

ROLE OF NATURAL GAS FIRED GENERATION

PURPOSE

To describe the role of natural gas fired generation as a resource option in the Integrated Resource Plan.

The role of natural gas fired generation (gas generation) as a resource option in the 2011 IRP will be determined with regard to (1) permitting risks; (2) the relative economics of gas generation; and (3) B.C. Government policy and the requirements of the *Clean Energy Act* (CEA). Gas generation is being considered given its dispatchable capacity capabilities and its role in numerous utilities across North America.

OVERVIEW

The majority of utility-scale gas generators can be grouped into two main categories; (1) Simple Cycle Gas Turbines (SCGTs) have lower capital cost, are relatively inefficient and are typically built for their dependable capacity; (2) Combined Cycle Gas Turbines (CCGTs) are more efficient than SCGTs, have higher capital costs, and are typically built where there is a need for both dependable capacity and an expectation of relatively high utilization (relatively heavy output and high operating hours).

Broadly speaking, gas generation is considered as a component in resource portfolios of many utilities. It is a source of both dispatchable dependable capacity and firm energy. It can generally be strategically sited in load centres or transmission constrained areas as an alternative to transmission, and it has a relatively short construction lead time if permitting is secured. In jurisdictions where the alternatives include oil or coal-fired generation, it provides energy with relatively lower emissions of air contaminants and greenhouse gases (GHG). In jurisdictions with primarily hydroelectric generation, gas generation typically plays a lesser role.

Permitting

Gas generation greater than or equal to 50 MW requires an Environmental Assessment Certificate (EAC) pursuant to the B.C. *Environmental Assessment Act* and an air emission permit under the B.C. *Environmental Management Act* (EMA):

- It is very unlikely that a proponent could obtain an EAC and/or air emission permit for gas generation in the Lower Mainland (LM). Metro Vancouver has responsibility for issuing air emission permits for LM facilities,¹ and has taken the public position that it would not welcome gas generation within the Lower Fraser Valley (LFV) airshed.² In addition, the Province, in its news release³ concerning Direction No. 2⁴ to the British Columbia Utilities Commission providing that for planning purposes Burrard Thermal Generating Station (Burrard) cannot be relied on for any firm energy, cited concerns with Burrard air emissions in the LFV airshed. For purposes of the 2011 IRP gas generation is not considered a potential resource for the LM;

¹ Per section 31 of EMA, S.B.C. 2003, c.53.

² For example, D. Bell, Metro Vancouver, letter to Washington State Energy Site Evaluation Council, "Re: Draft Notice of Construction/Prevention of Significant Deterioration Permit and Supplementary Draft Fact Sheet for Sumas Energy 2 Generating Facility", 28 September 2000.

³ B.C. Ministry of Energy, Mines and Petroleum Resources, "News Release: Province Advances Commitment to Clean, Renewable Energy", 28 October 2009, page 1.

⁴ B.C. Reg. 254/2009, repealed by B.C. Reg. 318/2010 and replaced by sections 3(5), 6(2)(d) and 13 of CEA and the Burrard Thermal Electricity Regulation, B.C. Reg. 319/2010.

- In other areas of the Province such as Vancouver Island⁵ it would be difficult to secure an EAC and/or air emission permit, even if the requirement for GHG emission offsets was satisfied. Permitting difficulties will be taken into account in the 2011 IRP.

Economics

In North America, the inventory of natural gas reserves, and expectations of its long-term availability, has significantly increased in the last few years. Shale rock formation gas recovery methods (such as Horn River Basin in B.C.) have dramatically improved, resulting in lower development costs. This new gas supply potential, combined with the recent global economic downturn, has resulted in lower short-term natural gas prices, as well as reduced mid to long-term natural gas price expectations. The reduced gas price forecasts result in gas generation becoming a relatively more cost effective supply source than previously considered, even when current forecasts of GHG costs are included. The relative cost effectiveness of gas generation as compared to other options will be reviewed in the IRP analysis.

