columbia, Canada, has just emerged on the frontier of environmental sustainability with a bold new plan to green its waste management system. The plan, to be launched in October 2012, involves three components: a shift by the City to use of a waste collection and recycling service provided exclusively by natural gas (rather than diesel) - powered trucks; a program requiring citizens and businesses to separate their organic materials from other wastes for collection, and the construction of a new waste-to-biofuels production facility where these organic wastes will be processed into a renewable form of fuel to power the refuse collection and recycling trucks.

This plan will make a completely closed loop system for waste disposal that is geared to cut costs, to reduce air pollution and greenhouse gas emissions, to convert what was a significant portion of the City's wastes into clean truck fuel, and, hence, to eliminate Surrey's reliance on petroleum-based fuel for its refuse fleet. If Surrey's plan unfolds successfully, it will provide a model for other communities in Canada and in the United States to follow with major energy, environmental and economic benefits.

THE CITY OF SURREY'S GOAL: GOING "GREEN"

Home to 470,000 residents, Surrey is the second largest city in the Province of British Columbia. It is located 35 minutes southeast of Vancouver. "As the City of Surrey develops in its role as a major urban centre, we're shaping growth and positioning ourselves as a premier investment location and leader in sustainability," says Surrey's Mayor Dianne Watts. She stresses the importance for governments of demonstrating leadership by advancing new technologies, reducing energy consumption, and creating healthier communities. Surrey's new green waste disposal plan demonstrates its commitment to these interconnected goals.

Surrey: Hub for clean energy businesses

The City has already made several impressive environmental achievements. In the last two years, it reports a reduction in its greenhouse gases of 18 percent, and it was one of four municipalities in Canada to receive a prestigious E3 Fleet Gold Rating from the Fraser Basin Council, based on high standards of fuel efficiency and sustainability.[1] In recent years, Surrey bought about a dozen fuel-efficient and alternative-technology vehicles including hybrids, hydrogen fuel cell-powered cars, 100 percent electric vehicles, and a compressed natural gas (CNG) truck. Surrey also operates two municipal hydrogen fuelling stations, funded by the Canadian Hydrogen Fuel Cell Association. But Surrey's new waste management plan is trend-setting and is being done on a much larger scale than its previous projects.

SURREY'S SEVEN-YEAR WASTE MANAGEMENT PLAN

The City's three - pronged waste management plan combines elements that are all commercially achievable. A look at how these elements work together makes it clear that they add up to one new model for sustainable municipal planning.

1 Surrey reported increasing its fleet fuel efficiency, averaging a 1.3% efficiency gain per year since 2005.

CHOOSING THE CLEANEST TRUCKS

The first of the three components of Surrey's new seven-year waste management plan involved its choice of the cleanest refuse and recycling trucks available today: trucks powered by conventional and renewable natural gas. The latter, called "RNG" or "biomethane," is made from waste. There are a small number of CNG trucks currently in operation in Canada. Waste Management operates 20 natural gas trucks for commercial use, and other public and private fleets have demonstration trucks. However, Surrey's seven-year waste-disposal contract with BFI Canada is the first by a Canadian municipality to require use of natural gas trucks as a condition of the Request For Proposal (RFP) that it sent out, soliciting bids from companies for the City's waste management contract.

The project is also a first for the large waste collection and recycling company, BFI Canada, headquartered in Toronto, which was awarded the contract, and will purchase 70-75 new trucks powered by CNG or RNG to perform the service for Surrey. "We are very excited about partnering with The City of Surrey in this visionary program," said Grant Hankins, BFI Canada's Vancouver District Manager. The City of Surrey estimates that CNG trucks in general emit 23 percent fewer carbon emission and 90 percent fewer air particulates compared to traditional diesel trucks. Trucks burning RNG are even cleaner. Both CNG and RNG are also free of dependence on petroleum-based diesel fuel, which is higher priced than natural gas and has been subject to volatile pricing swings.

