



## STAFF REPORT TO COUNCIL

**Date:** June 7, 2010  
**To:** Mayor and Council  
**From:** Bob Radloff, Project Manager  
**Subject:** Downtown District Energy System (DES)

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**ATTACHMENTS:** a) Appendix "A" – Elector Response Form  
b) Financial Model  
c) Downtown District Energy System Distribution Plan

### RECOMMENDATIONS:

1. THAT Council receive this report for information.
2. THAT subject to obtaining approval of the electors and the results of the Environmental Assessment process, the City proceed with the Downtown District Energy System.
3. THAT Council give first three readings to Lakeland Energy Supply Agreement Bylaw No. 8296, 2010 (the "Bylaw").
4. THAT Council:
  - authorize Administration to implement an alternative approval process as provided under s. 84 and s. 86 of the *Community Charter* to obtain approval of the electors for final reading and adoption of the Bylaw as required;
  - establish the deadline of 4:00 p.m. on July 21, 2010 for receiving elector responses to the alternative approval process;
  - approve the determination of the total number of electors of the area to which the alternative approval process applies as 52,351 electors, as described in this report;
  - approve for use in the alternative approval process the elector response form attached as Appendix "A" to this report; and
  - direct Administration to report the results of the alternative approval process, and if approval has been obtained, to return the Bylaw for final reading and adoption.

## PURPOSE:

The purpose of the report is to provide Council an update on the City's District Energy System, and to seek Council's approval to proceed with the "Downtown District Energy System" as described in this report.

## POLICY/REGULATORY ANALYSIS:

The recommendations in the report support City policy in the following manner:

1. Council identified the District Energy System as its number one initiative under the City's "Energy and Greenhouse Gas Management Plan".
2. The City of Prince George, as a Partner for Climate Protection Member, has set greenhouse gas emission reduction targets of 10% for the municipality and 2% for community emissions. City Council committed to:
  - reduce corporate GHG emissions by 10% from 2002 levels by 2012.
  - reduce community GHG emissions by 2% from 2002 levels by 2012.
3. The City of Prince George, as a signatory to the Climate Action Charter, is committed to becoming greenhouse gas neutral by 2012.

## Requirement for Approval of the Electors

The *Community Charter* requires that the proposed Energy Supply Agreement with Lakeland Mills Ltd. discussed later in this report be authorized by way of a bylaw adopted with the "approval of the electors".

The *Community Charter* provides that Council may obtain "approval of the electors" either by way of:

- (a) "assent of the electors" (i.e. a referendum); or
- (b) "alternate approval process" (i.e. a counterpetition process).

The assent of the electors process would require that a referendum be organized. The process is governed by the *Local Government Act*, and is similar to a local government election process. Assent of the electors would be obtained only if a majority of the votes counted as valid are in favour of the bylaw authorizing Council to enter into the agreement.

The alternate approval process is governed by the *Community Charter* requirements. This process would begin with the introduction of a Bylaw to authorize Council to enter into the Energy Supply Agreement. Council would give first three readings to the Bylaw, and direct Administration to then proceed with the alternate approval process to obtain approval to consider fourth reading and adoption of the Bylaw.

The alternate approval process involves publication of a notice in the newspaper once each week for two consecutive weeks. Electors are given the opportunity to indicate they are

opposed to Council proceeding with fourth reading of the Bylaw by signing and submitting an elector response form approved by Council. Council must set a deadline for elector responses to be submitted, which must be at least 30 days after the second publication of the notice in the newspaper. Council must also make a fair determination of the total number of electors. If by the established deadline 10% or more of the electors submit elector response forms, then Council may not proceed with fourth reading of the Bylaw and may not enter into the Energy Supply Agreement unless approval is received through “assent of the electors” (i.e. a referendum would be required to be held on the matter).

Administration recommends that Council obtain approval of the electors through the alternative approval process, and that Council establish the deadline of 4:00 p.m. on July 21, 2010 for receiving elector responses to the alternative approval process.

The alternative approval process would apply to the entire City area, and a fair determination of the total number of electors in the City is required. It is recommended that calculation of the number of electors in the City be based on information provided by Elections BC, a non-partisan independent public agency that maintains an up to date list of registered electors. According to Elections BC, the total number of registered electors within the City of Prince George as of June 2, 2010 is 52,351. Accordingly, Administration recommends that Council approve the determination of the total number of electors as 52,351. Approval of the electors for Lakeland Energy Supply Agreement Bylaw No. 8296, 2010 would therefore be obtained if the number of elector responses received by the deadline is less than 10% of 52,351.