Within BC Hydro's resource plans, gas generation could: 1) be a source of capacity should existing clean capacity options be either committed or face construction challenges; 2) meet loads in non-interconnected locations (e.g., Fort Nelson); or 3) reduce transmission costs by siting plants near load centres. In addition, if supplies were unable to meet customer loads, gas generation has a short construction period and could be useful in contingency plans if it is able to be permitted. Retaining some of the gas generating room for these purposes has option value.

Policy Perspective

The CEA sets out the following Energy Objectives relevant to the role of gas generation:

- (1) "to generate at least 93% of the electricity in British Columbia from clean or renewable resources..."
- (2) to reduce B.C. GHG emissions
- (3) to encourage energy efficiency and clean or renewable electricity through: (a) innovative technology s.2(d); (b) community actions s.2(i); (c) use of waste heat, biomass or biogas s.2(j); and (d) First Nations and rural development s.2(l)
- (4) to be a net exporter of electricity from clean or renewable resources providing the opportunity to reduce GHG emissions in neighbouring regions

⁵ For example, citing/re-zoning issues with respect to the proposed gas fired Port Alberni Generation Project.

(1) 93% Clean Target

BC Hydro must pursue actions to meet the targets and must use the prescribed guidelines in its electricity supply planning. This means taking measures in its actions and plans that would minimize the possibility of violating the objective. The large majority of BC Hydro's generation conforms to the B.C. Clean or Renewable electricity definitions established by the Ministry of Energy. The remainder is primarily generation from the following four gas generation sources in BC Hydro's resource portfolio: Fort Nelson Generating Station, Burrard⁶, Island Co-generation Plant and McMahon Cogeneration Plant⁷.

To meet the 93% clean generation target, resource planning would be undertaken to ensure that a minimum of 93% of actual generation in every year would come from clean resources. Consistent with self-sufficiency, this would be based upon critical water conditions from the Heritage Hydro, firm energy from clean IPPs and firm energy from any gas generation. On this basis, the BC Hydro system is current meeting the 93% clean target. In the future, as BC Hydro's customers' energy requirements increase and as BC Hydro achieves self-sufficiency, new generation requirements could include a 7% gas generation component.

(2) GHG Reduction

The CEA includes provincial GHG reduction targets of 6% less than the level of those emissions in 2007 by 2012, 18% by 2016, 33% by 2020 and 80% by 2050. These legislated targets, particularly for 2020 and 2050 are very challenging, and will put pressure to reduce emissions from GHG sources across all sectors. New gas generation represents incremental GHG emissions from the provincial baseline and these incremental emissions therefore make it more difficult to meet the reduction targets, even with the net zero offset requirement.

(3) Encourage Energy Efficiency and Clean or Renewable Electricity

Each of objectives (d), (i), (j) and (l) in section 2 rely to a substantial degree on there being opportunities for clean or renewable electricity. Development of any material amount of new gas generation that was not to reduce waste heat, such as co-generation, would reduce the available space for new clean or renewable electricity. Use of any new sources of gas generation would negatively impact these objectives to some degree.

(4) Export

BC Hydro must meet, and sustain on a going forward basis, the self sufficiency targets set out in the CEA. If BC Hydro is to be a net exporter of clean or renewable electricity, the electricity that is being exported would, to meet likely higher value markets, need to be clean or renewable. Adding new gas generation to BC Hydro's supply portfolio, even if it is for domestic purposes, will alter the overall operational supply stack. This could have a significant (and likely proportional) negative impact on the potential to be a net exporter of clean or renewable electricity.

⁶ Note that Burrard is only available for operation in emergency conditions or as permitted by regulation. Government has issued Ministerial Order M-319 that permits BC Hydro to operate Burrard for capacity purposes only until Mica 5/6, the ILM Transmission Reinforcement Project (5L83) and the 3rd Meridian substation transformer are in place.

⁷ BC Hydro's portfolio also includes the gas-fired Price Rupert Generating Station and several diesel generators that serve non-integrated areas. The total generation from these resources is relatively minor.