In 2010 Surrey's engineering staff conducted extensive market research to determine the viability of requiring a natural gas-powered fleet to collect its curbside waste. According to Rob Costanzo, Deputy Manager for Operations in the Surrey Engineering Department, "while the City had done its homework which led to the decision to move towards a natural gas-powered fleet, it was a visit to Waste Management's facility in Seattle, Washington, in February 2010, which solidified in our minds that we were on the right track. There we witnessed a large fleet of CNG trucks that were operating without issue. In speaking to the operators and fleet maintenance staff, the feedback received was entirely positive with respect to the viability of this technology compared to the traditional diesel approach."

The results of the staff's analysis confirmed that there was a solid rationale for moving forward with a natural gas fleet from a technological, environmental and economic perspective. Nevertheless, in early 2011, Surrey staff engaged a third-party advisor, Ernst & Young, to carry out a risk analysis to ensure an additional level of rigor in their findings. The results supported Surrey staff's initial analysis. Accordingly, the City leapt ahead of the pack, requiring the winner of its waste management contract to provide its services through the exclusive use of a natural gas waste collection fleet. While the contract was awarded in mid-December, 2011, to BFI Canada (Progressive Waste), the trucks will not go into operation until the start of the new city service contract - in October 2012.

At present, the City has deployed one pilot CNG waste collection truck for its weekly curbside collection service. The vehicle is a low entry Mack truck with a 26-yard McNeilus side load body with cart-tipper and a Cummins Westport ISL G, 320 horsepower engine. BFI is currently considering

Surrey's pilot CNG refuse collection truck, currently in service. The new CNG trucks will be provided by BFI Canada and will go into operation in October 2012.

vendors from whom to buy its trucks. It does not yet know what manufacturer or what specifications will be chosen – other than that the trucks will be natural gas-powered.

COLLECTING SEPARATED ORGANIC WASTES

Regarding the second component of Surrey's plan – a new organic waste collection program – the City has mandated that its residents and businesses separate their kitchen and yard wastes from their other solid wastes and recyclables beginning in October, 2012. The City also tested out the viability of this idea before deciding to plunge ahead. It needed to see how citizens would respond. In November, 2010, the Engineering Department initiated a pilot cart-based organic waste collection program (with food and yard wastes collected in the same cart) with over 2,000 households across the City.

The organics collection pilot was a success. It reduced the percentage of organic waste in the garbage stream from 65 percent to 20 percent under the most effective option, which the City will be adopting. The residents reacted enthusiastically. In response to a customer satisfaction survey after several months, the average participants' score in support of the program was 9 out of 10.[2] Now some 300,000 specialized carts will be distributed to all of the City's households. Property owners may opt to purchase additional carts from the City, but this provides an economic incentive to reduce their waste production. Smaller carts will be deployed at multi-family (townhouse) developments that have opted for door-to-door waste collection service from the City.[3] Organic wastes will be collected curb-side every week, while garbage and recyclables will be collected bi-weekly.

This component of Surrey's plan promises to have a huge impact on the City's waste stream. The City estimates that it will collect 80% of the kitchen waste, which means an annual reduction of 35,538 tons of organics being landfilled. Combined with all of its yard wastes, this adds up to a total of 65,538 tons of organics a year to be used for RNG generation. With another 30,000 tons of recyclables also collected separately, only 26,462 tons of garbage will remain to be landfilled.

