NAVIGANT

ENERGY

FIRST QUARTILE CONSULTING

Transmission Cost Benchmarking Study Work Plan and Peer Selection

hydro one

Stakeholder Engagement Meeting

August 6, 2015

DISPUTES & INVESTIGATIONS • ECONOMICS • FINANCIAL ADVISORY • MANAGEMENT CONSULTING

Agenda

Section 1 » Overview

Section 2 » Approach

Section 3 » Peer Group Selection

Section 4 » Performance Metrics

Section 5 » Next Steps

NAVIGANT

- A ***global and independent*** consulting firm, Navigant's reputation is for assisting our clients across core industries to address the critical opportunities and challenges of new markets, evolving customer demands, regulation and business model changes, new technologies, risk, and disputes
- With more than 400 consultants, Navigant's **Global Energy Practice** is the largest energy management consulting team in the industry. Our team of ***experienced professionals*** serves leading energy companies to address their most complex business opportunities and challenges

	Client Profiles				
	Nearly 300 financial services companies including many of the largest banks in the U.S.	Over 80% of AMLAW 100 firms	50 of the largest electric and gas utilities 20 largest independent power generators	Over 300 hospitals, health systems and academic medical centers in 2014 including most of the top-ranked U.S. institutions. Also many of the top life sciences companies in the world.	Federal, state and local government departments and agencies
DI&E	✓	✓	✓	✓	✓
FR&C	✓	✓		✓	✓
HEALTHCARE		✓		✓	✓
ENERGY		✓	✓		✓

First Quartile Consulting

FIRST QUARTILE CONSULTING

- First Quartile Consulting is the leading provider of benchmarking services in the transmission and distribution and customer service areas for utilities

- Established in 2007, the leadership team has was together for 20 years prior to founding of 1QC
  - The 1QC team began conducting large-scale transmission and distribution benchmarking studies in 1989
  - Annual studies under the First Quartile Consulting name began in 2008

- Beyond the annual studies, the firm conducts many different tailored benchmarking studies each year for individual clients, designed to meet specific needs, be it deep concentration on a particular area (e.g. work management approaches, capital planning, field construction, etc.), or a broader view across geographies or outside the utility industry

