From: T Vulcano [skywindtv@yahoo.ca]
Sent: Thursday, April 19, 2012 8:33 AM
To: BC Hydro Regulatory Group; bharper@econalysis.ca; wjandrews@shaw.ca; thackney@shaw.ca; elroys@telus.net; ludob@horizontec.com; alwait@telus.net; gas.regulatory.affairs@fortisbc.com; lworth@bcpiac.com; support@bcpiac.com; electricity.regulatory.affairs@fortisbc.com; colinfussell@shaw.ca; ron@highcliff.ca; sterilizers@excite.com; rcarle@newwestcity.ca; Carlo.DalMonte@catalystpaper.com; moulton@litigationchambers.com; cweafer@owenbird.com; chris_best@transcanada.com; PaulManson@SeaBreezePower.com; anderson.leis@telus.net; jeff@lca.ca; skipsalty@gmail.com; kebyrne@interchange.ubc.ca; djurijew@capitalpower.com; dgogol@enmax.com; tce_regulatory@transcanada.com; info@ippbc.com; daustin@securitieslaw.bc.ca; ian.wigington@corix.com; pcdalton@telus.net; gjcan@shaw.ca; robin@lca.ca; jweimer@telus.net; steven.huhman@morganstanley.com; rbw@bht.com; roninconsult@live.com; lguenther@novuscom.net; nicholasheap@canwea.ca; regulatorylibrary@enmax.com; policy@enmax.com; carleigh.whitman@teck.com; alexa.young@teck.com; paul.cassidy@blakes.com; gjohan@pris.ca; r_darnal@pris.ca; jhughes@litigationchambers.com; saaron@cope378.ca; ekung@bcpiac.com; Thanh_Nguyen@transalta.com; rsalvador@bcpiac.com; jquail@cope378.ca; acpullman@shaw.ca; guyleroux2@gmail.com; bharris11@hotmail.com; lisa.cherkas@morganstanley.com
Cc: Commission Secretary BCUC:EX
Subject: Evidence from Wikipedia

to BCUC Commission Secretary
Noted below is evidence/information for filing regarding BC Hydro Rate Increases

F2012 to F2014 Revenue Requirements Application (F12-F14 RRA

Water enters residences in the US at about 10 °C (50 °F) (varies with latitude and season). Hot water temperatures of 40–49 °C (104–120 °F) are preferred for dish-washing, laundry and showering; requiring the water temperature to be raised about 30 °C (54 °F) or more, if the hot water is later mixed with cold water. The Uniform Plumbing Code reference shower flow rate is 2.5 US gallons (9.5 L) per minute; sink and dishwasher usages range from 1–3 US gallons (3.8–11 L) per minute.

Natural gas in the U.S. is measured in CCF (100 cubic feet), which is converted to a standardized heat content unit called the therm, equal to 100,000 British thermal units (BTU). A BTU is the energy required to raise one pound of water by one degree Fahrenheit. A U.S. gallon of water weighs 8.3 pounds (3.8 kg). So, to raise a 40-gallon tank of 55 °F (13 °C) water up to 105 °F (41 °C) would require (40 × 8.3 × (105 − 55) / 100,000) BTU, or approximately 0.17 CCF, at 100% efficiency. A 40,000 BTU/h heater would take 25 minutes to do this, at 100% efficiency. At $1 per therm, the cost of the gas would be about 17 cents.

In comparison, a typical electric water heaterhas a 4500 watt heating element, which if 100% efficient results in a heating time of about 1.1 hours. Since 16,600 BTU is roughly 4.9 kWh, at 10 cents/kWh the electricity would cost $0.49. Operating a shower at 2.5 gpm and 104 °F (40 °C) is equivalent to operating a 19.8 kW appliance [ref. w computes 13.2 kW, but that is for 20 degree C increase instead of 30]. [4] In the UK, domestic electric immersion heaters are usually rated at 3 kilowatts.

Energy efficiencies of water heaters in residential use can vary greatly, particularly based on manufacturer and model. However, electric heaters tend to be slightly

more efficient (if one omits the power station losses) with recovery efficiency (how efficiently energy is transferred to the water) reaching about 98%. Gas fired heaters have maximum recovery efficiencies of only about 86% (the remaining heat is lost with the flue gasses). Overall energy factors can be as low as 80% for electric and 50% for gas systems. Natural gas and propane tank water heaters with energy factors of 62% or greater, as well as electric tank water heaters with energy factors of 93% or greater, are considered high-efficiency units. Energy Star-rated natural gas and propane water heaters have energy factors of 67% or higher; electric tank water heaters are not included in the Energy Star program. Since electricity production itself today has efficiency levels ranging from only 15% to slightly over 55% (combined cycle gas turbine), with around 40% typical for thermal power stations, direct electric water heating is typically the least energy efficient option. However, use of a heat pump can make electric water heaters much more energy efficient and lead to a decrease in carbon dioxide emissions, even more so if a renewable source of electricity is used.
A tankless water heater operating at those same power levels (at 100% efficiency) would be able to supply 1.6 gpm continuously, raising the temperature by 30 °C

(54.0 °F). The same unit could supply 1.3 gpm while raising the temperature by 33 °C (59.4 °F). To be able to handle a full house load of multiple uses (at least 5 gpm) with a centralized tankless water heater would require three to four times this power level—somewhat difficult to achieve with natural gas, and very difficult to achieve with electricity. Many tankless water heaters can use over 100,000 BTU/h during high flow, and so require especially large power supplies.

Unfortunately, it takes a great deal of energy to heat water, as one may experience when waiting to boil a gallon of water on a stove. For this reason, tankless on-demand water heaters need to have a very powerful source to be usable. A standard 15-ampere rated wall electric outlet, by comparison, can only source enough power to warm a disappointingly small amount of water: about 0.17 gpm at 40 °C temperature elevation