



APPENDIX E

Update – Conversion of Existing Propane System to Natural Gas Resource Option Details

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Introduction

Terasen Gas (Whistler) Inc. operates a propane storage and distribution system to meet energy demands in the resort community. A conversion to natural gas would involve decommissioning propane facilities, purging and gasifying the distribution system, upgrading meters and regulators, performing customer appliance conversions, and building a regulating station.

Project Description

The IP/DP regulating station will be sized for design flow and will reduce the IP Pipeline pressure from a maximum of 300 psig to 80 psig for delivery into the existing TGW NPS 8 distribution pipeline in the Function Junction area. As this involves a relatively low pressure drop, gas heating equipment to compensate for the pressure drop cooling effect is not required and the corresponding site space requirements are minimal. The IP/DP station will be located below grade within either municipal or MOT road right-of-way. Hence, it can be pre-fabricated off-site and installed and commissioned in Whistler with minimal traffic disruption.

Conversions and upgrades will be handled by contractor teams of 10-12 personnel. Each team will assist in the purging, leak-testing, and re-gasification of each isolated section and the conversion of customer appliances to use natural gas. TGI personnel will be deployed during the conversion and upgrade work as required to ensure the work can be efficiently placed into operation upon completion and to ensure all are completed in conformity with Terasen and industry practices.

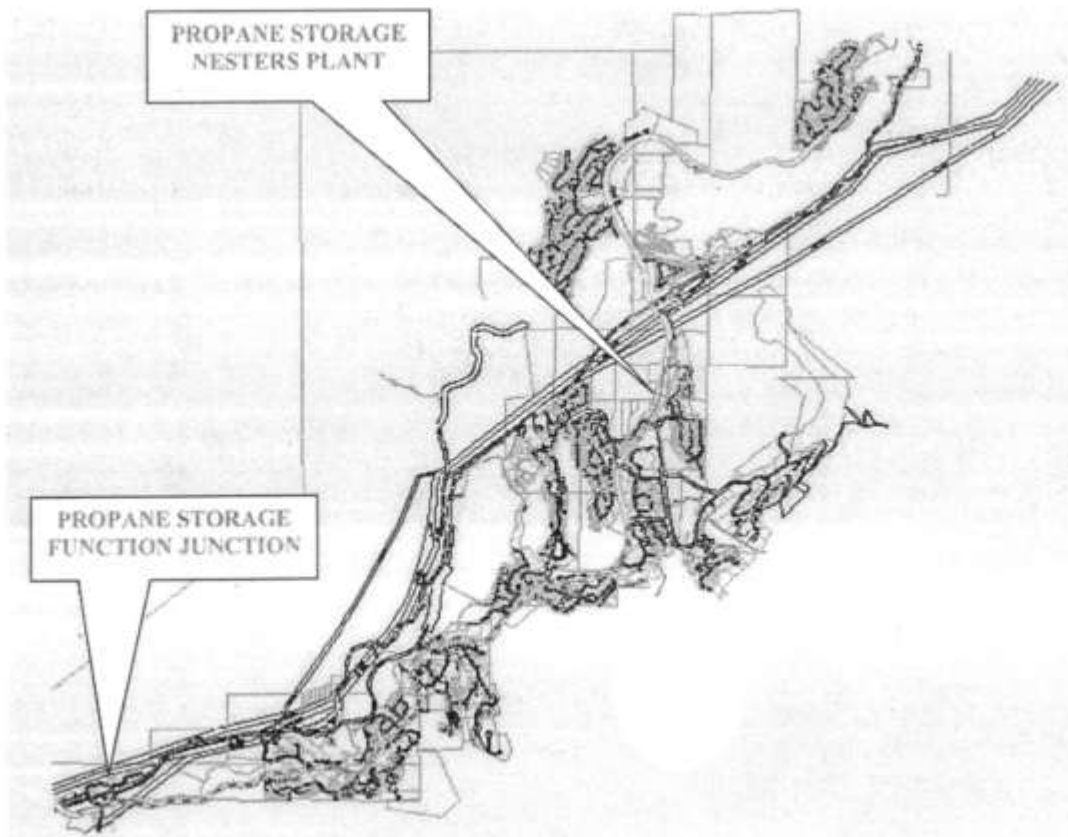
Natural gas has a lower energy value than propane. Conversely, propane distribution pressures must be kept relatively low compared to natural gas (20 psig versus 80 psig) to prevent the propane vapor from liquefying. Hence, a higher operating pressure is both feasible and necessary with natural gas to maintain and increase system capacity. A system survey will be performed to identify any upgrades that may be needed to operate with natural gas at higher pressures. Given the experience gained from the conversions in Squamish, Nanaimo, and Victoria, it is expected that only minor system upgrades will be required. Meters and regulators will have to be upgraded to handle larger gas volumes. Customer appliances will need to be retrofitted to use natural gas. Natural gas will be introduced in sections on a daily basis. A leak survey will be performed prior to and concurrently with the conversion to natural gas and higher operating pressures.

