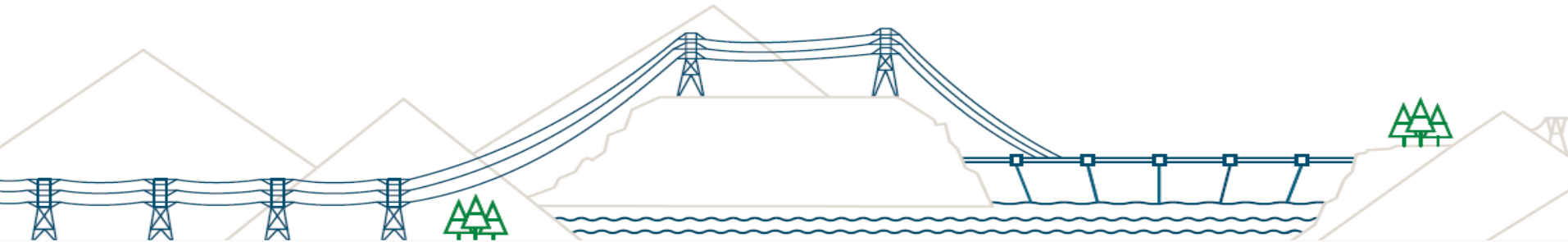


2021 Interconnections Workshop



Workshop
March 11, 2021

Webex Session Details

Two Different Ways to Join:

Technical Issues?

Send email to:

bchydroregulatorygroup@bchydro.com

Choice 1: Use your computer's audio and view our speakers

1. Click Join the virtual session link:
(embedded here or from your invitation)

Join the virtual session

2. Select Use Computer Audio:

Audio: Use computer audio

3. Select Start Meeting:

Start Meeting

4. Please mute and turn off video (**red icons = off**):

Start video

Unmute

Choice 2: Use cell phone or LAN line to hear audio only

Call in number: 604-449-3026 (can adjust for long-distance)

- Meeting number (access code): 146 629 2460
- Meeting password: 8MqtKKSgE26

4. Please mute audio (**red icons = off**):

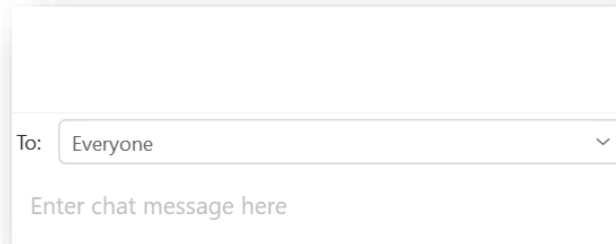
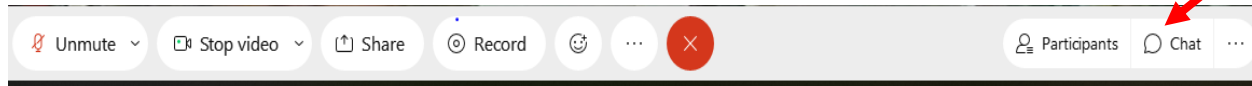
Unmute

HOW TO PARTICIPATE

Please use the Chat Function to ask Questions and provide feedback

With the large number of registrants, we will not be able to take comments or questions through audio. Please click the **chat box icon shown** below and direct your question or comment to “**Everyone**” to ensure one of the moderators captures it. If you wish to send a question specifically to BC Hydro or one of the presenters that option is available as well. Confidential questions can be forwarded to the email below.

We will endeavor to answer questions in the session as time permits, additional or follow-up questions can also be sent to bchydroregulatorygroup@bchydro.com. Thank you.

A screenshot of the Zoom chat input box. It shows a 'To:' dropdown menu with 'Everyone' selected. Below the dropdown is a text input field with the placeholder text 'Enter chat message here'.

For privacy reasons this session will not be recorded and ask that all recording tools be turned off.

Workshop Agenda

Item	Time
Welcome & Introductions	9:00 - 9:15
Electrification	9:15 – 9:30
Interconnection Process	9:30 – 10:00
BC Hydro Customer & Generator Interconnections Process Assessment Report	10:00 – 10:15
Break	10:15 – 10:30
Process Improvements (Transmission & Distribution)	10:30 – 11:30
BC Hydro's Internal Audit of our Interconnections Process	11:30 – 11:45
Wrap-up/Questions	11:45 – 12:00

Introductions – BC Hydro Staff

- Frank Lin, Director, Interconnections
- Chris Heminsley, Senior Business Development Lead
- Sachie Morii, Manager, Customer Interconnections
- Doris Huey, Manager, Capital Projects – Lines & Interconnections
- Sam Jones, Senior Manager, Customer Interconnections & Policy
- Ryan Hefflick, Senior Manager, Customer Interconnections & Policy

