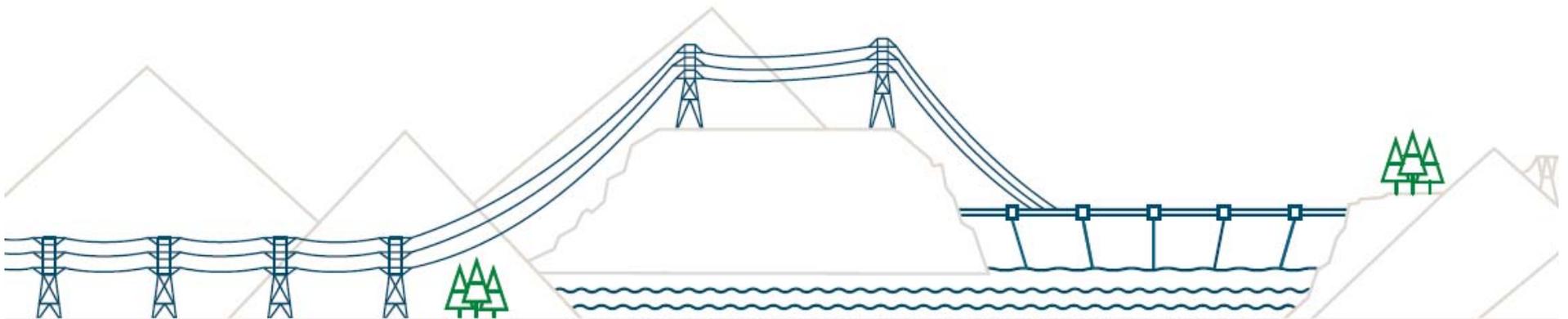


Reliability Coordination for B.C.

BCUC Workshop – December 19, 2018



Introduction

- In mid-July 2018, PEAK announced its wind down as Reliability Coordinator (**RC**) for the Western Interconnection
- On September 4, BC Hydro submitted its application to register as the RC in B.C. through the Western Electricity Coordinating Council's (**WECC**) website, in accordance with the B.C. MRS Registration Manual
- On October 29, BC Hydro submitted a Supplementary Filing to the British Columbia Utilities Commission (**BCUC**), with copies to WECC and the Registered Entities in B.C. in support of its application for registration as RC
- BCUC issued Procedural Order G-227-18 establishing a proceeding to review the application for registration as RC, including Intervener Registration, a BC Hydro led workshop, and the issuance of BCUC Information Requests
- BCUC further requested comments on WECC's resource availability to complete a full certification within BC Hydro's RC implementation timelines

Purpose of the Workshop

1. Regulatory and Legal Context
2. Reliability Coordination in the Western Interconnection - Update
3. Summarize BC Hydro's Reliability Coordination Strategy and Decision
4. Review BC Hydro's Work to Develop Reliability Coordination Capabilities
5. Next Steps
6. Discussion/Questions