### **Requirement for Environmental Assessment (EA) Process**

The proposed DES is also subject to a Federally regulated Environmental Assessment (EA) process. This process can involve various levels of review. For this project, the Federal Government has determined that the project will be evaluated at a screening level. For this level of review, the Federal Government indicates it will require the written record of inputs received from our consultations with stakeholders and the public during the rollout and public information stages of the project. The timing and nature of stakeholder inputs are described in this report.

### **STRATEGIC PRIORITIES:**

The District Energy System supports City Council’s Strategic Plan in the following ways:

1. **Creating a Better Downtown:** The DES provides a source of green energy to downtown Prince George. This, in turn, promotes reinvestment goals for the downtown and improves air quality in this important portion of the air shed.
2. **Improving our Health and Safety:** The DES contributes to real and measureable reductions to particulate emissions in the community which, in turn, improves community health.

3. **Taking care of our Air, Water, and Land Resources:** The DES improves air quality at the same time while reducing greenhouse gas emissions with consequent positive impacts on our local air.
4. **Strengthening and Diversifying our Economy:** The DES promotes new revenues for local industry and improves utilization of the forest base. It reduces reliance on imported fossil fuels, and keeps energy economy dollars in the community.
5. **Increasing Civic Pride:** Air quality improvements realized by the DES reduce negative aesthetics associated with particulates in the air shed and thus contributes to civic pride.
6. **Continuing Progressive and Responsible Fiscal Management:** The DES provides an opportunity for the City to generate new, non-tax revenue.

The DES is a Council priority for these reasons and is listed as a priority project in Council's Strategic Plan.

## **BACKGROUND:**

The City of Prince George was successful in its submission for Federal and Provincial grants for the construction of a bioenergy based District Energy System (DES). This system would see carbon neutral (green) heat supplied to commercial and institutional buildings in the downtown core of Prince George. Administration has:

- completed the terms of a proposed energy supply agreement for heat sales to the DES with Lakeland Mills;
- completed negotiations for heat supply to City buildings;
- completed discussions with the Coast Inn of the North and Accommodation and Real Estate Services- BC Provincial buildings (Plaza 400 and the Law Courts); and
- considered various configurations of the District Energy System which will accommodate future expansion capability.

Potential additional loads in the downtown core have also come to administration's attention. These additional downtown loads show promise and lend themselves to consideration of a smaller "Downtown District Energy System" concept since they provide additional energy density for the smaller distribution footprint. Although the proposed system will be designed with phasing expansion in mind, this smaller concept offers a number of advantages over larger concepts at this time.

These are:

- reduced capital cost and borrowing requirements;
- reduced risk;
- reduced implementation schedule;
- less complex agreements to impact implementation;
- ability to demonstrate the DES viability at a smaller scale for prospective customers beyond phase one; and
- reduced reliance on third parties for backup heat and peaking heat supply.

A schematic showing the layout for the Downtown District Energy System is attached to this report. The “Downtown District Energy System” concept provides Greenhouse Gas (GHG) emission reductions as well as particulate reductions. Additionally, it is intended that if implemented, the smaller scale project distribution system would be sized to accommodate quick expansion to additional customers thereby expanding greenhouse gas emission reductions.

## **DISCUSSION:**

### **Proposed Lakeland Agreement for Heat Supply**

It is intended to enter into a long term energy supply agreement (the Agreement) with Lakeland Mills Ltd. for the supply of heat to the Downtown District Energy System. The Agreement is attached to Lakeland Energy Supply Agreement Bylaw No. 8296, 2010 for reference. The Agreement provides long term stable pricing for energy supply at fixed prices. Key features of the Agreement include:

- stable pricing structure for a 10 year term with provision to extend the Agreement for an additional 10 years;
- heat supply from a Greenhouse Gas Neutral Energy Source that is derived from a sustainable forest and which reduces our City’s reliance on non-renewable fossil fuels;
- significant air quality improvements due to reduced stack emissions and reduced diesel truck traffic; and
- assignment of operation maintenance repair of heat supply to industry partner specialists.