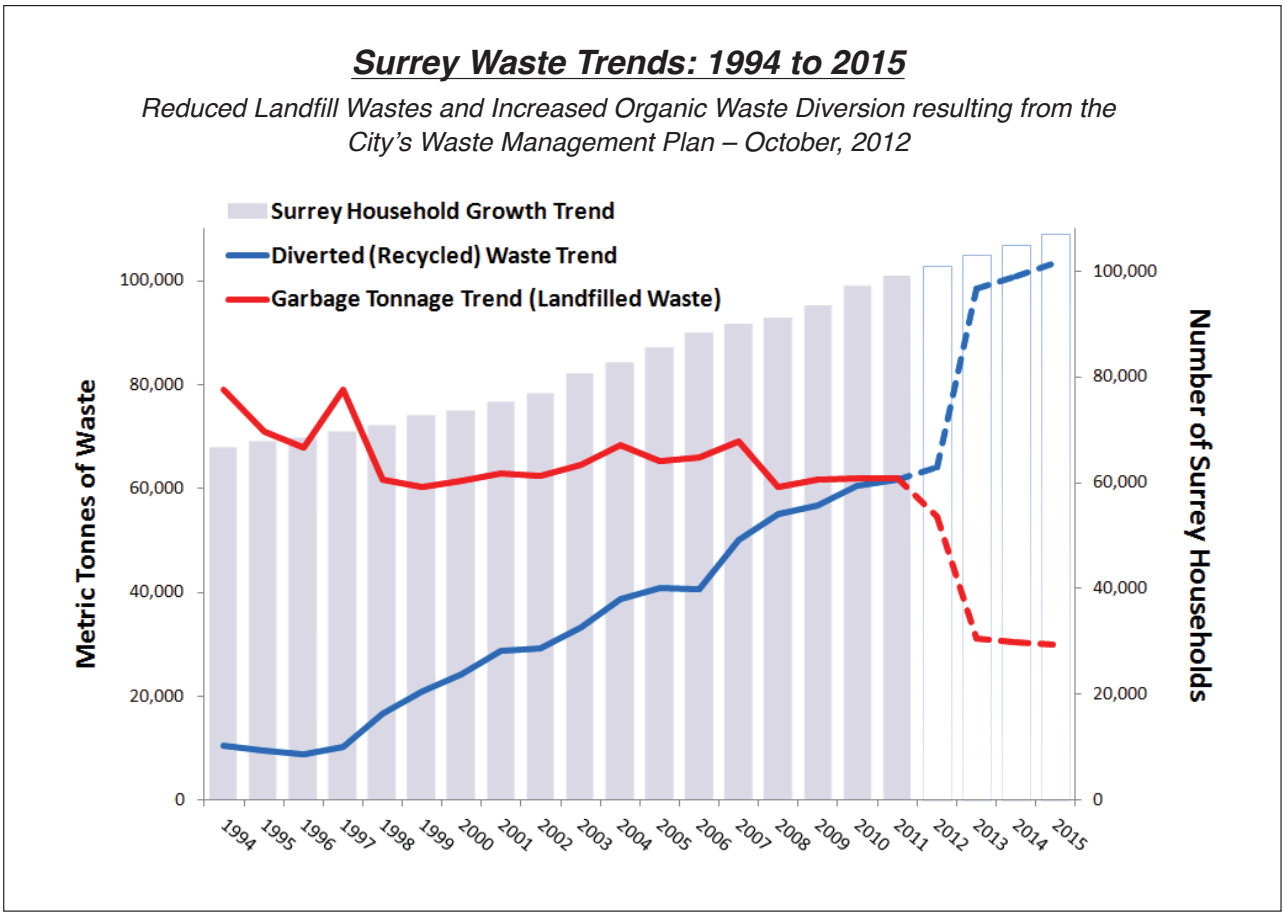
By preventing so much of its organic wastes from being landfilled, this new program will help Surrey meet the Metro Vancouver regional goal of diverting 70 percent of all its waste from landfills by 2015. In an effort to ensure that the 70 percent target is met, the Metro Vancouver Integrated Solid Waste and Resource Management Plan (ISWRMP) proposes a total ban on organic wastes in landfills by 2015.