BCUC Order No. G-246-20 & Directives 34 & 35

34.	The Panel directs BC Hydro to submit a filing to the BCUC, by December 31, 2020, explaining its progress to date in implementing each of the recommendations included in the Black and Veatch report, plus any other initiatives BC Hydro has or is undertaking to improve its interconnections process.	112
35.	The Panel further directs that BC Hydro conduct a workshop, by March 31, 2021, with BCUC staff present, to present the information in this filing to current and potential interconnection customers and current and potential IPPs. BC Hydro is directed to submit a further filing to the BCUC, by June 30, 2021, with its most recent performance on interconnections, its activities to date to improve its performance, and a revised plan for further improvement.	112

Responding to Directives 34 & 35

Today's Workshop is the Second of Three Phases



* Last possible date for filing, may be filed earlier

Our Objectives Today

Why we are here today

1. Provide an overview of CleanBC and BC Hydro's interconnection process.
2. Provide a summary of BC Hydro's progress in implementing the Black and Veatch Report recommendations.
3. Outline additional activities currently underway and planned to improve our interconnections processes.
4. Answer your questions and continue our dialogue.

Electrification

Delivered by: Chris Heminsley, Senior Business Development Lead

Electrification Plan

BC Hydro is developing a focused plan for low carbon electrification and load attraction

- The Electrification Plan will be an overarching framework that captures new and existing efforts to promote electrification in British Columbia.
- Potential actions could include rate design, tariff changes to make it easier for customers to connect, low carbon and load attraction programs and infrastructure support.
- The initial electrification plan will be filed as part of the Fiscal 2023+ Revenue Requirements Application.

CleanBC

BC Hydro has an important role to play in meeting climate action targets

- CleanBC is a provincial economic development, energy and climate strategy.
- The strategy prioritizes electrification as a means of meeting climate change commitments.
- BC Hydro and the government are working to remove barriers to electrification through new rates, infrastructure, and programs.



CleanBC Industrial Electrification Rates

Attract new customers and reduce the use of fossil fuels

- Two new categories of rates for transmission service customers:
 - Clean Industry and Innovation (Rate Schedule 1894)
 - Fuel Switching (Rate Schedule 1895)

Year	Rate Discount
0-5	20% discount
6	13% discount
7	7% discount

CleanBC Facilities Electrification Fund

Reducing the cost to connect to our clean electricity grid

- \$84 M of federal infrastructure funding for customer interconnection projects that reduce/avoid greenhouse gas emissions.
- 50% of eligible interconnection costs to a maximum of \$15 M per project.
- Funding supports public infrastructure (e.g., BC Hydro assets).
- Project must meet cost and fuel switching load thresholds:

	Industry	Transportation / Built Environment
Total interconnection cost	> \$5 M	> \$2 M
Fuel-switching load	> 5 MW	> 2 MW

Northwest Transmission Line Tariff

Rescinded to encourage economic development in northwest B.C.



- 344 km, 287 kV line from the Skeena Substation in Terrace to the new Bob Quinn switching station near Bob Quinn Lake.
- TS 37 levied a contribution based on a pro-rated share of the line from industrial customers and generators that connected.
- Identified as a barrier to development.
- Rescinded in February 2021
- Customers now connect according to Tariff Supplement #6 (TS#6).

New Infrastructure

Investing in infrastructure to advance industrial electrification

- Seeking federal funding to offset infrastructure costs and support electrification and transmission expansion opportunities.
- Enabling electrification of industry will help reduce greenhouse gas emissions.
- Priority projects include:
 - Peace Region Electricity Supply
 - North Montney Region Electrification
 - Prince George to Terrace Capacitors



