



City of Richmond

Report to Committee

To: General Purposes Committee

Date: March 30, 2016

From: John Irving, P.Eng. MPA
Director, Engineering

File: 10-6125-07-01/2016-Vol
01

Re: Improved Energy Efficiency In District Energy Connected Buildings

Staff Recommendation

That Richmond Zoning Bylaw 8500, Amendment Bylaw 9531 be introduced and given first reading.

John Irving, P.Eng. MPA
Director, Engineering
(604-276-4140)

Att. 2

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Development Applications	<input checked="" type="checkbox"/>	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: DW	APPROVED BY CAO

March 30, 2016

Staff Report

Origin

This report supports Council's 2014-2018 Term Goal #4 Leadership in Sustainability:

Continue advancement of the City's sustainability framework and initiatives to improve the short and long term livability of our City, and that maintain Richmond's position as a leader in sustainable programs, practices and innovations.

- 4.1. *Continued implementation of the sustainability framework.*
- 4.2. *Innovative projects and initiatives to advance sustainability.*

Background

In consultation with the City's consultants and local developers, staff have identified an opportunity to improve energy efficiency in district energy (DE) connected buildings within the City Centre Area. Improvements in energy efficiency can be achieved based on the type of mechanical heating and cooling system installed in the building. Developers have been installing water source heat pumps (WSHPs) to extract and transfer heat into buildings through the district energy system. Although water source heat pumps are cheaper to install, they operate vapour compressors in heating mode, which requires greater electricity use than other technologies and are therefore less energy efficient.

The proposed zoning bylaw amendment would provide a floor area ratio (FAR) exemption to allow developers to install more energy efficient equipment without adversely affecting their sellable area. This report summarizes the analysis and industry consultation and presents the proposed zoning amendment bylaw for Council's consideration.

Analysis

Energy Savings and Occupant Comfort

WSHPs use vapour compressors during heating mode, which require increased electricity usage compared to other technologies. Based on analysis completed by staff, installation of alternative technologies such as hybrid heat pumps, four-pipe fan coil and radiant heaters, could reduce electricity costs for the occupant of an average sized unit by approximately \$138 annually. In a development with 300 units, total savings for all occupants could reach a combined \$41,400 annually. Since other technologies do not use vapour compressors in heating mode, they are also quieter than WSHPs, increasing occupant comfort.

The major factor preventing developers from installing alternative technologies and realizing the above benefits is the higher installation cost. While operating costs are reduced, there is an initial capital cost premium to install these alternative technologies, estimated at approximately 18% over the cost of WSHPs.

March 30, 2016

Proposed Floor Area Ratio Exemption

The proposed zoning bylaw amendment would provide a FAR exemption of 1 m² (11 ft²) per dwelling unit that contains alternative (more energy efficient) district energy compatible heating equipment in-building. Based on a typical development connected to the district energy system in Richmond (approximately 323,000 ft² of floor area with 300 units), this would result in approximately 3,300 ft² of exempted sellable floor area for the developer.

Stakeholder Consultation

City staff consulted local developers throughout the technical analysis process. Staff met with UDI representatives in April 2015 and again in March 2016. In addition, a memorandum (Attachment 1) clarifying the proposed amendment to the Zoning Bylaw has been distributed to the stakeholder group for review and comment. The stakeholder group was supportive of the proposed FAR exemption and the only question posed was whether this exemption would apply to developments within the City owned district energy systems only. Staff indicated that there are currently no privately owned district energy systems within City regulated DE service areas.

Recommended Zoning Bylaw Amendment (Bylaw 9531)

The proposed amendment to Zoning Bylaw 8500 will insert a FAR exemption into the General Development Regulations of 1 m² per dwelling unit for units that contain heating equipment, where vapour compressors are not being used to deliver heating in buildings committed to connect to a district energy system. The proposed bylaw amendment encourages the installation of more energy efficient technologies without affecting sealable floor area for the developer. It is also expected to reduce energy cost and increase comfort for the occupant.

Financial Impact

None.

Conclusion

The proposed bylaw amendment would provide a floor area exemption to developments that are committed to connecting to district energy in City Centre, and install more efficient in-building mechanical equipment. It is recommended that Richmond Zoning Bylaw No. 8500 Amendment Bylaw 9531 be introduced and given first, second and third reading.


