

BC HYDRO & FORTIS BC

RESOURCE OPTIONS UPDATE

TECHNICAL ENGAGEMENT – RUN-OF-RIVER

NAN DAI



FOR GENERATIONS

March 02, 2015

AGENDA

- Background – Purpose of Resource Options Inventory and Update
- Objectives and Expectations of the Meeting
- Overview of Previous Methodologies
- Scope of Update
- Summary of Work Completed to Date
- Next Steps and How to Connect

BACKGROUND

Purpose of Resource Options Inventory and Update

- To maintain an accurate, up-to-date understanding of resource potentials, prices and technical capabilities of different technologies in B.C.
- To engage industry associations, equipment manufacturers, suppliers, consultants and others that can provide information important for this process
- To serve as input into BC Hydro and Fortis BC's long term analysis which further considers the value of these resources as they may be integrated into the system over time

OBJECTIVES AND EXPECTATIONS OF THE MEETING

- Input on the characterization of the run-of-river resource option, in particular,
 - project development costs
 - technology advancements
- Not be addressing at this meeting are system needs, resource value comparisons or acquisition practices.

OVERVIEW OF PREVIOUS METHODOLOGIES

- KWL's GIS Rapid Hydro Assessment Model (RHAM) was used to assess the energy, capacity and cost of potential RoR generating sites in both 2013 and 2010 resource options reports.
 - Section 5.2.7 Run-of-River <http://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/ror-update-report-20131115.pdf>
 - Run-of-River Report <http://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/ror-update-appx-8a-20130802.pdf>
- Same exclusion areas: legally protected areas, glaciers, reaches of streams that are use by salmon, and existing & committed projects
- Inflation only cost adjustment from 2010 to 2013
- Design flow estimated as 1.5 times the mean annual discharge to reflect the reality that often developers will design a larger project to optimize the cost effectiveness of the project and extract as much capacity and energy as they can from a location.

SCOPE OF UPDATE – SCREENING

- Screening potential RoR sites using the most recent geographic information system (GIS) data for parks, glaciers, salmon observations/reaches and new electricity purchase agreements (EPAs)
- Steelhead trout has been added to the FISS species exclusion list. Now considered as pacific salmon and its presence leads to permitting difficulty
- Terminated EPA sites will not be considered (i.e., not added back to the potential assessment)

SCOPE OF UPDATE – COST

- Reviewing the at-gate cost components and adjust to reflect present costs
 - Update water rental rates
 - Refine high head projects to include low and high penstock pressure classification that leads to slightly lower cost
 - Update turbine/generator/TIV and installation, and EBOP and installation
 - Mechanical and electrical installation updated to 16% total water to wire
 - Review construction camp cost
 - Allocate additional cost for operation of camp

SCOPE OF UPDATE – COST (CONT'D)

- Revise the 5% environmental and social permitting cost to a tiered approach that leads to higher cost for smaller projects and lower cost for projects larger than 15 MW

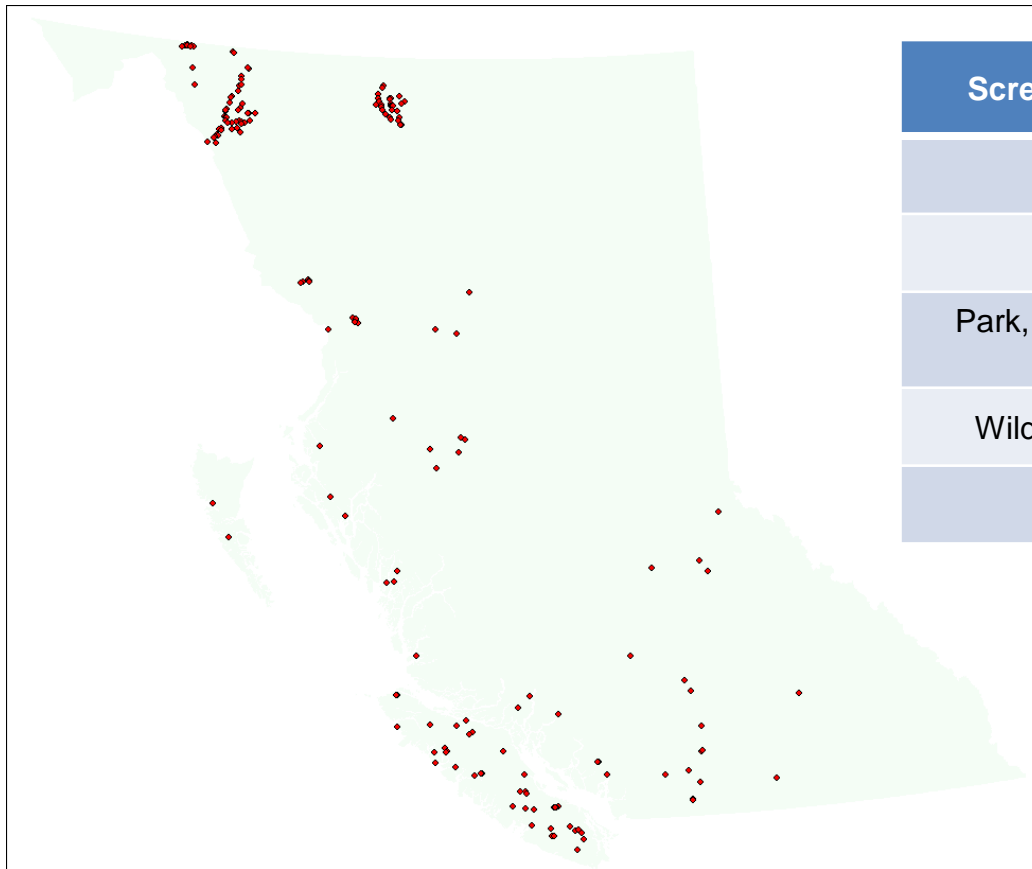
Project Size	Cost
< 0.5 MW	\$750,000
0.5 – 10 MW	\$1,000,000
10 – 15 MW	\$1,500,000
> 15 MW	3% of capital

- Escalate remaining costs by 2% per year

SUMMARY OF WORK COMPLETED TO DATE

- Confirmed screen layers and FISS screening criteria
 - Glaciers – Sep 2008 (i.e., no change)
 - Conservancies, national parks, parks and protected area regional boundaries, etc. – Aug 2013
 - FISS – Jan 2015
- Confirmed IPP EPA sites – as of October 01, 2014
- Completed screening for the RoR projects
 - 193 sites were removed due to the new screens/exclusions

SUMMARY OF WORK COMPLETED TO DATE (CONT'D)



Screen/Exclusion Criteria	# of Removal
Conservancy	94
FISS	79
Park, EcoReserve, Protected Area	5
Wildlife Management Area	1
IPP	14

NEXT STEPS AND HOW TO CONNECT

Comment period

- Comments & suggestions back by March 10, 2015

Next engagement meeting

- Tentatively scheduled towards the end of March to review the draft results

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General information

- www.bchydro.com/generationoptions