

BRITISH COLUMBIA UTILITIES COMMISSION  
**PANEL INFORMATION REQUEST NO. 1**  
TO SHANNON ESTATES RENTAL APARTMENTS LIMITED PARTNERSHIP

**Shannon Estates Thermal Energy Systems Rates Application**

Table of Contents	Page No.
A. Load (Sales) and Revenue Forecast .....	1
B. Corporate Structure .....	14

**A. LOAD (SALES) AND REVENUE FORECAST**

- 1.0 Reference: Load (Sales) and Revenue Forecast  
Exhibit B-17, SRG IRs 4.1, 4.2, and 4.3; Exhibit B-5, BCUC IR 39.1; Exhibit B-6, FAES IR 5.1; Redacted Confidential Reply Submission  
Forecast to Actual**

The 2016 and 2017 Load/Sales and Revenue forecast that was included in the financial model (Model) filed in Shannon Wall Centre Rental Apartments Limited Partnership (SWCRA) Redacted Confidential Reply Submission under the Analysis Per Year tab was as follows.

Financial Model - 30 years			2016 Half a year			2017		
2016 to 2045	[Unit]	[\$/Unit]	Qty.	[\$]	[\$/Unit]	Qty.	[\$]	
<b>Sales</b>	Space Cooling - kWh	[kWh]	73,959			73,959		
	Space Heating - kWh	[kWh]	535,644			1,071,287		
	Domestic Hot Water - kWh	[kWh]	100,225			200,450		
<b>Revenue</b>	Service Start Charge	[\$]	50.0000	275	\$ 13,750	\$ 50.0000	-	\$ -
	Monthly Capacity Levy	[\$/sqft]	0.0489	245,818	\$ 72,123	\$ 0.0501	245,818	\$ 147,852
	Monthly Metering Charge	[\$]	9.5000	275	\$ 15,675	\$ 9.5000	275	\$ 31,350
	Space Cooling	[kWh]	0.0518	73,959	\$ 3,811	\$ 0.0539	73,959	\$ 3,984
	Space Heating	[kWh]	0.1036	535,644	\$ 55,493	\$ 0.1077	1,071,287	\$ 115,425
	Domestic Hot Water	[kWh]	0.1036	100,225	\$ 10,383	\$ 0.1077	200,450	\$ 21,597
	<b>Subtotal - Revenue</b>				<b>\$ 171,255</b>			<b>\$ 320,209</b>

- 1.1 Please confirm, or explain otherwise, that the “2016 Half a Year” in the Model represents six months (July to December). If not, which part of 2016 does it represent?

[SETES: Confirmed it represents July 2016 to December 2016.

For the purpose of replying to the remainder of the IR, we respond for an extended period to include June to December 2016. This allows for a less complicated interpretation of accounting reports and also allows the collection of the service start charge for the majority of Customers to be included (e.g. interim rate period began in June, not July).]

- 1.2 Please confirm, or explain otherwise, that the 2016 Half a Year forecast was prepared under the assumption that the Rental Units were fully occupied and all the Phase I Units were sold/occupied.

[SETES: Not confirmed.

The forecast assumed that rental units are 98.6% rented and 88.7% occupied. It also assumed that Phase I Condominium units are 100% sold and 69% occupied.

A distinction was made between owned/rented and occupied; as units that have an owner or

lessee on record but not occupied for the period will pay the fixed component and not any variable charges. This is differentiated from unsold/unrented units or units which have no associated Customer.

The occupied rate for the strata units is estimated lower than for the rental units based on current market trends.]

- 1.2.1 Given that 2016 is now over, and actual information is known, please comment on the accuracy of this assumption, specifically confirming, or explaining otherwise, that the Rental Units were full and the Phase I Units were sold/occupied for the 2016 Half a Year.

[SETES: The number of Phase 1 Condominium units sold as of March 2017 was 65, and the average number of rental vacancies for the June to December 2016 period was 2 vacancies per month, so 99% rented.

We are not able to confirm the extent to which Phase 1 Condominium units or rental units were actually occupied as they are private residences. Additionally, for the purposes of estimating service hot water heating, a typical occupant number was assumed for each unit based on unit size - please see SWCRA's response to BCUC Panel IR 1.4 for the calculation method. We are not able to accurately verify this assumption while also respecting the privacy of Customers.]

- 1.3 What percentage of the total Phase I square footage area, as shown on the Usage Inputs tab of the Model, is attributable to the Rental Units?

[SETES: The rental units are attributed to 51.8% of the Phase 1 area. Please see the breakdown below with areas rounded to the nearest thousand square feet:

	Unit Area	Common Area	Heritage Area	All Types Area
	[sqft]	[sqft]	[sqft]	[sqft]
Strata	84,000	10,000	5,000	99,000
Rental	131,000	23,000	-	154,000
<b>Total</b>	<b>214,000</b>	<b>33,000</b>	<b>5,000</b>	<b>253,000</b>

Common area may include such areas such as lobbies, corridors, amenity spaces, and storage which are provided heating and/or cooling service.]

In response to Shannon Ratepayers Group's (SRG) Information Request (IR) 4.1 SWCRA provided the actual kilowatt hour (kWh) sales for June – December 2016 and January 2017 relating to Domestic Hot Water (DHW), Space Heating and Space Cooling. The table below was compiled with the forecast Load and Revenue data provided in the Model and the actual sales data provided in SRG's IR response for the months of July-December 2016. Please confirm, or update as necessary, that the table below accurately represents the forecast and actual July-December 2016 Load (sales) and Revenues collected from customers.