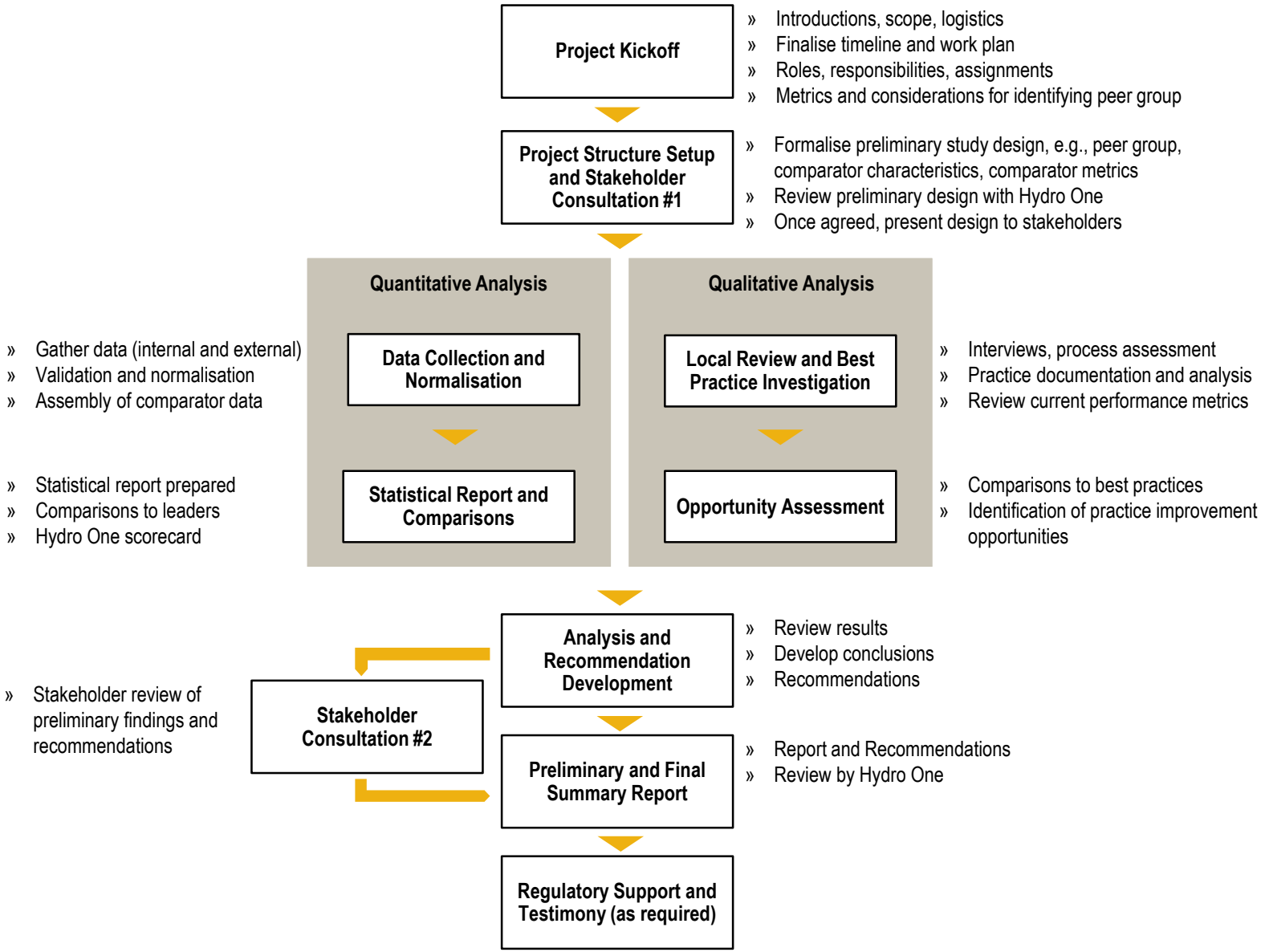
Study Objectives

Design and implement a robust and replicable benchmarking study of Hydro One's transmission costs

» The benchmarking study will:

- › Include an appropriate group of businesses to use as comparators/peers to Hydro One, taking into account a number of characteristics, including asset demographics, geography, customer characteristics, etc.;
- › Quantify and evaluate Hydro One's transmission costs relative to the peer group, taking into account cost drivers and differentiating characteristics;
- › Ensure a common understanding of the comparison criteria through the use of clear definitions;
- › Explore cost variations and associated practices and methods;
- › Make recommendations on practices that could be augmented or adopted to realise efficiency gains;
- › Engage stakeholders in regards to the peer group selection criteria, comparison metrics, and preliminary findings and recommendations.

Work Plan



Significant experience conducting T&D benchmark studies

- Refined approaches over time to improve data accuracy and validity
  - Introduced data validation comparisons
  - Began comparing results of different questions to identify outliers
  - Introduced a “data steward” for each company
  - Introduced steps in the data collection process to validate data before it is submitted

- Mostly long-term participants in our benchmarking community
  - Helps with data stability
  - Companies have at least the bias that they are voluntarily participating, with a goal of trying to improve

- Data Sources
  - Primary focus is data directly from companies, rather than public sources
    - Allows better targeting of practices and more detailed cost data
    - “some” use of FERC data for validation, but not for primary analysis

Multiple activities ensure accurate data for comparisons

Questionnaire	» Detailed questionnaire asking for cost data in specific categories – FERC-based data and activity-based data
Glossary & Guidelines	» Instructions defining significant terms, and describing what to include in various cost categories (and what to exclude)
Data Steward	» Assigned a consultant to each company, to help with data collection, and to review their data for accuracy, identify anomalies, and correct errors.
Kick-off Meetings	» Meeting with each company at start of data collection period to review guidelines, help with interpretations and understanding of the questionnaire.
Data Collection Webinars	» Group discussions during data collection – to help with specific questions and interpretations, give guidance on what to include or exclude for specific circumstances.
Report Review Webinars	» Review of reports in group setting, identifying outliers, highlighting any data issues so they can be investigated before dataset is finalized.
Statistical Analysis	» Review and analysis of data by 1QC to identify any questions of data accuracy, or errors of inclusion or exclusion of important factors.

Selection Criteria

Approaches to creating a pool of companies for a benchmarking study

Approach 1: Concentrate only on comparing overall performance outcomes
Panel 1: Select a homogeneous panel

Approach 2: Investigate operating practices in order to find the best practices
Panel 2: Select a panel of different utilities

Approach recommended for Hydro One:

a. Study goal is to look at both performance and practices
b. Select a "balanced" panel to include like companies as well as different companies
c. Some factors to consider in selecting peers for Hydro One:
   - ✓ Size of company
   - ✓ Density of the territory
   - ✓ Regulatory regime
   - ✓ Ownership structure
   - ✓ Weather and storm patterns
   - ✓ Ability to collect financial, operating, and practice data