### **Particulate Matter Emissions Reduction**

The Agreement calls for a modular electrostatic precipitator to be installed at Lakeland Mills as part of the DES project. This will permit the mill to meet a contractual emission guarantee of 20mg/nm<sup>3</sup> at 8% O<sub>2</sub> during the life of the heat supply agreement. This guarantee is based on the fuel specification for the existing energy system designed and the flue gas to hot water heat exchanger specified. The performance parameters are based on full load for the plant. Higher performance can be expected at lower loads. There is a guaranteed total annual emissions load of 6,700 kg. Monitoring will be conducted quarterly for the first year as a condition of the agreement so that emissions outputs can be verified quarterly and then annually. The information below has been accepted by the Canadian Environmental Assessment Agency’s responsible authority (Western Economic Diversification Canada) and their consultants, Hemmera.

Below are the parameters for the emissions and the projected particulate matter emissions at full load (the maximum output or production that the mill is able to handle). The Agreement commits Lakeland to obtain the above emissions rate.

**LAKELAND MILLS LTD.****Effect of ESP on Particulate Matter Emissions from Energy System**

<b>Current System Design</b>	<b>pph, 30% mc</b>	<b>SCFM</b>	<b>Nm3/Hr.</b>
Energy System @ 100% firing rate =	101,048	22,455	38,167

**Max. operating hours/year = 8760**

	<b>Particulate Matter (PM)</b>				
	<b>Mg/Nm3</b>	<b>Mg/hour</b>	<b>Kg/hour</b>	<b>Kg/year</b>	<b>% PM Reduction</b>
Maximum PM output specified in Permit	230	8,778,410	8.78	76,898.87	0.00%
Actual PM emission test (May 2008)	112	4,274,704	4.27	37,446.41	51.30%
Projected PM output with ESP	20	763,340	0.76	6,686.86	91.30%

The above table demonstrates that the emissions from Lakeland Mills will be reduced by approximately 30 tonnes per year through emissions control equipment installed as part of the Agreement. In addition, it should be noted that due to the District Energy System project, Lakeland Mills will no longer need to haul a substantial portion of its biomass from its River Road location to offsite locations. As a result, truck traffic will be reduced by 52,500 km per year. This results in a further regional total PM reduction in the order of 70 tonnes per year.

**As a result, a net reduction of 70 + 30 tonnes = 100 tonnes PM total results from the proposed project.**

**Greenhouse Gas Emissions Reductions**

Greenhouse Gas emissions reductions for the proposed Downtown DES and a larger scale concept are compared in the table below.

<b>Project</b>	<b>Greenhouse Gas Reductions</b>	<b>Existing Greenhouse Gas Emissions</b>
Downtown District Energy System	925t City 427t (Private) 516t Prov Gov	7,080 tonnes City  901,710 tonnes Community
Total Reduction	1868	

## Financials

The financial performance of the “Downtown DES “and DES systems like it, will vary on the basis of the price charged for energy. Typically these systems charge a rate for energy determined as a percentage of the net cost of energy for equivalent natural gas based systems. The performance of the system for 90% and 80% of net cost of operating on natural gas is presented in the table below.

The total capital cost to the City for the proposal of a “Downtown District Energy System” is \$14,141,000, of which \$295,000 has been expended as soft costs related to pre-design and feasibility. The total includes a stand alone natural gas back up system at the Lakeland Mill. The distribution system would be sized to accommodate the larger DES concept load allowing for ease of future system expansion.

Item	at 90% NG	at 80% NG
Capital Cost Est. (2010 \$)	\$13,846,000	\$13,846,000
Project Payback (years)	28	30
City Working Capital Need	0	0
Net Present Value (\$)	\$3,726,000	\$2,818,000

The above analysis demonstrates a range of net present values for the DES depending on size and heat price assumptions. It demonstrates that NPV for all options are positive. This contributes to administration’s assessment that smaller Downtown DES is a favourable option.

When selecting a target NPV for the DES, it is suggested that a NPV in the range of \$2,000,000 to \$4,000,000 is desirable to balance risks and unknowns for the project. The 80% NG pricing for the smaller Downtown DES achieves this result while offering a lowest cost heat price to our customers. This in turn improves market penetration and contributes to the potential for success of the system, both initially and in the future. It is also an important consideration for the City, since the City is a significant customer.

The City has obtained a number of grants to be used in support of the Downtown DES. Grants available to the project are shown below:

GRANT NAME	VALUE
Municipal Rural Infrastructure Fund (MRIF)	5,332,000
Green Municipal Fund (GMF)	461,000
Community Works Fund (CWF)	4,366,000
<b>Total</b>	<b>10,159,000</b>

Additional CWF funds in the amount of \$100,000 per year, for a 10 year term will also be applied.