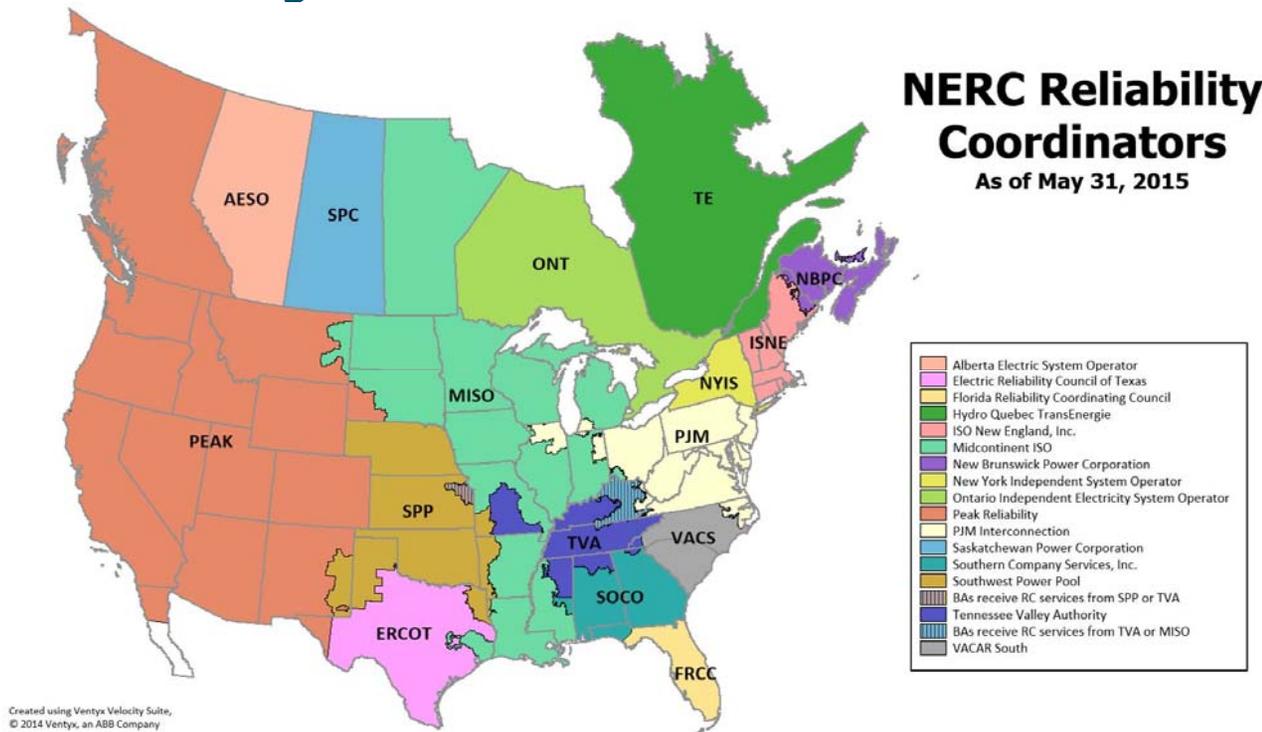
Regulatory and Legal Context

- The electricity grid in B.C. is part of a large interconnected grid in western Canada, the western United States of America (**U.S.**) and northern Mexico known as the Western Interconnection. The planning and operation of interconnected grids is facilitated by compliance with the Mandatory Reliability Standards (**MRS**) which have evolved from best practices across North American utilities and are developed by North American Electric Reliability Corporation (**NERC**).
- In B.C., the BCUC under the authority of section 125.2 of the *Utility Commission Act* (**Act**) has the jurisdiction to adopt MRS for application in B.C.
- The BCUC may make orders providing for the administration of adopted MRS pursuant to *Act* 125.2(10).

Regulatory and Legal Context Cont.

- BCUC Order R-40-17 adopted the latest version of the Rules of Procedure, Registration Manual, Compliance Monitoring Program and Penalty Guidelines for MRS in B.C. The WECC was appointed by the BCUC as Administrator to assist the BCUC in carrying out the registration of parties and compliance monitoring
- The role of Reliability Coordinator (**RC**) is one of the 11 function types that entities may register as under the BCUC Registration Manual (Appendix 1 to the Rules of Procedure)
- On September 4, 2018, BC Hydro submitted its application to register as the RC through the WECC website, and on October 29, 2018 filed its supplementary filing with the BCUC, with copies to Registered Entities
- The BCUC can issue orders under section 125.2(10) of the *Act*, and in accordance with the Registration Manual, may accept BC Hydro's registration for the RC function within the B.C. MRS Program

Reliability Coordinators in North America



Reliability Coordinator - *The entity that is the highest level of authority who is responsible for the reliable operation of the Bulk Electric System, has the Wide Area view of the Bulk Electric System, and has the operating tools, processes and procedures, including the authority to prevent or mitigate emergency operating situations in both next-day analysis and real-time operations. The Reliability Coordinator has the purview that is broad enough to enable the calculation of Interconnection Reliability Operating Limits, which may be based on the operating parameters of transmission systems beyond any Transmission Operator's vision.*

Mandatory Reliability Standards Applicable to Reliability Coordination

A subset of the MRS requirements are applicable to the RC function. The majority of work to develop RC capabilities is to support the requirements of the IRO (Interconnection Reliability Operations and Coordination) standards. These include:

- Responsibilities of RC
- Monitoring & Analysis
- Operational Analyses & Real Time Assessments
- Managing System Limits & Transmission Loading Relief
- Coordination between RCs
- Outage Coordination