CONVERTING ORGANIC WASTES INTO A SUSTAINABLE VEHICLE FUEL

While the exact specifications of the proposed waste-to-biofuels facility (the third component of Surrey's plan) have not yet been finalized, the City has determined that it will construct a facility that will process 80,000 metric tons of organic wastes per year.[4] The facility will be strategically situated on city-owned land within the Port Kells Industrial Park located adjacent to the Surrey Waste Transfer Station. By having both garbage and organic waste materials delivered to one central area where both facilities are located, there will be gains in efficiency and fewer vehicle-related carbon emissions compared to the delivery of materials to separate disposal locations.

This facility will have the capacity to process all of Surrey's organic wastes, including expected future increases. Upon its completion, the City intends to transport all of its organic wastes to its own facility. It will also accept commercial food waste from within the Metro Vancouver area, leading to enhanced

The new waste-to-biofuels processing plant will be in close proximity to the Surrey Waste Transfer Station, minimizing truck miles travelled, truck emissions, and fuel use.



regional environmental and economic benefits. The exact amount has not been made public.

The City estimates the organics biofuel processing facility will be completed by 2014.[5] Until that time, organic wastes will be delivered to the City's existing yard waste processor, Fraser Richmond Soil & Fibre (FRSF), located in Richmond, BC.

To treat the organic wastes, they will be placed in an "anaerobic digester." There, in this oxygen-free environment, the wastes will decompose, generating bio-gases that are then collected, refined, and compressed for use in fueling the trucks. The residual organics left after processing for biomethane can be used as fertilizer and soil amendments.

The renewable natural gas fuel produced could potentially be distributed through the region's natural gas pipeline network. Since RNG is virtually identical chemically to conventional CNG (containing four atoms of hydrogen and one of carbon), the two gases can be stored in the same facilities, transported in the same pipelines, and used separately or in a blend.

The biggest differences between conventional natural gas and renewable natural gas are that 1) the former is obtained by drilling while the later is not, and 2) because renewable natural gas is made from greenhouse gases that might otherwise be released into the atmosphere contributing to global climate change, both the production and use of renewable natural gas serve to reduce greenhouse gas emissions on a wells-to-wheels basis by more than 90 percent.

SURREY'S 2008 SUSTAINABILITY CHARTER

Surrey's new green waste management plan falls in line with the environmental sustainability goals that the City voluntarily set for itself. In 2008, the City Council

2 City of Surrey, "Award of Contract for Curbside Waste Collection Services," Corporate Report File 2320-20 (garbage): (December 8, 2011), 4. http://www.surrey.ca/files/Award_of_Contract_for_Curbside_Waste_Collection_Services_pdf_-_Adobe_Acrobat.pdf

3 Ibid., 12.

4 City of Surrey, "Region's First Biofuel Facility to be Built in Surrey," City of Surrey Media Room (April 23, 2010). http://www.surrey.ca/city-government/2951.aspx

5 City of Surrey, "Clean Energy Demonstration Projects," Mayor's Clean Energy Advisory Network (September 13, 2011), 1. http://www.surrey.ca/files/ENG_-_Clean_Energy_Demo_Project.pdf

An anaerobic digester similar to the one expected to be built in Surrey.

unanimously adopted the Sustainability Charter, a comprehensive framework for implementing a progressive, 50-year vision for a sustainable city. As Mayor Watts says, "Surrey's new green waste management plan will help us meet the goals within our Sustainability Charter, the policy framework that guides every decision we make as a City. It's about making the right choices, doing the right things and taking concrete actions to advance sustainability in our operations and in our community." With city officials projecting the population to increase to 682,000 by 2031, the goal of significantly reducing Surrey's total environmental footprint becomes even more challenging.[6]

The City has made a commitment to reduce its municipal fleet's carbon emissions by 20 percent by the year 2020, through a number of strategies. One of these, successfully accomplished in 2011, entailed the replacement of a number of Surrey's fleet vehicles with alternative fuel and propulsion technologies, including a number of 100 percent electric vehicles, hydrogen fuel cell and hybrid passenger vehicles, as well as the previously mentioned CNG waste truck. Heavily committed to building alternative-fuel infrastructure, Surrey will require all new gas stations to provide at least one alternative-fuel source.