### Present Cash Flow Projections:

Projected cash flows for the Downtown DES based on the current customer profile and estimates of construction costs for 80% of net cost of energy for natural gas are presented below:

## Downtown District Energy System CASH FLOW

	CASH FLOW PROJECTION			
	2012	2015	2020	2030
Revenue	885,600	934,700	1,023,000	1,229,000
Expenses	462,011	481,663	576,000	772,000
Debt Payments	62,220	330,292	290,000	0
Net Revenue	381,388	122,746	157,000	457,000

Detailed financial cash flow for the proposed Downtown DES is attached for reference.

### City as a Customer

The City will be both owner of the DES and a customer. Heat sales to DES customers include a component for heat as a “commodity” and a “capacity charge”. Capacity charge is related to avoided cost of boiler capital/maintenance/operation/repair and insurance in the customers building (which is needed to convert natural gas to heat energy). A typical heat sale structure for the 80% NG heat pricing for the Downtown DES is shown on the table below.

PROPOSED DES RATES AND CHARGES:					
ANNUAL CAPACITY AND ENERGY CHARGE					
Building	Capacity Charge		Energy Charge		Total CES Charges (\$/yr)
	CES Capacity Rate \$/kW	CES Capacity Charge (\$/yr)	CES Energy Rate \$/MWh	CES Energy Charge (\$/yr)	
City Hall	51.02	21,690	45.00	36,000	62,190
Civic Centre	62.40	37,440	45.00	46,800	90,180
Library	71.44	14,310	45.00	13,950	29,880
Four Seasons Pool	76.43	49,680	45.00	85,050	147,330
Law Courts	17.16	9,438	45.00	45,553	59,850
Plaza 400	7.28	8,010	45.00	85,950	103,050
Coliseum	92.16	23,040	45.00	21,150	47,520
Two Rivers Gallery	110.89	24,930	45.00	23,850	52,740
Coast Inn of the North	46.80	54,990	45.00	104,850	172,710
Ramada	7.53	1,882	45.00	62,108	70,560
<b>Sub Total Phase 1</b>	<b>57.28</b>	<b>245,409</b>	<b>45.00</b>	<b>525,261</b>	<b>826,010</b>



Under this pricing structure, the capacity charge for capital related to boiler systems replaced for the City would be approximately \$146,160 per year. This amount would have to be budgeted for by the City's Community Facilities Division as a budget adjustment will be made in 2012 for this purpose. This budget increase is however, offset by reduced need for city capital to replace and or upgrade city boiler systems as well as maintenance of these assets. City facilities would otherwise require approximately \$1.4 million in capital upgrades over the next 10 years according to the City's Community Facilities Division.

### **Environmental Assessment**

This project is subject to a Federal Environmental Assessment process which has been determined to be at the screening level. This means Western Economic Diversification has requested that they receive the meeting notes from the Stakeholder meetings received during the consultation stages of the project. The City will receive stakeholder input as noted below.

### **Timeline and Activities for Environmental Assessment**

<b>Date</b>	<b>Activity</b>
June 7- August 8	<ul style="list-style-type: none"> <li>• Environmental Assessment unfolds</li> <li>• Stakeholder meetings with several key groups and audiences including</li> <li>• PACHA, PGAIR, Millar Addition Concerned Citizens, Downtown Prince George, Individual Activists</li> <li>• Other key audiences- City staff, Industrial Partner's staff, PACHA members, Bowl residents, other Prince George residents</li> <li>• Key organizations include- IPG, Northern Bioenergy Partnership, NHA, UNBC, Ministry of Health, Environment, Forests, and Energy</li> <li>• Information and notes gathered from these meetings will be used for the Environmental Assessment</li> <li>• Public community open house</li> </ul>

### **Alternate Approval Process**

If Council approves an alternate approval process on June 7, 2010, the suggested timeline below would occur:

<b>Date</b>	<b>Activity</b>
June 7	<ul style="list-style-type: none"> <li>• Council approves alternate approval process</li> </ul>
June 11	<ul style="list-style-type: none"> <li>• First Notice in newspaper</li> </ul>
June 18	<ul style="list-style-type: none"> <li>• Second Notice in newspaper</li> </ul>
4:00 p.m. on July 21	<ul style="list-style-type: none"> <li>• Deadline for receiving elector response forms</li> </ul>
August 9	<ul style="list-style-type: none"> <li>• Report results of alternative approval process</li> </ul>

## SUMMARY AND CONCLUSION:

Administration recommends that the City proceed with public approvals and the required environmental assessment processes to enable construction of a “Downtown District Energy System”. This system will provide particulate reductions and Greenhouse Gas Emission reductions. The distribution system will be sized to accommodate expansion of the system for additional customers in next steps to improve greenhouse gas emission reduction performance. The “Downtown” system will see a positive cash flow.