Additionally, RC-specific work is required for following MRS: CIP (Critical Infrastructure Protection), COM (Communications), EOP (Emergency Operations), MOD (Modeling), PER (Personnel Training), PRC (Protection and Control) and TOP (Transmission Operations)

Reliability Coordination in Western Interconnection

Background – 2013 to 2014

- In June 2013 the WECC Board of Directors unanimously approved the bifurcation of WECC into a Regional Entity (**WECC**) and a Reliability Coordination Company (**PEAK**)
- BC Hydro joined as a member of PEAK in October 2014
- Alberta Electric System Operator (**AESO**) established their own RC services for Alberta

Reliability Coordination in Western Interconnection

Background – 2017 to 2018

- In December 2017 PEAK announced they were exploring a partnership with PJM, a Regional Transmission Organization, market operator, and Reliability Coordinator on the east coast
- In January 2018, California ISO (**CAISO**) announced they would terminate their membership with PEAK, provide their own RC service and offer RC services to others
- Numerous entities subsequently provided notice to PEAK and signed letters of intent with CAISO
- The Southwest Power Pool (**SPP**) also announced they would offer RC services in the Western Interconnection

Reliability Coordination

Background – 2018 (continued)

- PEAK requested that members provide an indication of whether they will continue membership or support a wind down of PEAK
- On July 18, 2018 PEAK announced that it would wind down its operations and that it had ended its relationship with PJM
- PEAK has stated publicly that they expect to close by December 31, 2019, after transitioning its customers to other RCs
- All entities in the WECC Region were requested to provide their intentions to WECC and NERC by September 4, 2018 to assist in understanding what the new RC footprints would look like in WECC as PEAK ceases operations

Reliability Coordination

B.C. RC Alternatives

In light of events related to RC service, BC Hydro considered options for RC services for B.C.

- Alternative 1 - BC Hydro as RC for B.C.
- Alternative 2 - CAISO as RC for B.C.
- Alternative 3 - SPP as RC for B.C.
- Alternative 4 - AESO as RC for B.C.

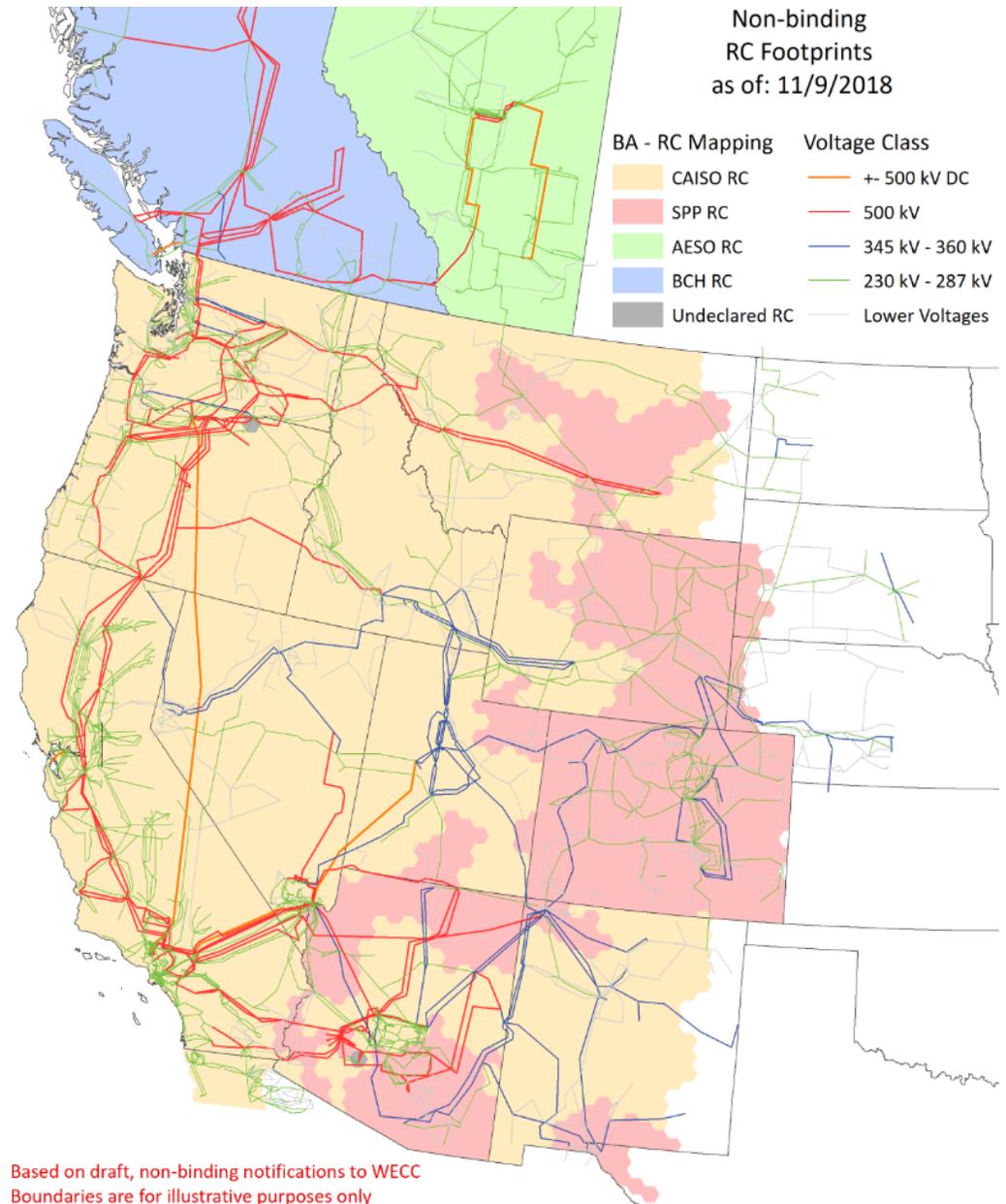
The evaluation and comparison of leading Alternatives 1 and 2 was performed on reliability benefits, governance, implementation risk, and cost