2016 Half a Year						
	[Unit]		Forecast	Actual	Variance \$	Variance %
Load	Space Cooling - kWh	[kWh]	73,959	301,204	227,245	307%
	Space Heating - kWh	[kWh]	535,644	1,178,633	642,989	120%
	Domestic Hot Water - kWh	[kWh]	100,225	291,674	191,449	191%
			<b>709,828</b>	<b>1,771,511</b>	<b>1,061,683</b>	<b>150%</b>
Revenue		Proposed Rate				
	Space Cooling - kWh	\$ 0.05180	\$ 3,831	\$ 15,602	\$ 11,771	307%
	Space Heating - kWh	\$ 0.10360	\$ 55,493	\$ 122,106	\$ 66,614	120%
	Domestic Hot Water - kWh	\$ 0.10360	\$ 10,383	\$ 30,217	\$ 19,834	191%
			<b>\$ 69,707</b>	<b>\$ 167,926</b>	<b>\$ 98,219</b>	<b>141%</b>

[SETES:

Please see our revised table below for June to December 2016 (Please refer to SWCRA’s response to BCUC Panel IR 1.1 for why June is included in our reporting):

2016 Half a Year						
	[Unit]		Forecast	Actual	Variance \$	Variance %
Load	Space Cooling - kWh	[kWh]	73,959	39,331	-34,628	-47%
	Space Heating - kWh	[kWh]	535,644	1,264,243	728,599	136%
	Domestic Hot Water - kWh	[kWh]	100,225	342,372	242,147	242%
			<b>709,828</b>	<b>1,645,946</b>	<b>936,118</b>	<b>132%</b>
Revenue		Proposed Rate				
	Space Cooling - kWh	\$ 0.05180	\$ 3,831	\$ 2,192	\$ (1,639)	-43%
	Space Heating - kWh	\$ 0.10360	\$ 55,493	\$ 11,944	\$ (43,549)	-78%
	Domestic Hot Water - kWh	\$ 0.10360	\$ 10,383	\$ -	\$ (10,383)	-100%
			<b>\$ 69,707</b>	<b>\$ 14,136</b>	<b>\$ (55,571)</b>	<b>-80%</b>

Please note: The figures have been revised from previously reported due to miss interpretation of metered data. Specifically, a majority of what appeared to be “Space cooling energy” was instead the chillers operating in a heating capacity. A correction of these figures is issued on the plant and building levels. We emphasize, suite billing is not unaffected as they are individually metered at the point of use and therefore customer invoices are correct.

We note, for the purpose of responding to this question actual revenue is defined as payment collected from customers in the calendar period of June 1, 2016 to February 28, 2017 with the 2017 period to allow for issuance of December usage period invoices and collection.

For accounting purposes, collected payments are attributed first to the service start charge / monthly capacity levy / monthly metering charges before energy charges. Consequently, this exaggerates the apparent variance percentages with the energy charges variance appearing higher and the service charge variance (refer to the response to BCUC Panel IR 1.5) appearing lower.]

- 1.4 Please provide a rationale for the 2016 Load and Revenue forecast filed in the Model being significantly different from the actuals provided in the SRG IR responses.

[SETES: The following factors in the financial model / directly supporting elements can lead to variation between forecast and actual rates:

1. Rental rate / rental occupancy rate and the strata sale rate / strata occupancy rate

Based on SWCRA’s response to BCUC Panel IR 1.2.1, the actual rental rate and sale rate appear to be reasonably comparable to the assumptions. What is not able to be reasonably verified, is the actual occupancy rate for either the rental units / strata units.

The occupancy rate is estimated. Occupancy for the purpose of responding to this IR is the presence of people in the service address who will use the energy services as opposed to no people using the energy services. Occupancy rate for the purpose of responding to this IR is the ratio of the actual, average number of inhabitants in the service address versus the predicted, average number of inhabitants. There could be more people living in the dwelling units than forecast which could place additional demand on all services. It may also be assumed that additional occupants would increase the required runtime for bathroom, laundry, and kitchen exhaust which increases space condition load and also increases the amount of domestic hot

water heating required. SWCRA is not able to reasonably verify the actual occupancy or occupancy rate while respecting the privacy of the Customers.

The number of occupants in dwelling units was estimated on the basis there would be one occupant in studio apartments and two occupants at a minimum in any larger dwelling unit plus one more occupant for second, third, etc. additional bedrooms. For example, two occupants in a 1-bedroom dwelling unit and three occupants in a 2-bedroom dwelling unit. Adjustments are made on a higher-level to the overall energy consumption via the “intensity of usage” factors described in SWCRA reply to BCUC Panel IR 1.4.2.

## 2. Weather

The abnormally cold weather during November and December of 2016 heavily contributed to increased heating energy demand. The forecast was based on a 30-year average of weather data at the Vancouver International Airport (YVR). The forecast has not been normalized to the actual weather of 2016, with the further factors described below this is unlikely to fully capture the effect of varied temperatures. For example, while heat transfer is practically directly proportional to the difference in temperature (outdoor temperature, indoor temperature), the combined effect with potential variations in exhaust runtime and occupant usage of domestic hot water make the correlation more complicated.

The microclimates of YVR and the SETES service area could be different from the forecast assumptions used. We do not have enough historic data for the SETES service area nor have we taken an environmental survey to quantify this effect / establish relationships which would allow more specific forecasts of load.

The wind speed may have varied from the forecast assumptions used. This could affect the infiltration/exfiltration of outdoor air into/out of the buildings which tends to increase heating and cooling load. Some buildings are provided with central mechanical pressurization to minimize this effect however, there are constant interactions with building indoor temperature and discontinuities in the building’s perimeter when people open/close doors or windows (e.g. stack effect or buoyancy driven airflow). We do not have enough historic data nor sensors to track this which would affect space heating and space cooling demand.

## 3. Building envelope performance

The building envelope, the thermal mass and resistance which is the combined effect of insulation and other building materials on heat transfer, could vary from the forecast assumptions. The interaction of the building envelope including for the detail of all fasteners/structural elements with time and final construction implementation could be different. We have not undertaken nor are we aware of any practical testing procedure for in-situ measurement of building envelope performance for the entire site. An increase in insulation versus the forecast would tend to decrease space heating load and increase space cooling load. A decrease in insulation versus the forecast would tend to increase space heating load and decrease space cooling load.

Heritage building envelopes in particular were not significantly modified for insulation during the development. Estimates were made of the building envelope performance however, the age of the structures, unknown modification history, and heritage conservation have limited the refinement of the estimates.

All units have been provided with operable windows which would introduce large quantities of outdoor ambient temperature air into the unit. These windows are opened or closed at the occupant's discretion. Typically keeping windows open increases heating energy consumption while lowering cooling energy. All units are mechanically ventilated above local requirements regardless of window position.

#### 4. Customer usage patterns

Departures from assumptions of Customer thermostat settings throughout the year. For the purpose of forecasting, the Customer thermostats were assumed to follow a particular schedule. SWCRA cannot read or control Customer thermostats and Customers may have set their thermostats differently than assumed.