Interconnections Process

Delivered by: Frank Lin, Director, Interconnections

Interconnection Processes

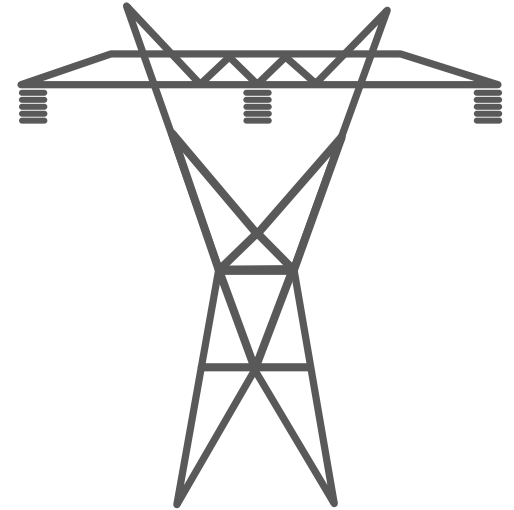
It's a collaborative effort



Interconnection Processes

Key Types of Interconnection Projects

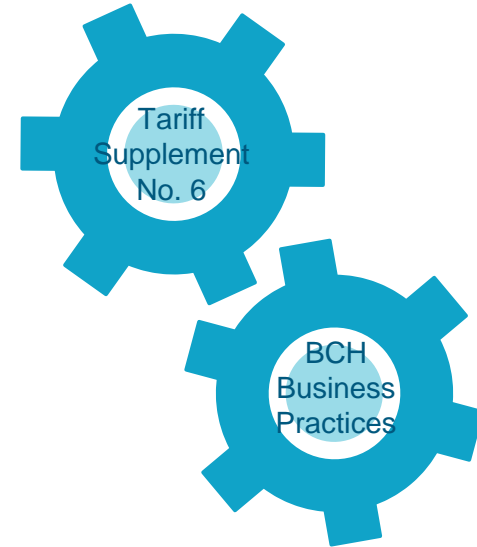
- Transmission Load Interconnections.
- Transmission Generator Interconnections (IPP).
- Major Distribution Load Interconnections.
- Other Areas of Responsibility: transmission line relocations, shared assets, inter-utility, distribution generator interconnections.



Transmission Load Interconnections

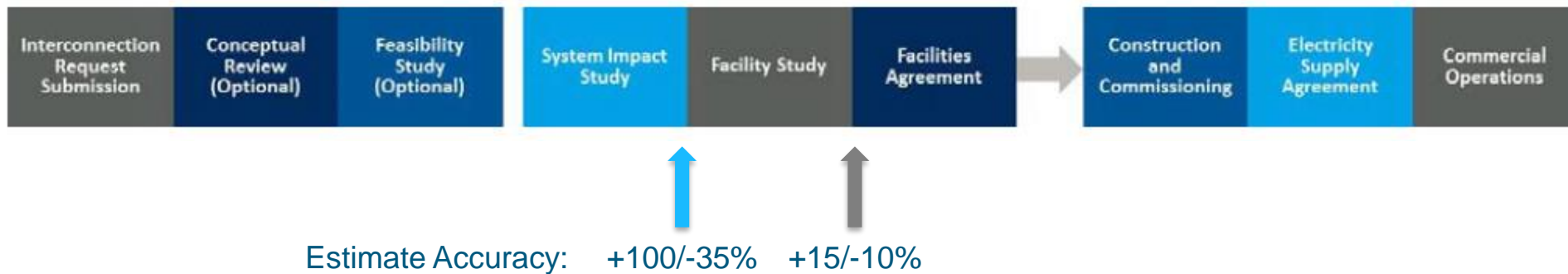
Electric Tariff Supplement No. 6

- Governed by Tariff Supplement No. 6.
- Tariff defines:
 - i. BC Hydro and Customer obligations
 - ii. How costs are treated and allocated
- Business practices define:
 - i. Study process
 - ii. Interconnection queue management (first come, first served)



Transmission Load Interconnections

Process from First Contact to Commercial Operation



Transmission Generator Interconnections

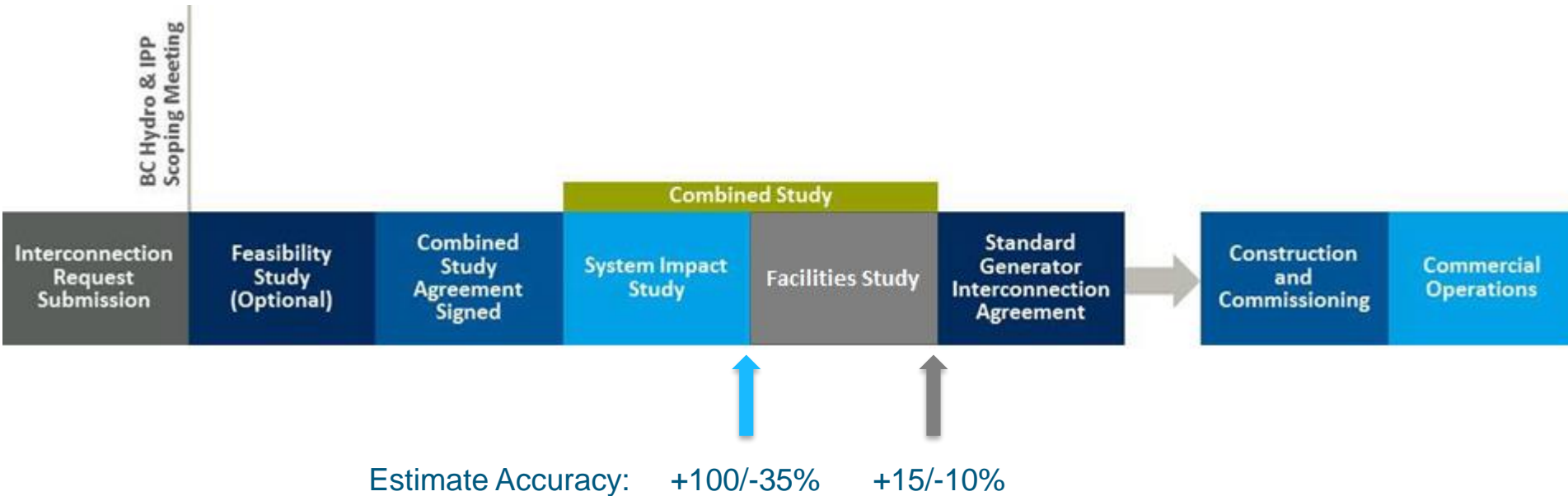
Open Access Transmission Tariff

- Governed by the Open Access Transmission Tariff (OATT) defines:
 - i. BC Hydro and Customer obligations
 - ii. How costs are treated and allocated
 - iii. Study process
 - iv. Interconnection queue management (first come, first served).