Reliability Coordination

BC Hydro's Decision

- BC Hydro concluded it is in the best position to assume the RC function
- With BC Hydro as RC for the province:
 - the reliability of the electricity grid will be strengthened with staff familiar with provincial operations;
 - it will provide a strong governance framework; and
 - It will have more control over ongoing sustainment costs for RC services in the future
- BC Hydro estimates its annual costs to provide RC services to be in the range of \$2.5 million to \$2.8 million

Reliability Coordination Tentative Commitments as of November 2018



Reliability Coordination

Updates since September 2018

- BC Hydro has been working with PEAK, AESO, WECC and prospective RCs in the Western Interconnection to ensure interconnection reliability during the RC transitions expected in 2019
- There are four transition dates planned in 2019:
 1. **July 1, 2019:** CAISO assumes RC responsibilities for the state of California
 2. **September 2, 2019:** BC Hydro assumes RC responsibilities for B.C.
 3. **November 2019:** CAISO assumes RC responsibilities for expanded footprint
 4. **December 2019:** SPP assumes RC responsibilities for expanded footprint

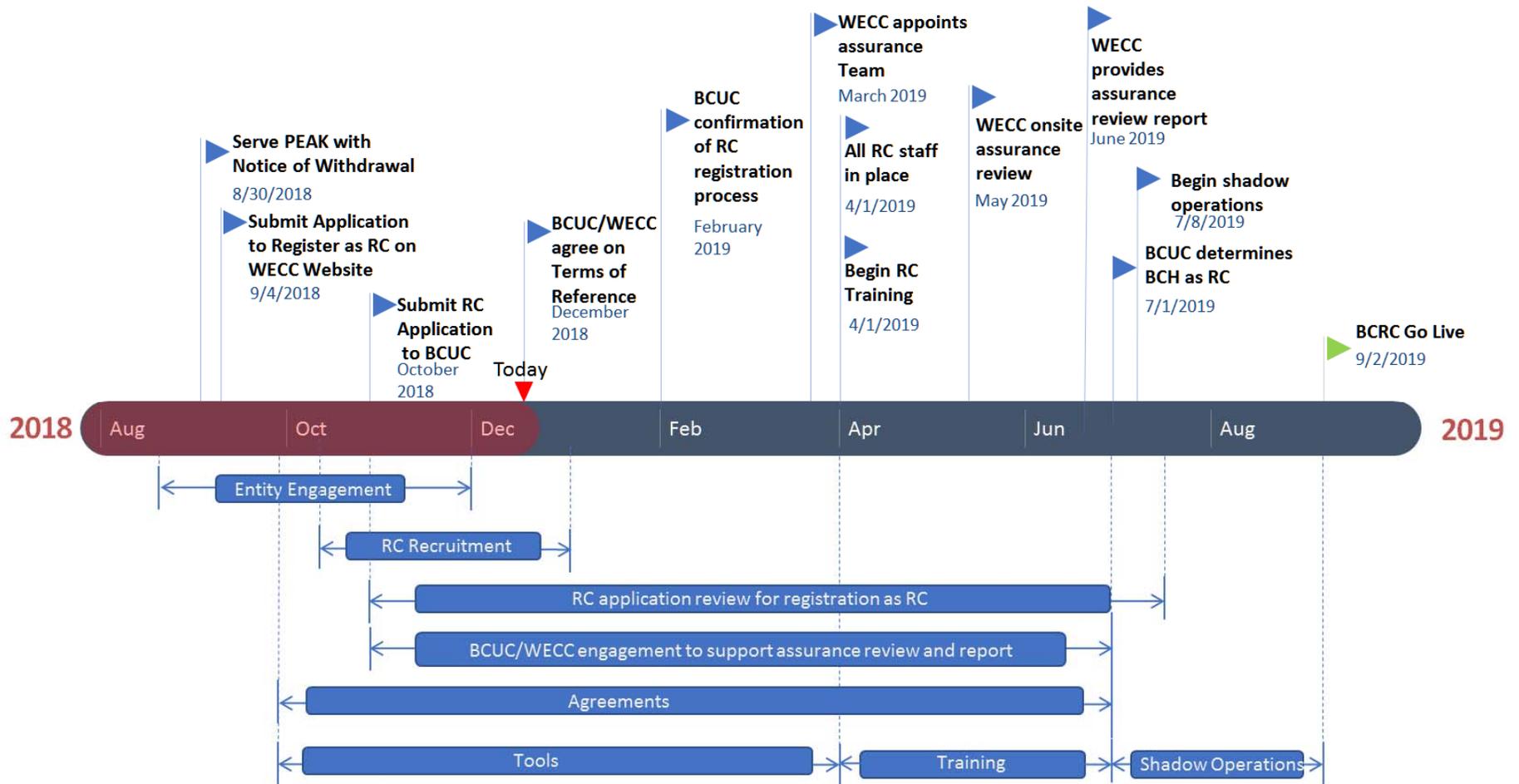
Once these four transitions occur, PEAK will wind-down operations

Reliability Coordination

Updates since September 2018 (continued)

- RC to RC coordination will continue through 2019 with meetings 1-2 times per month to:
 - Make decisions, assign action items and track progress;