Departures from assumptions of Customer behavior for exhaust fans and opening of windows/doors with simultaneous operation of heating or cooling equipment. Increased operation of exhaust fans / opening windows or doors leads to a greater exchange rate of indoor air with outdoor air. Consequently, the indoor temperature is driven by this exchange to be more similar to the outdoor temperature. This counteracts the operation of heating/cooling equipment which is to drive the indoor temperature to a different temperature from the outdoor temperature. SWCRA cannot limit Customer operation of exhaust fans (e.g. for cooking or bathing or laundry) and there are no interlocks provided to disable heating or cooling equipment when doors/windows are open.

Departures from assumptions of Customer usage of domestic hot water from plumbing fixtures and dishwashers. Customers could be taking longer showers, washing their hands more often and longer, and using their dishwashers more frequently. This would increase the usage of domestic hot water heating if this occurred or if they used it less it would decrease the usage of domestic hot water heating. SWCRA cannot limit Customer usage of domestic hot water.

Departures from the quantity of heat-generating equipment inside of dwelling units. Customers could be operating their lights / home appliances / home electronics with greater intensity than anticipated. Moreover, Customers may use a variety of appliances which are difficult to ascribe with any certainty. The dwelling units have been initially provided major home appliances and luminaries for hard-wired lighting fixtures. Beyond this however, SWCRA is not able to control what additional appliances are brought into dwelling units nor the frequency of usage of any appliance. With time, it has been generally observed that individual appliances have become more energy efficient. This has also been counterbalanced with the greater abundance of individual appliances which are available. SWCRA cannot limit what appliances including lighting are used inside of dwelling units nor control their usage.

Additional factors that are not expressly described in the financial model or its directly supporting elements are:

- Relatively small population (the number of dwelling units during the June to December 2016 period was less than 300), which makes the consumption more prone to be driven by a small number of consumers or non-typical demand patterns.
- Customers were provided with up to 6 months of service without charge, the 6-month period of analysis may have captured energy consumption when customers had not yet adjusted their usage habits for paid service. The recorded demand for space heating,

space cooling and service hot water was greater than forecasted.

- The revenue variation is attributed to the uncertainty some customers have for the billing and rate setting process. In particular, the initial months of the interim rate approval. In general, thermal energy billing is not a matter residential Customers are familiar with in BC unlike electricity or natural gas. With further familiarity, as is developed by paying invoices, Customers can be assumed to reduce excess usage which would reduce the load.

From our understanding of all of the above, Customers have used more heating, and DHW than forecast. The load variations are attributed most strongly to weather and Customer usage patterns. The forecast was based on averaged weather patterns and typical occupancy. The reporting period includes months that had abnormally cold weather (i.e. December 2016 had 33% more heating degree-days than December 2015)

The rental building exhibited service hot water consumption greater than a typically occupied building.

Recorded space cooling, while lower than expected, still is only a minor fraction of thermal energy demand.

While the projected rate of unit ownership and tenancy closely matches reality, we cannot verify occupancy rate of private dwelling units.

The revenue variations are attributed most strongly to the load variations and Customer adjustment to thermal energy billing.

The factors for which SWCRA's appears to have the most influence and therefore ability to improve the validity of forecast assumptions are:

1. Temperature inputs, however, this is limited to backwards reviews only
2. Operation of equipment controlled by SWCRA, such as the rental building's common air handling units

The large majority of factors are now outside of SWCRA's control and ability to identify with precision in advance / maintenance of Customer privacy.

]

- 1.4.1 In your response, please specifically address whether, on average, each unit used more cooling, heating, and DHW than anticipated when the Model was originally developed. In other words, is the forecast Load different than the actual Load because individual units used more energy than expected or because more units were occupied than expected or some other reason.

[SETES: Please see SWCRA's response to BCUC Panel IR 1.4.]

- 1.4.2 How, if at all, is the increased Load related to the energy efficiency of the building(s) and/or the 'Intensity of Usage' set out on the Usage Inputs tab of the Model. Please explain fully.

[SETES: The higher than forecast load for the June to December 2016 period is not expected to be related to the energy efficiency of the buildings but rather primarily to weather and Customer usage patterns.

From the Usage Inputs tab, Intensity of Usage (Rows labelled 19 to 21) is a factor used to adjust the Usage Inputs Predicted energy (Rows labelled 16 to 18) to become the forecast energy sales (Rows labelled 2 to 4) which are copied into the Analysis Per Year tab. The factors applied to the financial model are less than 1 which decreased them below the direct output of the load forecasting model. If the factors were increased to more than 1 they could match the historical

data.

For Customers living in restored heritage buildings, their energy efficiency is anticipated to be lower than new construction however this effect has been included to the extent possible as described in SWCRA reply to 1.4. Heritage building construction focused on longevity of useful building life, at least for the heritage buildings in service today. Modern building science has established contraindications for addition of insulation to these heritage buildings as it may affect the moisture management inherent to the original design. Additionally, heritage conservation regulations limit what may be done to alter the building especially for fenestration products.

For Customers living in new construction, their energy efficiency is anticipated to be as reported in other replies to Information Requests.

We would not support the direct use of historical data from 2016 to forecast for 2017 and beyond by adjusting the Intensity of Usage factors. Some factors which we believe cause the historical data from 2016 to make it unsuitable for forecasting include:

- does not reflect the 4 seasons of Vancouver;
- only includes a single data collection period to forecast 29 more years;
- winter weather pattern appeared to be an outlier having met design low temperatures and prolonged cooler weather;
- only includes Phase 1 which is rental Customer weighted but the full build out will be strata Customer weighted; and
- includes period of adjustment for Customers from no thermal energy billing to thermal energy billing.

]

- 1.5 For the 2016 Half a Year, please provide the actual quantity and actual Revenues collected for Service Start Charges, the Monthly Capacity Levy, and the Monthly Metering charges. Please provide an explanation for any variance between these actuals and the forecast that was included in the Analysis per Year tab of the Model.