The plan simultaneously involves developing a hub in the City with incentives aimed at attracting companies that research and develop clean energy technologies, and incentives to commercial clean energy companies to locate in Surrey.[7] "Working in cooperation with industry, government, and academic partners," says Surrey Mayor Dianne Watts, "we are positioning Surrey as a premier investment location and leader in the sustainability sector. We want to give companies every reason to consider Surrey first."[8]

THE REGIONAL CONTEXT FOR SURREY'S PLAN

Surrey has not planned and implemented all of its programs completely on its own. The City is working closely with its regional counterparts in British Columbia and following guidelines set under several key environmental and energy policies. Following the BC Climate Action Charter, a provincial initiative introduced in September, 2007, The City of Surrey has joined other participating local governments in voluntarily committing to achieve carbon neutral operations by 2012. The BC Climate Action Plan sets a provincial target of 33 percent fewer greenhouse gas emissions by 2020 and 80 percent fewer by 2050, and Surrey will play a big part in making this happen.

As an integral player in the Greater Vancouver area's Integrated Solid Waste and Resource Management Plan, Surrey will also follow the guidelines of several other BC programs. The BC Energy Plan sets goals for clean, self-sufficient electricity production including "clean energy leadership" and energy self-sufficiency by 2016. LiveSmart BC aims to support low-carbon communities through incentives for energy savings and greenhouse gas reduction in homes and businesses, on the road, and in communities. These incentives include FortisBC grants of up to $10,000 for businesses that purchase natural gas vehicles, depending on how heavy-duty they are. Lastly there is the BC Bioenergy Strategy, which encourages the

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6 Ron MacDonald and Amy Seabrooke, "Corporate Emissions Action Plan," City of Surrey Sustainability Office (Stantec Consulting: October 2010), 1. http://www.surrey.ca/files/Corporate_Emissions_Actions_Plan_2010.pdf

7 Components of this plan include:

- the establishment of an incubator centre for the commercialization of clean energy research;
- the implementation of incentives to encourage clean energy companies to construct and operate their business premises in Surrey; and
- the development and implementation of an effective marketing strategy.

The hub concept will encourage clean sustainable energy companies to establish and grow in Surrey in a cluster with complementary clean energy companies by providing incentives including:

- Eliminate property taxes for 3 years from the date of occupancy of the company premises;
- Reduce building permit fees by 50% in relation to the construction of the company premises; and
- Reduce the business license fee to $1 for the first three years of company operation

City of Surrey, "Economic Investment Action Plan Phase 2 – 2010," City of Surrey Economic Development Office, (2010), 5. http://www.surrey.ca/files/COSEconomicActionPlanPhase22010.pdf

8 Diane Watts, quoted in "Taking action on Surrey's Energy Future," Green Space BC (Vancouver: BIV Magazines, 2011), 48. http://www.biv.com/publications/pdf/GreenSpaceBC11-ebook.pdf

production of fuel from biomass, and the Landfill Gas Management Regulation, which requires landfills to consider designs that optimize methane capture, reducing greenhouse gas emissions.

THE BOTTOM LINE: ECONOMIC BENEFITS

Based on the figures below, Surrey's plan to green its waste management system is expected to be a smart economic move for both the City and BFI Canada. The City is currently paying $12.3 million per year for waste collection services under a contract with Emterra. BFI's bid of $9,505,923 per year will save the City approximately $2.8 million per year for waste collection.[9] According to Grant Hankins of BFI, while there are no government grants or economic incentives available to help cover the higher cost of the natural gas refuse trucks, the cost of natural gas (which is abundant in Canada) is lower than that of diesel, so BFI Canada expects to save money on its fuel costs.