 - Ensure sustainment of tools and processes that are currently supported by PEAK; and
 - Provide summaries from task teams focused on specific technical areas (i.e. Operations Planning, data exchange, System Operating Limit (**SOL**) methodology, etc.)

Updated Schedule and Milestones



RC Project Scope

Regulatory Legal Coordination

- BCUC Registration
- Consultation with BC Registered Entities
- WECC Engagement
- Agreements

HR “People”

- Recruitment
- Training
- Space Planning

Policies and Procedures

- Next Day Operations
- Real Time Operations
- Emergency Operations

Technology

- Network Applications and Modelling
- EMS Infrastructure and Additional Licensing
- Situational Awareness
- Display work
- Alarms

Activity Update

Regulatory, Legal, RC Coordination

- **Regulatory**

- July 24, 2018 - RC information session with BCUC
- Engagement with WECC re: assurance review/operational assessment
- Oct 29, 2018 – RC filing to support RC registration submitted

- **B.C. Registered Entity Engagement**

- Engagement commenced with B.C. registered entities on August 14, 2018
- Provided responses to registered entities that raised questions
- Actively meeting with FortisBC

- **Legal and RC Coordination**

- Attendance at meetings/conference calls with CAISO/ SPP/ AESO/ PEAK/ WECC/ NERC
- Ongoing participation in task teams for operations planning, data exchange, etc.
- Work underway on draft data sharing and RC Coordination Agreements
- Planned meeting with AESO and WIRAB in Feb 2019