Transmission Generator Interconnections

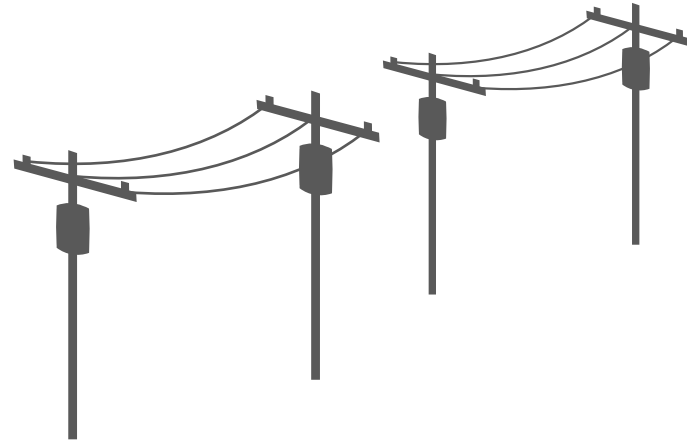
Process from First Contact to Commercial Operation



Major Distribution Load Interconnections

BC Hydro Distribution Extension Policy

- Governed by the BC Hydro Distribution Extension Policy, which defines:
 - i. BC Hydro and customer obligations
 - ii. How costs are treated and allocated
- Business practices define:
 - i. Study process
 - ii. Interconnection queue management (first come, first served).





BC Hydro Generator & Customer Interconnections Assessment Report (Black & Veatch Report)

Delivered by: Frank Lin, Director, Interconnections

Black & Veatch Report – Original Context

- BC Hydro commissioned the report in 2015.
- Purpose:
 - i. Evaluate the effectiveness of BC Hydro's transmission load and generator interconnection processes
 - ii. Provide recommendations on streamlining these processes.
- Included input from internal and external stakeholders, including customers.

BC Hydro vs. Peers

Accurate peer comparison is challenging

- Data availability and quality
- Regulatory and economic environment
- Planning philosophy
- Volume of interconnection work vis-à-vis utilities other capital portfolio
- Presence of ISO in some jurisdictions
- Geography
- Generation and load mix – predominantly hydroelectric
- Government-owned



BC Hydro vs. Peers

What we heard from 8 of our peers

- Customer feedback and issues similar to peer utilities.
- BC Hydro is in line with our peers.
- Volume of requests BC Hydro received in 3 years considered in the study (2013-2015) was unparalleled.
- Volume of requests has continued to increase since 2015.

Key Findings

What we heard

“The process is well defined”

“BCH is responsive”

“Communication is frequent and effective”

Mixed feedback from customers

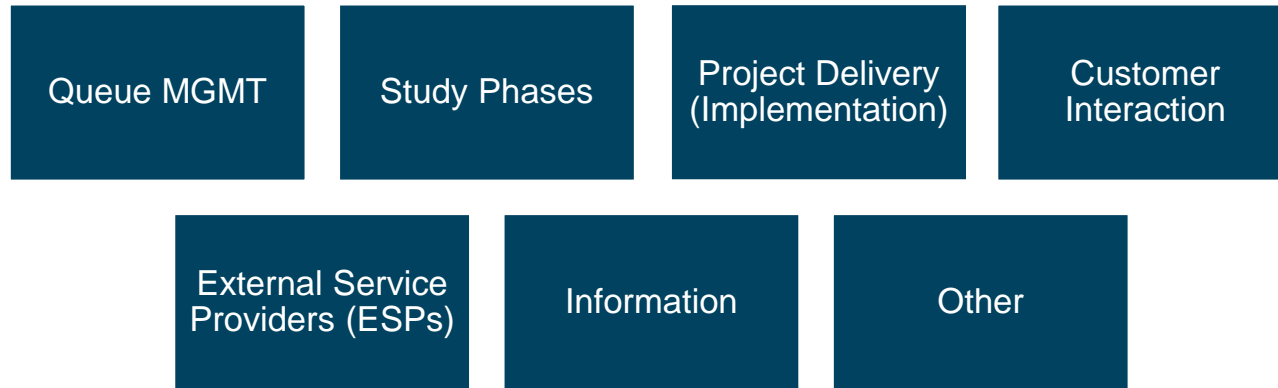
“Get to go or no-go decision quicker”

“Studies take too long & cost too much”