After 1999, meters and regulators have been sized in anticipation of natural gas to the service region. It is likely that only a simple orifice change is required for these meters and regulators. Older models may require complete replacement to handle larger flow volumes. In general, the complexity and per unit cost of an appliance conversion increases with large gas customers. Cost to convert large resort hotels to natural gas will be highest; it will be the lowest for residential properties.

The distribution system will be sectionalized based on customer density and complexity to allow for the complete natural gas conversion of each section in a single day. Figure 1 shows a schematic of the TGW distribution system. Natural gas will be introduced from the south, section by section. Mains will be purged and gasified, meters and regulators will be upgraded, and

customer appliance conversions will be performed. A leak survey will be performed prior to and concurrently with the introduction of natural gas and the increase in operating pressure to each section. The Nesters plant will continue to supply propane from the north until all sections are converted. The Function Junction Plant will be decommissioned when all sections to the south of Function Junction have been converted to natural gas. Once natural gas is introduced to all sections south of the Nesters plant, the Nesters plant will be decommissioned and temporary propane tanks will be employed to supply propane to sections north of the Nesters plant. The conversion will continue north section by section until the entire system is converted to natural gas.

Figure 1 Schematic of TGW Distribution System



Cost Estimate

The original cost estimate for a natural gas conversion program in Whistler was prepared in 1999 by performing a customer appliance survey. This cost estimate was prepared by the contractor that performed the Victoria conversion. The cost estimate in the 2004 Whistler Resource Plan was updated by incorporating increases in labour and equipment rates and customer growth. In 2005, the cost estimate was updated by performing a review of TGW customer records, an assessment of labour rates in consultation with the contractor that performed the Victoria upgrade work, an estimate of conversion man-hours and material costs,

and a survey of per diem expenses. Just prior to the conversion project, a detailed appliance survey will be performed to determine the exact details for conversion in each household. At that time, specific materials can be ordered for each development. This detailed survey is captured under planning and project management. Table 1 shows the appliance distribution for a sample development. Table 2 summarizes the revised cost estimate for the IP/DP station and the conversion project.

Table 1 Appliance distribution of a sample development

Appliance Type	Count
Fireplace	78
Barbeque	10
Patio Heater	2
Furnace	8
Boiler	11
Hot Water Tank	11
Range	8
Commercial Boiler	4
Commercial Hot Water Tank	3
Makeup Air Unit	4
Generator	1

Table 2 Capital Cost Summary

Description	Cost (\$000s)
IP/DP Station	269
DP Conversion	
Technical Assessment	43
System Improvements	294
Customer Upgrades	
Meter and Regulator Upgrades	457
Equipment Retrofits	3,049
Piping Compliance	250
Planning and Project Management	350
Contingency	590
Total	5,303