Activity Update People

- **Staffing**
 - Nov 12, 2018 - RC Manager confirmed
 - Dec 11, 2018 - Specialist Engineer confirmed
 - Recruitment in progress for 10 technical roles, on track to complete in early January 2019
- **Training and Space Planning**
 - Job task analysis is underway to support training development
 - RC staff to be located at BC Hydro's existing control centers
- **Planned**
 - All staff confirmed by January 15, 2019
 - Job task analysis finalized by March
 - NERC System Operator certification as required
 - Training to start in April 2019
 - Space Planning to be completed by April 2019

Activity Update

Policies and Procedures

- Completed
 - The majority of new RC procedures have been drafted and review has begun
 - A number of documents will impact BC registered entities and we have begun to solicit feedback
 - A dedicated 'extranet' site has been established to share documents
- Planned
 - Provide extranet access to BC registered entities
 - Continue internal and external reviews through February 15, 2019
 - Finalize documents in March to support training
 - Ensure necessary entity coordination takes place to meet MRS requirements ahead of 'go-live'

Activity Update Technology

- **Tools**

- Fully extended power system model has been released to production Energy Management System
- Contingency analysis tool and configuration substantially complete and ready for testing
- Purchased wide area monitoring tool, held workshop with vendor

- **Planned**

- Further calibration and validation of tools
- Development of wide area monitoring tool

Reliability Coordinator Independence

RCs must act in the best interests of their RC area and the Interconnection before the individual interests of any single entity. The BC Hydro RC organization is being developed to support this principle:

- The RC staff will be under the direction and oversight of a dedicated senior manager (the Manager, Provincial Reliability Coordination Operations)
- RC staff will be located at BC Hydro's NERC CIP secure facilities with separate physical space from existing BA/TOP operations staff
- RC staff will be subject to the BC Hydro Standards of Conduct and potentially to an additional RC Standards of Conduct
- BC Hydro has drafted a governance model to support opportunities for MRS registered entities to stay engaged on RC activities

Reliability Coordinator Governance

Two groups will be established for RC governance

1. RC Registered Entities oversight group

- Participants
 - RC staff
 - MRS registered entities, including BC Hydro
 - BCUC
- Scope
 - RC reports on performance, proposed changes, responds to questions and feedback from entities

Reliability Coordinator Governance

Two groups will be established for RC governance

2. RC and BA/TOP Operations Working Group

- Participants
 - RC staff
 - BC Hydro BA/TOP
 - Other registered BA/TOPs within B.C.
- Scope
 - Review short term operational issues
 - Plan and coordinate joint initiatives such as training, restoration plans, etc.

Evaluation of BC Hydro's RC Capabilities

Working with BCUC and WECC to determine process

Evaluation Approach	Process	Scope
Full certification	NERC process governed by the NERC Rules of Procedure (section 500 and Appendix 5A Organization Registration and Certification Manual)	A review of all applicable MRS for the function the entity is registering for
Assurance review/ operational assessment	BCUC process to be developed with WECC under the B.C. MRS Rules of Procedure	<ul style="list-style-type: none">• Can be tailored to meet the BCUC's evaluation requirements in B.C.• May focus on only those MRS that will require additional work or changes to existing tools/processes, and exclude MRS applicable to other functions that BC Hydro is registered for (e.g. BA and TOP) and already subject to annual self-certification and on-site audits

- ❖ See Appendix B of the BC Hydro's MRS RC Registration Filing for a list of MRS applicable to the RC function effective in B.C. as of September 2, 2019

Next Steps

- Set BCUC IR response due date
- BCUC confirmation of scope and timing for WECC evaluation of BC Hydro's RC capabilities by January 2019
 - WECC appoint their assessment team (proposed timing: March 2019)
 - WECC onsite review (proposed timing: May 2019)
 - WECC completes the evaluation of BC Hydro's RC capabilities (proposed timing: June 2019)
- BCUC Order accepting BC Hydro's registration as RC for B.C. by July 1, 2019
- BCUC rescind Order L-65-14 appointing PEAK as RC for B.C. on or before September 1, 2019
- BC Hydro go-live for the RC function on September 2, 2019