“More value for money”

Key Themes

Black & Veatch identified 7 themes from their review





Process Improvements - Transmission

Delivered by: Sachie Morii, Manager, Customer Interconnections
Doris Huey, Manager, Capital Projects – Lines & Interconnections
Sam Jones, Senior Manager, Customer Interconnections & Policy

Transmission Interconnection – Key Success Factors



Improve collaboration between BC Hydro team and Customer Team

- To better integrate BC Hydro and customer processes



Flexible and adaptable processes

- To accommodate variety of interconnection work & frequent changes



Understand Customer needs and priorities throughout the process

- To balance different requirements and priorities which are dynamic in nature

Process Improvements Transmission - Themes

BC Hydro reorganized the recommendations from the 7 themes (discussed previously) into the following groupings as some process improvements cross multiple themes:



- Improving Customer Interactions
 - Providing More Options to the Customer
 - Flexible and Adaptable Processes
 - Prioritizing Interconnection Work
 - Improving Queue Management
 - Improving Information Availability

Improving Customer Interactions

- Team to address technical issues.
- Improvements to customer communication.
- Stronger coordination with customers.
- Cost estimating practices.
- Third-party transmission line transfer to BC Hydro.



Communication & Collaboration

- Engage the right technical resources at the right time.
- Improve customer communication:
 - Study cover letter & change orders
 - Regular meetings/status updates.
- Coordinate with customers on First Nations consultations, property acquisition, archeological assessments, geotechnical studies, and environmental management.



Cost Estimating Practices

- Updated interconnection estimate review process.
- T & D unit costs are updated regularly based on recent projects.
- Geotechnical investigation work advanced to an earlier stage.
- Improved communication to the customer on study assumptions, risks, and exclusions.




Third Party Transmission Line Transfer

- Transmission Load customer has an option to transfer their line to BC Hydro under Tariff Supplement #6 (TS#6):
 - Framework developed with updated/new reference documents
 - Commercial agreement templates developed
 - Early engagement with our customers.



Process Improvements Transmission - Themes

BC Hydro reorganized the recommendations from the 7 themes (discussed previously) into the following groupings as some process improvements cross multiple themes:

- Improving Customer Interactions
-  • Providing More Options to the Customer
- Flexible and Adaptable Processes
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- Improving Information Availability

More Options for Customers

- Optional pre-interconnection process studies / customized studies.
- Election of reliability.
- Customer design and build TAP.
- Indirect Interconnection tariffs.



Optional / Customized Studies

Types:

- Feasibility Study (for Transmission Load interconnection customers).
- Customized Non-Tariff Study (for Transmission Generator customers).

Benefits:

- Pre-interconnection process study.
- Study scope customized to meet customer needs.
- Provides a high-level scope and good-faith cost estimate (as required).

- 42 Helps the customer in making decisions earlier.



Customer Choice

Election of Reliability:

- Allows customers to connect with a lower level of reliability before completion of a permanent solution.

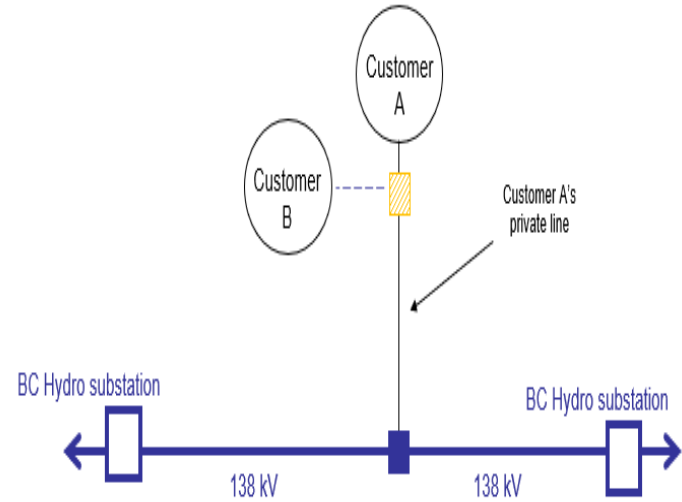
Customers design and construct a transmission TAP:

- Process and commercial agreement templates developed.




Indirect Interconnection Tariffs

- Customers can connect to a third-party owned transmission line or substation and still be a BC Hydro customer.
- Minimized environmental footprint due to the customer and the third-party sharing the existing infrastructure.



Process Improvements Transmission - Themes

BC Hydro reorganized the recommendations from the 7 themes (discussed previously) into the following groupings as some process improvements cross multiple themes:

- Providing More Options to the Customer
- Improving Customer Interactions
-  • Flexible and Adaptable Processes
- Prioritizing Interconnection Work
- Improving Queue Management
- Improving Information Availability

Flexible & Adaptable Processes

Adapt to the variety of interconnection work & frequent changes

- Expedited process for low complexity.
- Combine/overlap study phases.
- Improving the transition from System Impact Study to Facilities Study.
- Scaling Project & Portfolio Management Practices.