Once implemented, the Downtown District Energy System will:

- reduce particulate emissions in the city airshed;
- permit the City and its customers to meet greenhouse gas reduction goals;
- reduce the City’s reliance on non-renewable fossil fuels;
- help to position the City as a leader in bioenergy application;
- assist with energy security and stability;
- keep energy related funds in the community;
- assist with downtown renewal; and,
- generate non-tax revenue for the City.

Respectfully submitted,



Bob Radloff, P. Eng.  
Project Manager

Doc #163981

**TO: MAYOR AND COUNCIL**



**APPENDIX "A" to Staff Report**



# CITY OF PRINCE GEORGE

.C.'s Northern Capital  
City Manager's Office, 1100 Patricia Boulevard, Prince George, BC V2L 1  
Telephone (250) 561-7602 / Fax (250) 561-0183 / www.city.pg.bc.ca



## **ALTERNATIVE APPROVAL PROCESS ELECTOR RESPONSE FORM**

I, the undersigned hereby indicate that I am opposed to the adoption of the "Lakeland Energy Supply Agreement Bylaw No. 8296, 2010", unless it is approved by assent of the electors.

I understand the aforementioned Bylaw would authorize the city council to enter into an Energy Supply Agreement with Lakeland Mills Ltd. providing for the supply by Lakeland Mills Ltd. of thermal energy to the City for use in a district energy system.

For the purposes of signing this elector response form, the "elector" means a person who meets the qualifications of the *Local Government Act* for registration as a resident elector, or as a non-resident property elector, in the City of Prince George, British Columbia.

By signing this form I **hereby declare** that I am an elector of the City of Prince George, and:

- I am a Canadian Citizen;
- I am 18 years of age or older;
- I am a resident of the Province of British Columbia for at least the last six months; and
- I am not disqualified by the *Local Government Act* or any other enactment from voting in an election or otherwise disqualified from voting in an election;
- I am entitled to vote, and have not previously voted in this Alternative Approval Process;

**AND**

- I have been a resident of the City of Prince George for at least the last 30 days prior to signing this Elector Response Form.

**OR**

- I am not a resident of the City of Prince George but I have been the registered owner of real property in the City of Prince George for at least the last 30 days;

**OR**

- If there is more than one registered owner of the property, I am the person named in the written consent (see over) as the person entitled to register as a non-resident property elector for the property described below.

Property Address \_\_\_\_\_

*Address of Property in relation to which you are entitled to register as a Non-Resident Property Elector*

\_\_\_\_\_  
Full Name (Please Print)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Residential Address

\_\_\_\_\_  
Date

Please mail or deliver your completed form to:  
City of Prince George, Attn: Corporate Officer, 5<sup>th</sup> Floor, 1100 Patricia Blvd., Prince George, BC V2L 3V9

**Responses must be received the Corporate Officer by no later than 4:00 p.m. on July 21, 2010.**

Elector Response Forms **may not** be submitted by e-mail or facsimile.

Document Number: 163728

**ELECTOR RESPONSE FORM (Continued from page 1)**

Complete this side of the form if there is more than one registered owner.

Each registered owner must provide consent to the person registering as a Non-Resident Property Elector. The person designated as the Non-Resident Property Elector must be one of the owners of the property and must be one of the individuals granting consent.

WE, together with the person registering as a non-resident elector, constitute a majority of registered owners of real property in Prince George, BC, and hereby give consent to:

\_\_\_\_\_  
*Full Name of person designated to be the non-resident property elector*

to be registered as the non-resident property elector for the jointly owned property described above.