[SETES:

Strata	Forecast \$	Collected \$	Variance \$	Variance %
Service Start Charges	\$3,250	\$3,150	-\$100	-3%
Monthly Capacity Levy	\$28,618	\$25,420	-\$3,198	-11%
Monthly Metering Charges	\$4,323	\$4,095	-\$228	-5%
<b>Total</b>	<b>\$36,191</b>	<b>\$32,655</b>	<b>-\$3,536</b>	<b>-10%</b>

Rental	Forecast \$	Collected \$	Variance \$	Variance %
Service Start Charges	\$10,500	\$9,954	-\$546	-5%
Monthly Capacity Levy	\$43,505	\$37,339	-\$6,166	-14%

<b>Monthly Metering Charges</b>	\$11,353	\$12,750	\$1,397	12%
<b>Total</b>	\$65,358	\$60,043	-\$5,315	-8%

We note, for the purpose of responding to this question actual revenue is defined as payment collected from customers in the calendar period of June 1, 2016 to February 28, 2017 with the 2017 period to allow for issuance of December usage period invoices and collection.

Differences in forecasted vs actual collected fixed charges is primarily caused by non-payment of issued bills. Some Customers appear to have lingering uncertainty if invoices must be paid before final rates have been set.

For accounting purposes, collected payments are attributed first to the service start charge / monthly capacity levy / monthly metering charges before energy charges (see SWCRA response to BCUC Panel IR 1.3). Consequently, this exaggerates the apparent variance percentages with the service charge variance appearing lower and the energy charges variance appearing higher.]

- 1.5.1 If the 2016 Half a Year actual results are different from the forecast how, if at all, does this information impact the forecast provided in the Model for Service Start Charges, the Monthly Capacity Levy, and the Monthly Metering charges for the remaining years.

[SETES: The calculated variance for service start charge / monthly capacity levy / monthly metering charges is relatively low compared to the variance for energy charges. See SWCRA's response to BCUC Panel IR 1.5 for the reasons for this.

A negligible adjustment could be made to the service start charges to be non-zero in the years other than 2016/2019/2020 to reflect the collection for turnover of rental customers and any sales of strata units. Such an adjustment however, is expected to be minute compared to the impact of any year to year variation in energy related charges and as such is not expected to be observable in total revenue variations (e.g. 4 changes in rentals and 4 sales is \$400 additional revenue out of forecast revenue of \$975,800 in 2020 or less than 0.05% variance.).

As the Monthly Capacity Levy rate design is to reference the CoV SEFC NEU, a change in CoV policy on its rate design and change in Monthly Capacity Levy could alter the forecasts applicability for this charge. SWCRA has applied current, publicly released information to forecast the Monthly Capacity Levy rate change over time.

The expected impact to service start charge / monthly capacity levy / monthly metering charge based on continuation of existing accounting is of minimal impact to the forecast once final rates are approved. ]

- 1.6 The following table was prepared to compare the 12 months 2017 forecast Load (sales) and Revenue to the 6 months actual Load and Revenue. Please confirm that the table is accurate or update as necessary.

2017 (12 Months)					
	[Unit]	Forecast 2017	Actual 2016 Ha	Variance \$	
Load	Space Cooling - kWh	[kWh]	73,959	301,204	<b>227,245</b>
	Space Heating - kWh	[kWh]	1,071,287	1,178,633	<b>107,346</b>
	Domestic Hot Water - kWh	[kWh]	200,450	291,674	<b>91,224</b>
			<b>1,345,697</b>	<b>1,771,511</b>	<b>425,814</b>
Revenue		Proposed Rate			
	Space Cooling - kWh	\$ 0.05387	3,984	\$ 16,226	\$ <b>12,242</b>
	Space Heating - kWh	\$ 0.10774	115,425	\$ 126,991	\$ <b>11,566</b>
	Domestic Hot Water - kWh	\$ 0.10774	21,597	\$ 31,426	\$ <b>9,829</b>
			<b>\$ 141,006</b>	<b>\$ 174,643</b>	<b>\$ 33,637</b>

[SETES: Please see the revised table below:

2017 (12 Months)						
	[Unit]	Forecast	Actual	Variance	Variance %	
Load	Space Cooling - kWh	[kWh]	73,959	39,331	-34,628	-47%
	Space Heating - kWh	[kWh]	1,071,287	1,264,243	192,956	18%
	Domestic Hot Water - kWh	[kWh]	200,450	342,372	141,922	71%
			<b>1,345,696</b>	<b>1,645,946</b>	<b>300,250</b>	<b>22%</b>
Revenue		Proposed Rate				
	Space Cooling - kWh	\$ 0.05180	\$ 3,831	\$ 2,192	\$ (1,639)	-43%
	Space Heating - kWh	\$ 0.10360	\$ 110,985	\$ 11,944	\$ (99,041)	-89%
	Domestic Hot Water - kWh	\$ 0.10360	\$ 20,767	\$ -	\$ (20,767)	-100%
			<b>\$ 135,583</b>	<b>\$ 14,136</b>	<b>\$ (121,447)</b>	<b>-90%</b>

Please refer to SWCRA's response to BCUC Panel IR 1.3 for further remarks about the 2016 data.

We note, we would not recommend the extrapolation of 2016 data to 2017 data and beyond.

For the reasons specified in response to BCUC Panel IR 1.1.4 the energy usage patterns from 2016 are not expected to be typical. Furthermore, once Phase 2 is completed the utility will be predominated by strata customers as opposed to rental customers.

]

- 1.7 Please confirm, or explain otherwise, that the table above shows that SWCRA actually sold more kWh in the last six months of 2016 than it forecasts to sell in all of 2017 (12 months).

[SETES: Confirmed with the modification that it is the last seven months of 2016 which are reported instead of the last six months of 2016.

Please see SWCRA's response to BCUC Panel IR 1.4 for discussion. ]

- 1.8 In SRCRA's view is the Load (sales) and Revenue forecast for Space Cooling, Space Heating, and DHW provided in the Model still accurate considering the actual 2016 information that is now available? If SWCRA considers the forecast is still accurate, please explain fully.

[SETES: SWCRA believes it is better to characterize the forecasts as being informative rather than being accurate/inaccurate.

Please see SWCRA's response to BCUC Panel IR 1.9.1.1 for reasons why extrapolation of recorded 2016 data over long periods could cause significant errors.

Please see SWCRA's response to BCUC Panel IR 1.4 for a discussion on how the various factors which may affect the usefulness of the forecast and possible means to improve the accuracy of the forecast inputs.

Space heating accounts for a majority of the energy sold both in the forecasted and actual loads. Space heating energy is primarily driven by winter temperatures. Severely cold winters and mild winters occur roughly cyclically according to the El-Nino/El-Nina weather phenomenon, and it is expected that over the course of many years, the winter temperatures will average to the typical metrological mean. Therefore, extrapolation of space heating loads during a once-in-30 year extraordinary weather event will likely cause significant projection errors. Furthermore, academic sources predict the progressive rise of winter temperatures in the near future for the region, which should decrease heating demand.