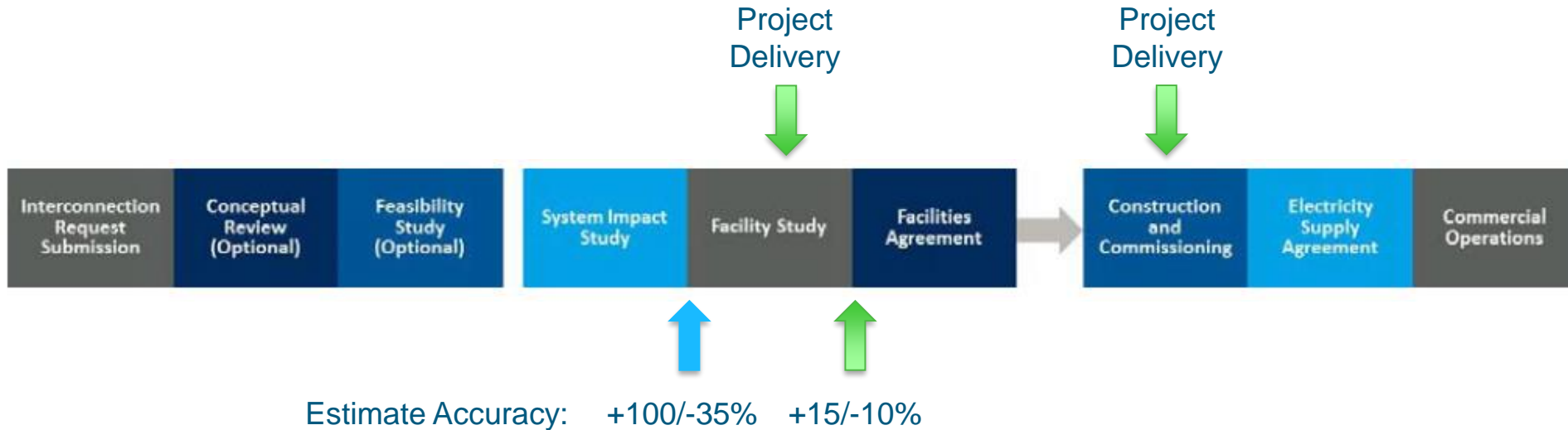
Expedited Process for Low Complexity

- New low complexity System Impact Study (SIS) process established.
- Criteria: small load increase of existing customer sites which require no major BC Hydro system upgrades.
- Facilities Study delivered through Program & Contract Management KBU with an expedited delivery model.

	Average Duration (Days)
SIS (baseline)	127
F2020 Low Complexity SIS (actual)	54
F2021 Low Complexity SIS (actual)	47

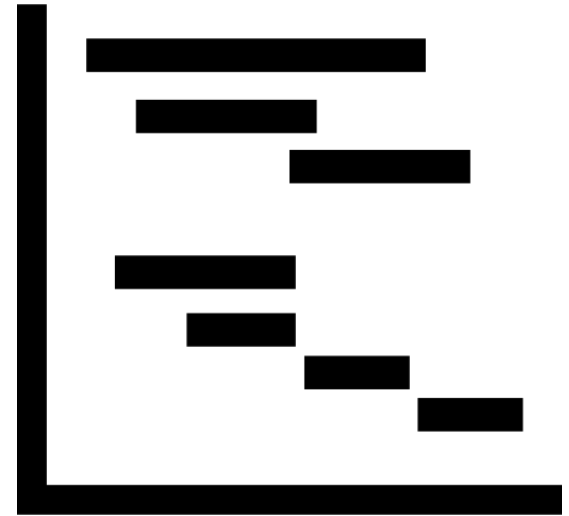
Interconnection Process

Study Phase to Project Delivery



Combine and Overlap Study Phases

- Program delivery approach - multiple studies/projects initiated to meet customer's staged load requirements or reliability election.
- Advance Implementation scope – e.g., procurement of long-lead equipment during Facilities Study.



Process Improvements Transmission - Themes

BC Hydro reorganized the recommendations from the 7 themes (discussed previously) into the following groupings as some process improvements cross multiple themes:

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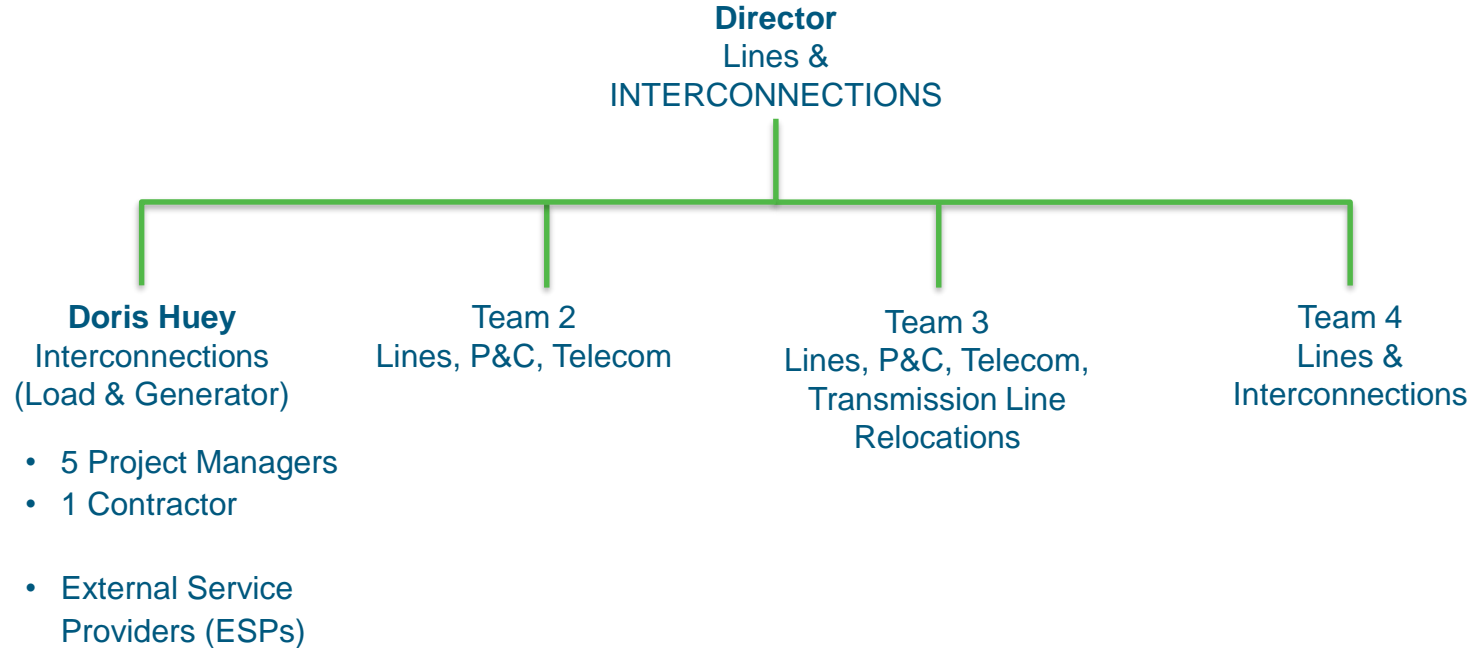


Prioritizing Interconnection Work

- Dedicated team of Project Managers.
- Increased visibility of interconnection projects.
- Executive oversight.
- Resourcing – prioritizing/reassigning/resource augmentation.



Dedicated Project Managers



Team has been in place since 2017

External Service Providers (ESPs)

- Project Managers report to BC Hydro Manager, Interconnections Project Delivery.
- BC Hydro Interconnections Project Manager is assigned as Program Manager to provide day-to-day guidance, ensure consistency, and remove roadblocks.
- Annual, quarterly and monthly meetings to review and discuss performance.

Increased Visibility of Interconnections Projects

- Monthly planning meetings with key business units.
- Improved project release process from System Impact Study to Project Delivery.
- Monthly project accountability meetings with senior/executive management.
- Regular executive steering committee meetings.

Resourcing

Prioritizing interconnection studies

- Priority for customer interconnections.
- Reassign planning resources.
- Utilize contract resources to supplement internal resources.



Process Improvements Transmission - Themes

BC Hydro reorganized the recommendations from the 7 themes (discussed previously) into the following groupings as some process improvements cross multiple themes:

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- Improving Queue Management
- Improving Information Availability



Queue Management

BC Hydro's transmission load Interconnection queue management business practice was formalized and posted on the BC Hydro External Web site:

<https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-matters/00-2014-11-18-queue-management-business-practice.pdf>



Improving Queue Management

BC Hydro is currently reviewing Queue Management

- How to minimize the impacts to other customers when customers request changes.
- How to help more likely & earlier customer in-service date projects to proceed while being fair to earlier queue customers.
- How to facilitate cluster studies in a capacity-constrained area.



Process Improvements Transmission - Themes

BC Hydro reorganized the recommendations from the 7 themes (discussed previously) into the following groupings as some process improvements cross multiple themes:

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- Improving Queue Management
- Improving Information Availability



Improving Information Availability

- Information on BC Hydro website.
- Tariff Supplement 6 Security/Revenues offset calculation example.
- Extension policy updates.
- Posting of interconnection metrics.