\_\_\_\_\_  
*Registered Owner's Full Name*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Registered Owner's Full Name*

\_\_\_\_\_  
*Signature*

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*Registered Owner's Full Name*

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*Registered Owner's Full Name*

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*Signature*

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*Registered Owner's Full Name*

\_\_\_\_\_  
*Signature*

run 3	Phase 1	80% of NG Price														
Case: CWF/yr =	\$ -															
Total CWF (2009-2015) =	\$ -															
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Investment	\$ -	\$ 2,380,000	\$ 9,335,000	\$ 2,131,000												
Energy Sold, MWh	-	-	4,669	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672
Energy Purchased - Lakeland, MWh	-	-	4,569	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561
Revenue	\$ -	\$ -	\$ 230,900	\$ 885,600	\$ 901,600	\$ 918,000	\$ 934,700	\$ 951,700	\$ 969,100	\$ 986,800	\$ 1,004,800	\$ 1,023,200	\$ 1,042,000	\$ 1,061,200	\$ 1,080,700	\$ 1,100,700
Operating Expenses	\$ -	\$ -	\$ 165,600	\$ 175,700	\$ 147,700	\$ 153,100	\$ 158,500	\$ 164,200	\$ 170,000	\$ 176,000	\$ 182,100	\$ 185,800	\$ 189,500	\$ 193,300	\$ 197,100	\$ 201,100
Payment to Lakeland	\$ -	\$ -	\$ 97,585	\$ 259,324	\$ 272,273	\$ 285,916	\$ 300,252	\$ 315,282	\$ 331,005	\$ 347,538	\$ 364,996	\$ 364,991	\$ 383,240	\$ 402,402	\$ 422,522	\$ 443,649
Gas Purchases	\$ -	\$ -	\$ 16,555	\$ 26,987	\$ 22,022	\$ 22,462	\$ 22,911	\$ 23,369	\$ 23,837	\$ 24,314	\$ 24,800	\$ 25,296	\$ 25,802	\$ 26,318	\$ 26,844	\$ 27,381
Subtotal Expenses	\$ -	\$ -	\$ 279,740	\$ 462,011	\$ 441,995	\$ 461,478	\$ 481,663	\$ 502,851	\$ 524,842	\$ 547,852	\$ 571,896	\$ 576,087	\$ 598,542	\$ 622,020	\$ 646,467	\$ 672,130
Operating Income	\$ -	\$ -	\$ (48,840)	\$ 423,589	\$ 459,605	\$ 456,522	\$ 453,037	\$ 448,849	\$ 444,258	\$ 438,948	\$ 432,904	\$ 447,113	\$ 443,458	\$ 439,180	\$ 434,233	\$ 428,570
Other	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Income	\$ -	\$ -	\$ (48,840)	\$ 423,589	\$ 459,605	\$ 456,522	\$ 453,037	\$ 448,849	\$ 444,258	\$ 438,948	\$ 432,904	\$ 447,113	\$ 443,458	\$ 439,180	\$ 434,233	\$ 428,570
Interim (Grant) Debt Payment (1.5%)	\$ -	\$ -	\$ 30,255	\$ 62,220	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
GMF Debt Payment	\$ -	\$ -	\$ -	\$ -	\$ 345,972	\$ 338,045	\$ 330,292	\$ 322,191	\$ 314,264	\$ 306,337	\$ 298,497	\$ 290,483	\$ 282,556	\$ 274,629	\$ -	\$ -
NDI Debt Payment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
MFA Debt Payment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Debt Payments	\$ -	\$ -	\$ 30,255	\$ 62,220	\$ 345,972	\$ 338,045	\$ 330,292	\$ 322,191	\$ 314,264	\$ 306,337	\$ 298,497	\$ 290,483	\$ 282,556	\$ 274,629	\$ -	\$ -
<b>Cashflow</b>	\$ -	\$ -	\$ (79,095)	\$ 361,369	\$ 113,633	\$ 118,477	\$ 122,745	\$ 126,657	\$ 129,993	\$ 132,611	\$ 134,407	\$ 156,630	\$ 160,902	\$ 164,551	\$ 434,233	\$ 428,570
<b>Cum. Cashflow</b>	\$ -	\$ -	\$ (79,095)	\$ 282,273	\$ 395,906	\$ 514,383	\$ 637,128	\$ 763,785	\$ 893,779	\$ 1,026,390	\$ 1,160,797	\$ 1,317,427	\$ 1,478,329	\$ 1,642,880	\$ 2,077,113	\$ 2,505,683