The domestic hot water (DHW) consumption is considered independent from the building envelope and internal heat-gain driven loads (e.g. space heating and space cooling) as the DHW is used for personal hygiene / cooking. DHW consumption patterns are driven primarily by personal habits. This leads to the conclusion that the DHW consumption data from 2016 (reflecting Phase 1 Customers during an initial start up period) is not necessarily representative of future DHW consumption once full build-out is achieved and the majority of SWCRA's Customers are Phase 2 Customers.

Perhaps there are some inferences of future usage patterns which may be relevant from 2016 usage patterns, however, the 2016 usage patterns were established in the midst of what is expected to be a new type of utility bill for most Customers. With the cost of thermal energy being visible instead of being embedded into electric / natural gas /strata fees / rents and so forth, Customers are provided with a more clear means of understanding how personal usage patterns affect costs. Thus, the 2016 data is unlikely to be representative of typical Phase 1 Customer usage patterns.

Another forecasting method could be used, such as the extension of thermal energy utility data from other utilities from similar buildings. Such a method however, ultimately depends on the same physical governing principles described in SWCRA's response to BCUC Panel IR 1.4.

For historical data of SWCRA to be of greater use to forecast SETES' loads, SETES should be at full build-out and several years of representative data should be included. As the scientific community is predicting increased incidents of "extreme weather" as a result of climate change, the ability of any one year of historical data to provide significantly improved matches to actual occurrence may be limited.

In summary, SWCRA believes the existing financial model and its forecast has continued validity for understanding the economics of SETES for future years. For the limited factors within SWCRA's control, the most dominant factor of adjusting for weather is a backwards-only solution. For the remainder of factors, they appear to be out of SWCRA's control and/or ability to know with certainty.]

- 1.8.1 If not accurate, please update the Load (sales) and Revenue forecast in the Model for all years and explain how the updated Load forecast for 2016 to 2020 (full build out) was derived and explain any assumptions.

[SETES: Please see SWCRA's response to BCUC Panel IR #1.8.]

- 1.9 On the basis of an updated Load forecast please update the four tables that were provided in response to BCUC IR 39.1 to reflect the updated expected Load for a 775 square foot unit and a 2000 square foot unit and update the 'Comparison of the Rates' table.

[SETES: As the load forecast has not been updated, the tables are not modified.]

- 1.9.1 For any changes to the estimated kWh (11,547 kWh for a 775 square foot unit and 13,381 kWh for a 2000 square foot unit) please explain the rationale for the change addressing space heating, space cooling, and DHW separately.

[SETES: Please see SWCRA’s response to BCUC Panel IR 1.9.]

- 1.9.1.1 If there are resulting changes to the British Columbia Hydro and Power Authority (BC Hydro) scenario’s kWh please explain fully the rationale for the change.

[SETES: Please see SWCRA’s response to BCUC Panel IR 1.9.]

- 1.9.2 Please explain any difference between the forecasted annual charges under SWCRA’s proposed rates and BC Hydro’s rates in the updated ‘Comparison of the Rates’ table if different than the one provided in response to BCUC IR 39.1.

[SETES: Please see SWCRA’s response to BCUC Panel IR 1.9.]

- 1.10 If the Load forecast is updated is there a resulting change to the energy savings set out in response to FortisBC Alternative Energy Services Inc. (FAES) IR 5.1? If not, why not? If yes, please explain and disclose the updated energy savings.

[SETES: Please see SWCRA’s response to BCUC Panel IR 1.9.]

**2.0 Reference: Financial Model  
Exhibit B-17, SRG IRs 4.2, 4.4; Appendix D – SETES Utility Invoices  
Monthly electric usage**

- 2.1 Based on the BC Hydro invoices provided in Appendix D of Exhibit B-17 (SRG’s IRs), the registered kW demand for the months of September 2016 to January 2017 does not agree to the information in the table provided in response to SRG IR 4.2. Please explain the discrepancy or update the table as necessary.

[SETES: Please see the updated table below:

Electricity	kWh	kW
Jan 18- Feb 16	74,700	121
Dec 16- Jan 17	84,600	<del>205</del> -185*
Nov 17- Dec 15	82,800	<del>214</del> -194*
Oct 18- Nov 16	85,500	<del>201</del> -181*
Sep 16- Oct 17	63,000	<del>194</del> -174*
Aug 17- Sep 15	62,100	143
Jul 16- Aug 16	54,900	116
Jun 16- Jul 15	54,900	116
May 17- Jun15	60,300	121

]

- 2.2 The table below was compiled to show variances between the 2016 Half a Year (July to December) electricity and natural gas (Cost of Energy or COE) forecast purchases provided in the Model with the actual COE purchases provided in response to SRG IR 4.4. Please confirm that the table is accurate or update as necessary.

Utility Invoices Summary				
2016 Half a year				
	Forecast	Actual	Variance \$	Variance %
BC Hydro	\$ 19,458.39	\$ 36,430.60	\$ 16,972.21	87%
Fortis	\$ 14,511.82	\$ 47,758.42	\$ 33,246.60	229%
	\$ 33,970.21	\$ 84,189.02	\$ 50,218.81	148%
Invoice	BCH	Fortis		
	Note 1			
17-Jan	\$ 3,777.07			
16-Dec	7,837.26	16,890.81		
16-Nov	6,765.31	8,667.47		
16-Oct	5,689.81	11,444.25		
16-Sep	5,301.70	2,409.93		
16-Aug	4,706.48	4,064.32		
16-Jul	2,352.98	4,281.64		
	\$ 36,430.60	\$ 47,758.42		
<b>Note 1:</b>	BCH billing period starts mid-month (i.e. billing period ending Jul 2016 covers Jun 16th to Jul 15th). Therefore, half of the total bill amount for billing periods ended Jul 2016 & Jan 2017 were used to calculate COE for Jul 1 to Dec 31, 2016.			

[SETES: The utility costs for August-December accurately reflect the BC Hydro bills, using half the bills for the months of July and January is a reasonable way of estimating the electrical energy costs for the period. The Fortis billing periods are from start to end of month so are accurately reflected.]

2.3 Please explain why the Fortis (natural gas) October, November and December invoices are significantly higher than the other months.