Local governments in BC are subject to a carbon tax, which was initiated at $10 per ton on July 1, 2008, and which will reach $30 per ton by July 1, 2012. Yet by signing the BC Climate Action charter and committing to becoming carbon neutral, Surrey is eligible for the Climate Action Rebate Incentive Program (or CARIP rebate). Based on 2009 levels of energy consumption, the CARIP rebate would be approximately $416,200 in 2012; however, the real amount will surely be higher as the quantity of petroleum used decreases with the refuse fleet's shift to trucks powered by renewable natural gas, which slash their carbon contribution wells-to-wheels by more than 90%. Surrey has committed to buying carbon offsets to make up the difference and become carbon neutral; based on 2009 levels of emissions this would cost approximately $380,500 in 2012, but the real amount will be smaller because of the fleet's shift to natural gas, which emits far less carbon than petroleum. [10]

Once completed, the organics biofuel processing facility in Surrey will provide economic savings to all sectors by avoiding the costs that previously had to be paid to dispose of organic wastes. Economic considerations were very important in deciding how to construct and operate the waste-to-biofuels facility. According to RFP submissions to the City, Surrey found it would endure relatively higher costs were it to build a RNG fueling facility itself and provide fuel to the contractor carrying out the municipal waste disposal services. So the City chose the more cost-effective option, having a private-sector proponent design, build, own, operate, and maintain the RNG facility.[11]

Because the City will be carrying out this project as a Public Private Partnership (PPP), it was able to apply, in the summer of 2011, for grant funding through PPP (P3) Canada, a Crown corporation with an independent Board of Directors reporting through Canada's Federal Minister of Finance. PPP Canada's mandate is to improve the delivery of public infrastructure by achieving better value, timeliness and accountability to taxpayers, through P3s. If the City's application is approved, it will receive a federal grant of up to 25 percent of the capital cost of the waste-to-biofuels facility. The facility will be initially funded by Surrey's future private-sector partner, with the City covering 25% of the capital costs if its grant application to P3 Canada is approved. The City will then pay back the capital over a 25-year period via the contractual disposal rates.

"Engaging and informing the community is essential if we want to build strong communities," says Surrey Mayor Watts. The City recently launched the Community EnergyShift program to engage the public and create a strategy for reducing the City's carbon footprint. City communications to the public about the new waste management program logistics will start in May of 2012 and continue at least three months beyond the start date of the new contract with BFI Canada, in October 2012.[12] All of the publicity has only helped the City inform its residents and focus more attention on Surrey's bold initiatives.

"Working in cooperation with industry, government, academic, and community partners, we're taking action on Surrey's energy future," says Mayor Watts. By doing so, the City is setting a great example for other communities to follow.

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9 City of Surrey, "Award of Contract for Curbside Waste Collection Services," 10
10 MacDonald and Seabrooke, "Corporate Emissions Action Plan," 7
11 City of Surrey, "Award of Contract for Curbside Waste Collection Services," 9
12 Ibid., 13

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Comments on:

THE CITY OF SURREY: SETTING THE PACE FOR SUSTAINABLE TRANSPORTATION

"Municipalities all over the world need to take a close look at this uniquely creative, innovative and fully sustainable project. More thinking - and doing - along closed loop energy system lines is urgently needed to address humanity's carbon footprint challenge."

Richard Marceau, eng., M.Sc.A., Ph.D., F.C.A.E.
Provost, University of Ontario Institute of Technology

"Surrey's breakthrough project is a remarkable achievement from a leading Canadian municipality. Over the same timeframe that the City was analyzing natural gas as a potential fuel for refuse collection trucks, a broad group of stakeholders under the direction of Natural Resources Canada was collaborating on the development of Natural Gas Use in the Canadian Transportation Sector – Deployment Roadmap. Surrey's conclusions mirrored the Roadmap findings, proving out that natural gas trucks – operating on either conventional natural gas or biomethane made from waste - have come of age, providing strong economic and environmental benefits for return-to-base and regional corridor fleets. Energy Vision's profile of the Surrey project is a must-read for anyone interested in sustainable procurement or transportation."

Alicia Milner
President, Canadian Natural Gas Vehicle Alliance

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