NPV @6% Discount, 25 yrs, \$000

**\$2,818**

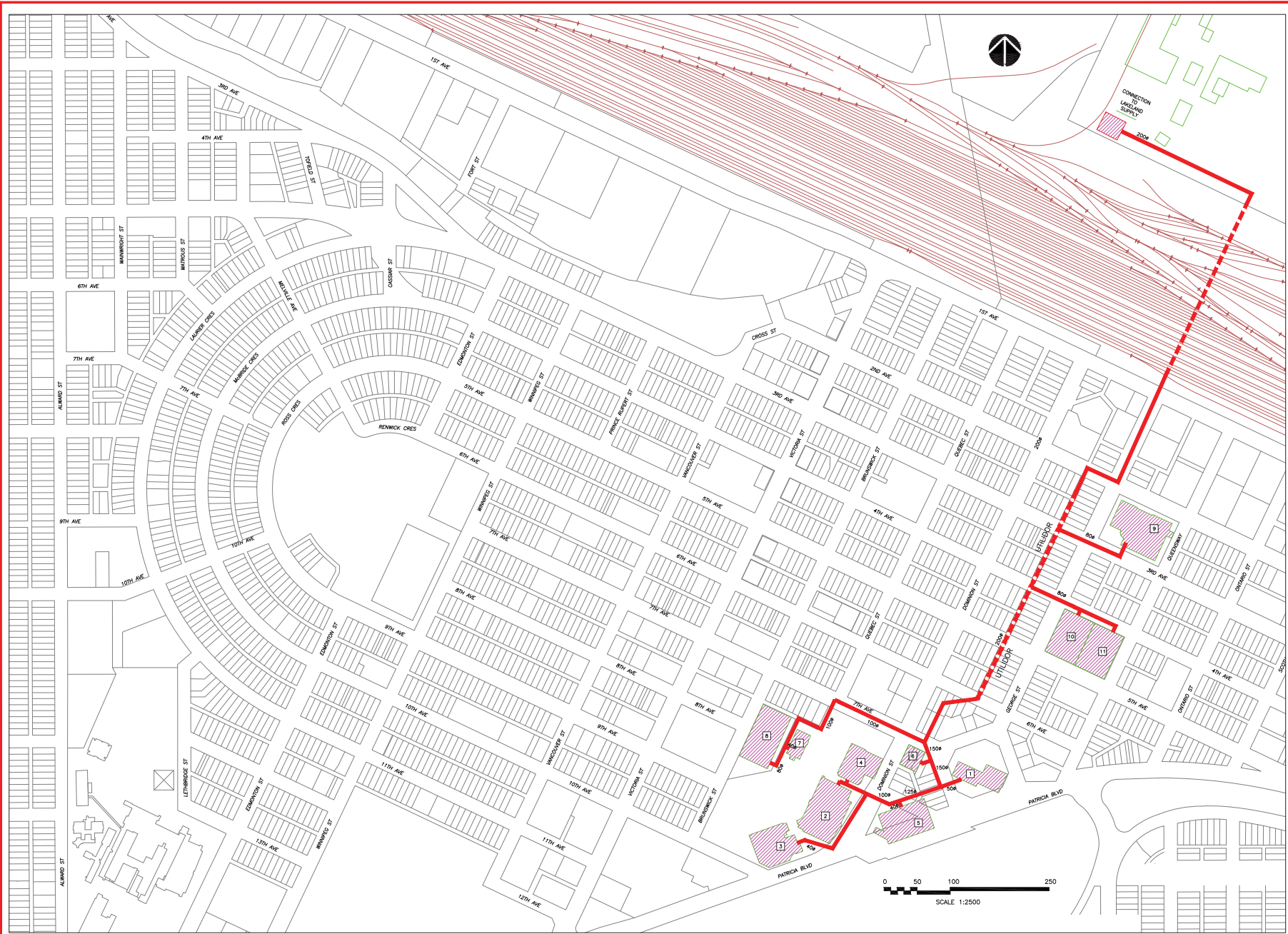
\$2,818 check

**run 3**

Case: CWF/yr =  
Total CWF (2009-2015) =  
Year


	16	17	18	19	20	21	22	23	24	25	26	27	28	29
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
<b>Investment</b>														
Energy Sold, MWh	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672	11,672
Energy Purchased - Lakeland, MWh	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561	11,561
Revenue	\$ 1,121,000	\$ 1,141,800	\$ 1,162,900	\$ 1,184,500	\$ 1,206,500	\$ 1,229,000	\$ 1,251,900	\$ 1,275,200	\$ 1,299,100	\$ 1,323,400	\$ 1,348,200	\$ 1,373,500	\$ 1,399,200	\$ 1,425,600
Operating Expenses	\$ 205,100	\$ 209,200	\$ 213,400	\$ 217,700	\$ 222,000	\$ 226,500	\$ 231,000	\$ 235,600	\$ 240,300	\$ 245,100	\$ 250,000	\$ 255,000	\$ 260,100	\$ 265,300
Payment to Lakeland	\$ 454,740	\$ 466,108	\$ 477,761	\$ 489,705	\$ 501,948	\$ 514,496	\$ 527,359	\$ 540,543	\$ 554,056	\$ 567,908	\$ 582,105	\$ 596,658	\$ 611,574	\$ 626,864
Gas Purchases	\$ 27,929	\$ 28,487	\$ 29,057	\$ 29,638	\$ 30,231	\$ 30,835	\$ 31,452	\$ 32,081	\$ 32,723	\$ 33,377	\$ 34,045	\$ 34,726	\$ 35,420	\$ 36,129
Subtotal Expenses	\$ 687,768	\$ 703,795	\$ 720,218	\$ 737,043	\$ 754,178	\$ 771,832	\$ 789,811	\$ 808,224	\$ 827,079	\$ 846,385	\$ 866,150	\$ 886,384	\$ 907,095	\$ 928,292
Operating Income	\$ 433,232	\$ 438,005	\$ 442,682	\$ 447,457	\$ 452,322	\$ 457,168	\$ 462,089	\$ 466,976	\$ 472,021	\$ 477,015	\$ 482,050	\$ 487,116	\$ 492,105	\$ 497,308
Other	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Income	\$ 433,232	\$ 438,005	\$ 442,682	\$ 447,457	\$ 452,322	\$ 457,168	\$ 462,089	\$ 466,976	\$ 472,021	\$ 477,015	\$ 482,050	\$ 487,116	\$ 492,105	\$ 497,308