Alen Postolka
Manager, District Energy
(604-276-4283)

- Att. 1: Richmond Zoning Bylaw 8500, Amendment Bylaw 9531
2: Memo to Urban Development Institute (UDI)



City of Richmond

Bylaw 9531

Richmond Zoning Bylaw 8500, Amendment Bylaw 9531

The Council of the City of Richmond, in open meeting assembled, enacts as follows:

1. Richmond Zoning Bylaw 8500, as amended, is further amended, as follows:
2. (a) by adding the following as section 4.19:

“4.19 District Energy

4.19.1 Notwithstanding a provision for **floor area ratio** established in a **zone**:

 - a) if a **dwelling unit** contains mechanical, heating, ventilation and air conditioning equipment where a **vapour compressor** is not being used to provide heating; and
 - b) if for which **dwelling unit** the owner has entered into a written agreement with the **City** to connect to the **district energy utility**;

then 1 m² is exempted from the **floor area ratio** calculation for that **dwelling unit**.”
3. (b) by adding, in the proper alphabetical order, the following definitions to section 3.4:

“**District Energy Utility** means the **City** owned district energy utility system for the generation, storage, transmission, and distribution of energy for heating and cooling of space and water at any designated property within the service area;

Vapour Compressor means equipment using liquid refrigerant as the medium which draws heat from a source and subsequently rejects that heat into the conditioned space.”
4. This Bylaw may be cited as “Richmond Zoning Bylaw 8500, Amendment Bylaw 9531”

FIRST READING



PUBLIC HEARING

SECOND READING

THIRD READING

ADOPTED

MAYOR

CITY OF RICHMOND
APPROVED by 
APPROVED by Director or Solicitor 

CORPORATE OFFICER



City of Richmond

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Engineering
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Mr. Jeff Fisher
Urban Development Institute
Suite 200 - 602 West Hastings Street
Vancouver, BC V6B 1P2

Dear Mr. Fisher:

Re: District Energy Equipment Floor Area Ratio Exemption

In April 2015, City staff met with Urban Development Institute (UDI) members where a representative from Trane Canada provided a presentation comparing a range of different in-building mechanical systems that can use energy from the district energy system. The representative compared the installation cost, energy consumption, impacts on occupant comfort, noise impacts and other aspects of different technologies. During discussion between UDI members and City staff following the presentation, UDI members suggested that the City should consider a possibility to provide a FAR exemption for developments that utilize technology that does not use vapour compressors to deliver heating, in order to offset initial higher installation cost to developers.


Water source heat pumps (WSHPs) are frequently used by developers in the Richmond City Centre area due to their relatively lower cost compared to other technologies. However, WSHPs can use only approximately 80% of the District Energy Utility (DEU) energy for space heating and for the remaining energy they have to use electricity (to run the vapour compressors). Other technologies, such as hybrid heat pump, hydronic perimeter heater and 4-pipe fan coil system, do not need to use electricity to provide space heating, which reduces overall heating energy cost to the user.


City staff are bringing forward a zoning bylaw amendment to Council for consideration that will provide a FAR exemption of up to 1 m² of floor space for buildings which are not using vapour compressors in heating mode and commit to connect to the district energy system. Based on a typical development in Richmond with two towers (29,700 m² of gross floor area and 293 units) this would result in approximately 225 m² of additional sellable space for the developer. At the same time, the owner of a 100 m² unit in this building would save approximately \$138 in electricity costs annually. Other benefits of the proposed bylaw amendment include:

- Marketability as a more efficient building
- Increased occupant comfort (no compressor noise)
- Compliance with the Oval Village District Energy Utility Bylaw requirement to use 100% of the annual space heating energy from the DEU

Staff are planning to bring forward the bylaw amendment to Council for consideration at General Purposes Committee on April 18, 2016. We are seeking feedback from UDI members prior to April 4, 2016.

For further information please contact Alen Postolka at apostolka@richmond.ca or 604-276-4283 or Steven De Sousa at sdesousa@richmond.ca or 604 204 8529.


Alen Postolka, P. Eng., CP, CEM
Manager, District Energy


Steven De Sousa
Corporate Support

AP:kdl