Additional Information for Customers

Public posting of metrics

- **Transmission Load Metrics:** <https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/transmission/tgi/External-Metrics-Q2-Transmission-Load-LTR.pdf>
- **Transmission Generator Metrics:** <https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/transmission/tgi/External-Metrics-Q2-Transmission-Generator-LTR.pdf>
- **Major Distribution Load Metrics:** <https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/distribution/dgi/External-Metrics-Q2-Major-Distribution-Load-LTR.pdf>
- **Distribution Generator Metrics:** <https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/distribution/dgi/External-Metrics-Q2-Distribution-Generators-LTR-2.pdf>



Process Improvements - Distribution

Delivered by: Ryan Hefflick, Senior Manager, Customer Interconnections & Policy

Distribution

Recent Process Improvements

- Changes to Financial Thresholds.
- Review of BC Hydro's distribution civil delivery process.
- Simplified application and agreements for generation projects < 1 MW.
- Updated quote letters.
- Change notice process.

Financial Thresholds

What Changed?

Major Distribution Load Project Threshold

- Increased from \$1M to \$2M.
- These will instead be managed by Distribution Design, allowing for more non-complex projects to go to local design offices.

Internal Financial Approval Limits

- Approval limits have been changed to reflect project complexity/risk. These changes help expedite internal approval timelines.

Civil Delivery Process

Recent Process Improvements

- In 2021, BC Hydro will be reviewing how civil work is estimated and delivered to minimize cost escalation risk.
- BC Hydro has moved to a unit price contract for lower complexity civil work to improve cost certainty and construction timelines (no RFP/RFT process).

Other Distribution Focused Improvements

Recent Process Improvements

Revised Quote Letters

- Continuing to improve the clarity/content of our quote letters to help our customers understand what we need from them for better coordination.

Internal Handovers

- Developed an internal online tool to formalize our coordination with Engineering teams.
- This tool helps track and create visibility of requests and clearly defines expectations for review (scope and schedule).
- Updating our Information Request Form to ensure our planning teams have the right level of data which will aid in completing studies in a timely manner.



BC Hydro's Internal Audit of Interconnections

Delivered by: Ryan Hefflick, Senior Manager, Customer Interconnections & Policy

Internal Audit Function

- Independent audit function reporting to the Audit & Finance Committee of the Board.
- Audits conformance with the International Standards for the Professional Practice of Internal Auditing.

Audit Objectives

- Audit report was approved by BC Hydro's Board of Directors in February 2021.
- Assessed the Customer Interconnections processes' effectiveness to ensure projects comply with tariffs while maintaining customer relationships.
- Focused on key business risks and controls for the Major Distribution and Transmission Interconnection load processes from project initiation to completion.
- Audit covered governance, program execution, and reporting.

Audit Key Findings

- We received a **GREEN** audit.
- Effective governance is in place.
- Project completion times are impacted by BC Hydro's stringent requirements and competing priorities.
- BC Hydro is making continuous efforts to streamline requirements and reduce timelines, but the overall process is still extensive.
- Also a need for higher cost transparency, mainly for cost increases.



Audit – Customer Feedback

14 customers interviewed:

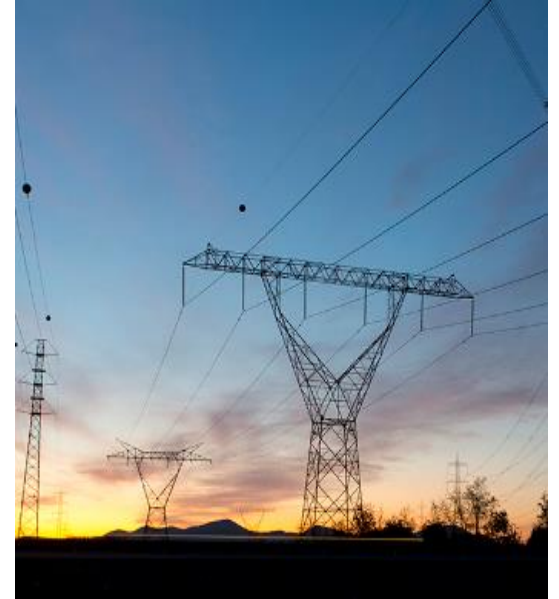
- 12 of the 14 customers were pleased with their experience.
- Most customers surveyed felt BC Hydro is providing good service and regular updates.
- Customer concerns included cost transparency and the ability to meet timelines.



Recommendations (Transmission)

For Transmission projects:

- Continue to look for scaling opportunities in project delivery processes for smaller projects.
- Interconnections to work with Finance to generate automated invoices for customers.
- Finance to refresh the external loading rates and consider simplifying and reducing the number of external loading rates for better customer communication.



Recommendations (Distribution)

For Major Distribution projects:

- Ensure Program & Contract Management completes civil tendering process review and identifies areas to shorten the timeline.
- Ensure variance analysis is performed on billing estimate to actual costs.
- Consider providing customers more cost details particularly on cost increases.



Recommendations (Metrics)

Consider new metrics to further track:

- Progress of ongoing System Impact and Conceptual studies.
- Measure against original timelines agreed with customers.
- Define and measure the source of delays between the customer and BC Hydro.

Questions & Discussion