Interim (Grant) Debt Payment (1.5%)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
GMF Debt Payment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
NDI Debt Payment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
MFA Debt Payment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subtotal Debt Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Cashflow</b>	<b>\$ 433,232</b>	<b>\$ 438,005</b>	<b>\$ 442,682</b>	<b>\$ 447,457</b>	<b>\$ 452,322</b>	<b>\$ 457,168</b>	<b>\$ 462,089</b>	<b>\$ 466,976</b>	<b>\$ 472,021</b>	<b>\$ 477,015</b>	<b>\$ 482,050</b>	<b>\$ 487,116</b>	<b>\$ 492,105</b>	<b>\$ 497,308</b>
<b>Cum. Cashflow</b>	<b>\$ 2,938,915</b>	<b>\$ 3,376,920</b>	<b>\$ 3,819,602</b>	<b>\$ 4,267,058</b>	<b>\$ 4,719,380</b>	<b>\$ 5,176,548</b>	<b>\$ 5,638,637</b>	<b>\$ 6,105,613</b>	<b>\$ 6,577,634</b>	<b>\$ 7,054,649</b>	<b>\$ 7,536,699</b>	<b>\$ 8,023,815</b>	<b>\$ 8,515,920</b>	<b>\$ 9,013,228</b>


NPV @6% Discount, 25 yrs, \$000



BLDG. #	BUILDING NAME
1	CITY HALL
2	CIVIC CENTRE AND PLAZA
3	LIBRARY
4	FOUR SEASONS SWIMMING POOL
5	COLISEUM
6	UNKNOWN
7	ART GALLERY
8	COAST INN
9	LAW COURTS
10	RAMADA
11	PLAZA 400 OFFICE BUILDING

**LEGEND**

 PHASE 1 PIPE LINE

 PHASE 1 BUILDINGS

REVISIONS		
DATE	REMARKS	NO.
MAY 4/10	INFORMATION	B
JAN 21/10	INFORMATION	A

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PROJECT TITLE: PRINCE GEORGE COMMUNITY ENERGY STUDY

SHEET TITLE: DOWN TOWN DISTRICT ENERGY SYSTEM DISTRIBUTION PLAN DESIGN 45C TEMP. DIFF.

DGN: J.CHIN SCALE: AS SHOWN  
 DWN: S.CASEY JOB NO.: 209209  
 APPR: DATE: 2009/09/16  
 DWG NO.: D-9209-02B