[SETES: For the period in consideration, the months of October, November and December typically have colder temperatures which is the greatest driver of space heating energy. In essence, the difference is driven by Winter / Late Autumn weather versus Summer / Early Autumn weather.

The conditions for excess space heating energy consumption is further compounded by the untypically cold winter experienced in late 2016 / early 2017. The recorded temperatures for December dipped below the winter design condition (low probability engineering statistical value established in building codes for the purpose of designing heating systems) for Vancouver several times.

The heating-only equipment includes the natural gas boilers. As the boilers are providing heat, they consume more natural gas.]

2.4 Is the increased COE, of 87 percent for BC Hydro and 229 percent for Fortis, related solely to the increased demand (increased kWh sold) or is it also related to the Thermal Energy System requiring more electricity and natural gas than originally expected? If the later, please fully explain.

[SETES: The explanation for the extra cost of actual energy vs. projected can be attributed to the following:

1. Colder than normal weather drives up space heating demand; this causes increased demand on the heating equipment as well as causing a drop in the efficiency of the DX heating equipment.
2. Thermal energy plant being tuned, system not running at optimum efficiency and energy being consumed in the commissioning process.
3. Thermal energy for service hot water demand for rental building customers higher than expected.

Thus, the main attribution for increased electricity and natural gas is due to increased loads.

A secondary attribution is the ongoing commissioning of SETES' equipment. As SETES is leading

the application of this combination of thermal equipment for a primarily residential application, there are ongoing adjustments of plant equipment. Commissioning has provided some adjustments including to: different control sequences for the solar thermal panels to increase their ability to contribute thermal energy and therefore offset a greater amount of boiler-derived energy; altered control of pumps to increase their responsiveness to system conditions; and altered control of water temperatures to more exactly match customer conditions.]

- 2.5 On the basis of the actual 2016 COE used does SWCRA still consider the COE forecast in the Model to be accurate? If yes, please fully explain why.

[SETES: Yes, for the ratios of customer load to energy purchases. The COE may vary as is proven when loads vary or as utility rates vary.

As the COE has a strong relationship to the loads, a variation in the load will affect the COE. If the load forecast were updated, the COE would be adjusted in a fairly linear fashion to the load change. COE forecasts are also subject to changes in government policy. If government policy were to alter the pace of changes in electricity rates or were to alter the pace of change of natural gas rates (e.g. carbon tax increase), the COE forecast could be updated.

It is expected that as plant performance stabilizes and under average weather conditions, the COE will track closer to the predictive financial model for any given load. The longer the plant is in service, the better its specific operating characteristics will be understood by SWCRA which will support ever better commissioning and maintenance to achieve design levels of efficiency. SWCRA notes that Phase 2 is introducing additional equipment to Phase 1 equipment and its integration will not be instant nor are the exact impacts knowable until they occur.

Also, as per SWCRA's response to SRG IR 3.5.1, 3.5.2, and 3.5.3, there is a factor of uncertainty ("performance degradation factor") which is included into the forecast COE. SWCRA considers that the COE forecast is accurate as far as it is also uncertain of the COE, among multiple factors, which make far away forecasts less likely to match actual numbers.]

- 2.5.1 If not, please update the Model to reflect the updated COE forecast for 2016 and beyond. For clarity please update the entire Confidential Financial Model filed as Exhibit B-1-1 (Updated Application) to reflect the updated Load/Sales forecast, Revenue forecast and COE forecast for 2016-2045. Please ensure that the Analysis Per Year tab and all the supporting tabs including the Usage Inputs and Loads tabs are updated as necessary.

[SETES: Please refer to SWCRA's response to BCUC Panel IR 2.5.]

- 2.5.2 Please fully explain how the updated COE forecast was derived and explain any assumptions.

[SETES: Please refer to SWCRA's response to BCUC Panel IR 2.5.]

- 2.6 Given the apparent uncertainty with the Load forecast (and the resulting Revenues and COE expense), in at least the initial years, would SWCRA be open to having a deferral account to capture any variance between forecast and actual: (a) Revenues due to Load, and (b) COE expense? In your response please explain fully the basis of any objections and discuss the advantages and disadvantage of such a variance deferral account.

[SETES:

SWCRA is not opposed in principal to a deferral account mechanism to capture the impact to revenue due to uncertain load or cost of energy; however, the following issues/disadvantages would arise with applying such a mechanism to SWCRA:

- The suggested variance deferral account mechanism would appear to require a cost of service revenue requirement based on forecasts of load and revenue, whereas SWCRA proposes rates that are pegged to the rates of other utilities and that are not based on forecasts of load and revenue at SETES.

- If the Utility rates are pegged as proposed, the rates will not be set on the basis of enabling the Utility to recover a forecast revenue requirement and it would not necessarily follow that higher than forecast revenues will result in over-recovery of costs. If actual revenues exceed forecast revenues, the Utility could nevertheless have insufficient revenues to cover costs or vice-versa because the rates are not proposed to be set specifically on the basis of a revenue forecast.
- There would be significant additional regulatory burden and cost to determine a cost of service revenue requirement for the Utility and to review and approve load and revenue forecasts presumably for each year the deferral account is in effect.
- Adds volatility to customer bills as the balance in the account is recovered from or credited to Customers from time to time, potentially resulting in Customer confusion/dissatisfaction.
- Perceived reduction in self-interest to maintain the thermal energy system at full efficiency as there is less consequence to not maintaining a full efficiency plant.
- Might require increased monitoring of Customer energy usage patterns to improve forecasting.

Applying such a mechanism to SWCRA could have the following potential advantages:

- SWCRA's annual revenues would be fixed and not subject to variable load resulting in a reduction to SWCRA's risk. However, this risk would be borne by the Customers.
- The certainty of revenues and reduced risk would improve SWCRA's financial position. SWCRA has access to financial resources from external sources however the introduction of such a deferral account mechanism would be expected to decrease reliance on external sources.
- Greater ability to flow through changes in provincial/federal tax practices. For example, increased carbon taxes.]

## B. CORPORATE STRUCTURE

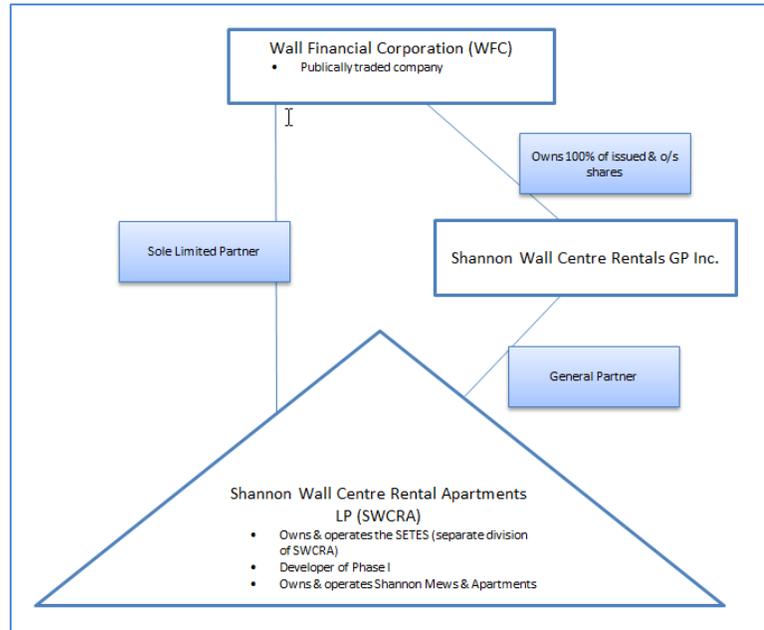
### 1. Reference: Corporate Structure

Exhibit B-1-1, p. 13; Exhibit B-5, BCUC IR 49.1; Exhibit B-17, SRG IR 2.12; Exhibit B-20, BCUC IR 92.1

#### Organizational chart

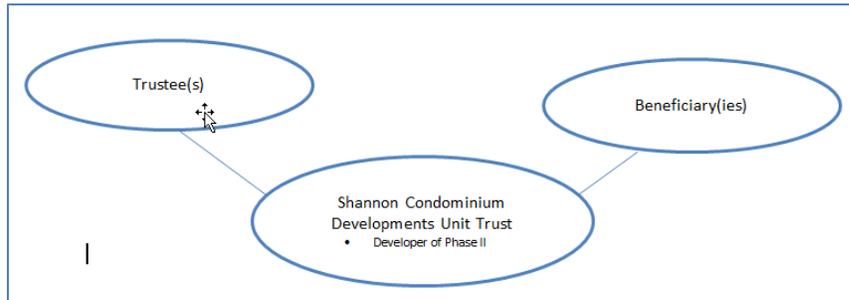
- a. Based on the information provided in the Updated Application and SWCRA's responses to BCUC's and SRG's IRs, the current corporate structure of the Shannon Estates Thermal Energy System (SETES) is as depicted below in Figure 1 and in Figure 2 following (IR 3.4). Please confirm, or update as necessary, that these diagrams accurately reflect the current corporate structure of the SETES.  
[SETES: WFC and SWCRA confirm that Figure 1 is an accurate representation of the parent corporate structure]

**Figure 1: Shannon Wall Centre Rental Apartments**

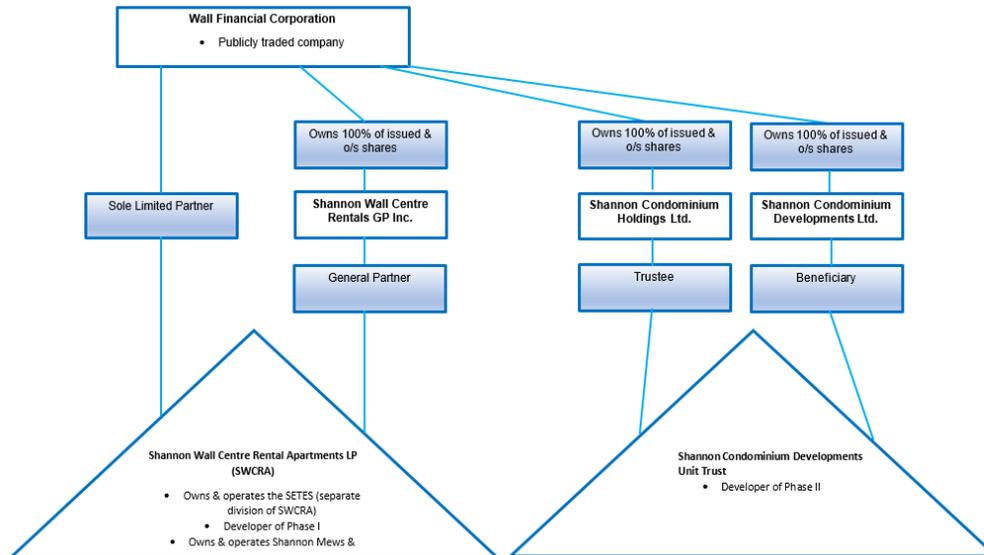
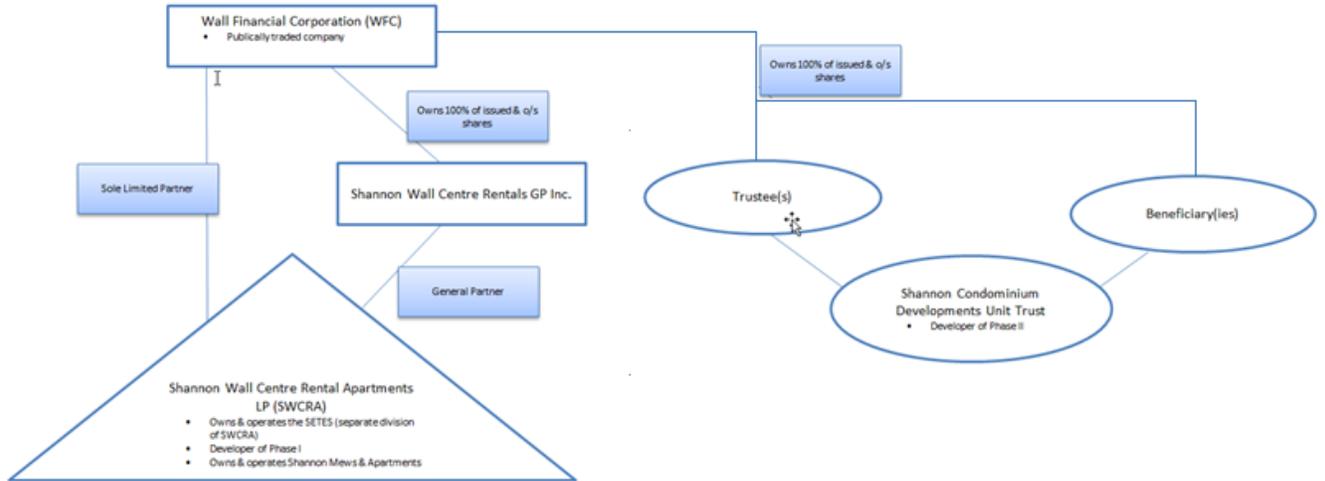


- b. SWCRA stated that SETES operates as a separate division of SWCRA. Please clarify the meaning of a 'division' of a limited partnership. In your response please address how the books for SETES are maintained and if they are tracked separately from the rest of the activities of the limited partnership.
- [SETES: The limited partnership has operations in the different segments (or divisions) listed in the above diagram. These operations are separately tracked for accounting purposes.]
- i. Other than the SETES and the Rental Apartments, are there any other divisions within SWCRA? If yes, please explain what they are.
- [SETES: There are currently only the Rental Apartments and SETES segments within SWCRA.]
- c. The diagram in Figure 2 shows the structure of the Shannon Condominium Unit Trust. Please identify who the current trustee(s) and beneficiary(ies) of the Shannon Condominium Developments Unit Trust are.
- [SETES: The trustee is Shannon Condominium Holdings Ltd. and the beneficiary is Shannon Condominium Developments Ltd., both of which are owned by Wall Financial Corporation.]
- d. Please combine Figures 1 and 2 to show the inter-relationship, if any, between the Shannon Condominium Developments Unit Trust and Wall Financial Corporation and SWCRA.

**Figure 2: Shannon Condominium Development Unit Trust**



[SETES: Please see the diagrams below.]



**C. ADDITIONAL INFORMATION REQUESTS FROM MR. D. FOX**

1.0 Please provide me with the pages of the Limited Partnership Agreement and the Trust Declaration that identify the parties to the agreements.

[SETES: Please refer to the initial pages of the Limited Partnership Agreement and Declaration of Trust below.

**AGREEMENT OF LIMITED PARTNERSHIP  
OF  
SHANNON WALL CENTRE RENTAL APARTMENTS LIMITED PARTNERSHIP**

This Limited Partnership is made effective the 4<sup>th</sup> day of February, 2014, between Shannon Wall Centre Rentals GP Inc., as general partner (the "**General Partner**"), and Wall Financial Corporation ("**Wall Financial**"), as the initial Limited Partner, pursuant to the Limited Partnership *Act* of British Columbia (the "**Act**") on the following terms and conditions.

WHEREAS:

A. The General Partner, and Wall Financial wish to establish the Shannon Wall Centre Rental Apartments Limited Partnership (the "**Limited Partnership**") as a limited partnership under the *Act* pursuant to the terms of this Agreement (the "**Partnership Agreement**") upon the filing of a Certificate of Limited Partnership with the Registrar of Companies for the Province of British Columbia; and

B. The parties wish to record the agreement amongst them and each and every person who from time to time is admitted to the Limited Partnership as a Limited Partner and any Person who is a successor to such Limited Partner.

**ARTICLE 1  
DEFINITIONS**

1.1 Definitions. Capitalized terms not otherwise defined in this Agreement shall have the meanings given to such terms in Schedule A to this Agreement.

**ARTICLE 2  
ORGANIZATION**

2.1 Formation. The General Partner and Wall Financial hereby agree to form a limited partnership pursuant to the provisions of the *Act*, upon the terms and conditions set forth in this Agreement.

2.2 Certificate of Limited Partnership. A Certificate of Limited Partnership for the Limited Partnership shall be duly filed in the Corporate Registry of the Province of British Columbia and shall be filed or recorded in such other public offices as is required under applicable law. Amendments to the Certificate shall also be duly filed and recorded as required under law or deemed advisable in the discretion of the General Partner to reflect any amendments effected pursuant to this Agreement, the making of additional Capital Contributions, the admission to the Limited Partnership of additional Limited Partners or for any other reason that the General Partner may determine.

2.3 Required Filings. The General Partner shall execute, acknowledge, file, record and/or publish such other certificates and documents, as may be required by this Agreement or by law in connection with the formation and operation of the Limited Partnership. Each Partner shall execute all certificates and other documents consistent with the terms of this Agreement which are necessary for the General Partner to accomplish

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**SHANNON CONDOMINIUM DEVELOPMENTS UNIT TRUST**

**THIS DECLARATION OF TRUST** is made as of March 16, 2015

BETWEEN:

**SHANNON CONDOMINIUM DEVELOPMENTS LTD.**, a  
company formed and existing under the laws of British Columbia  
  
(the “**Initial Unitholder**”)

AND:

**SHANNON CONDOMINIUM HOLDINGS LTD.**, a company  
formed and existing under the laws of British Columbia  
  
(the “**Initial Trustee**”)

**WHEREAS:**

- A. The Initial Unitholder desires to create a trust for the purpose of acquiring and developing real estate and/or investing in real estate or real estate related ventures;
- B. For the purpose of settling the trust, the Initial Unitholder paid to the Initial Trustee the amount of \$100.00 in lawful money of Canada (the “**Initial Contribution**”);
- C. The Initial Trustee agreed to hold the Initial Contribution and all amounts and assets subsequently received under this Declaration of Trust in accordance with the provisions hereof; and
- D. The Initial Unitholder and the Initial Trustee desire that the beneficiaries of the Trust, including the Initial Unitholder, shall be the holders of Units (as hereinafter defined).

**NOW THEREFORE THIS DECLARATION WITNESSES** as follows:

**ARTICLE 1.  
INTERPRETATION**

**1.1. Definitions**

In this Declaration of Trust, including the recitals hereto, unless the context otherwise requires, the following terms shall have the following meanings:

“**Affiliate**” of a Person means any Person directly or indirectly Controlling, Controlled by or under common Control with such Person.

“**Auditors**” means the firm of chartered professional accountants appointed as the auditors of the Trust from time to time in accordance with the provisions hereof;

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2.0 Have any other limited partners joined the partnership. If so, who are they and to they remain as limited partners at this time?

[SETES: No other partners joined the partnership.]

3.0 Have any other trust unit been issued. If so, to whom and to do they remain as trust unit holders at this time?

[SETES: No other unit trusts have been issued.]