Companies Under Consideration

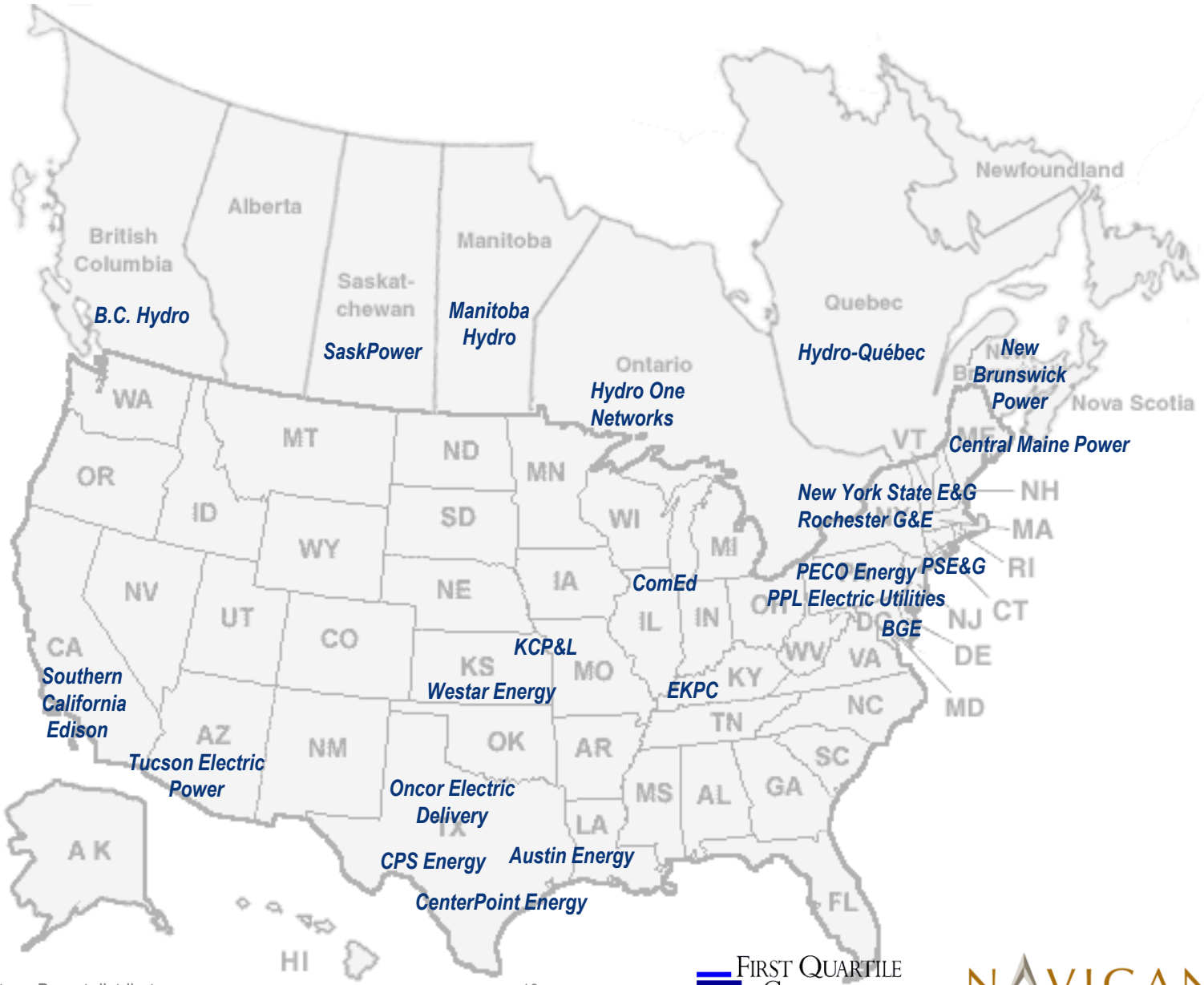
Company	Customers ('000)	Service Territory (sq. km)	Length of Lines (km)	Throughput (TWh)
Austin Energy	440	700	1,000	12.6
B.C. Hydro	1,950	42,370	18,500	54.6
CenterPoint Energy – Electric (Houston, TX)	2,300	8,050	6,000	101.7
CPS Energy (San Antonio, TX)	770	2,450	2,400	26.3
East Kentucky Power Coop.	530	N/A	4,700	22.8
Exelon – Baltimore Gas & Electric	1,350	3,700	2,100	30.6
Exelon – ComEd (Chicago)	3,840	18,400	8,650	90.0
Exelon – PECO Energy (Philadelphia)	1,235	3,400	1,750	37.5
Hydro-Quebec	4,200	527,079	33,600	175.0
Kansas City Power & Light	905	28,850	4,250	24.7
Manitoba Hydro*	555	N/A	12,800	30.0
New Brunswick Power*	395	73,450	6,850	18.3
Oncor Electric Delivery (Dallas, TX)	3,310	86,050	25,800	114.9
PPL Electric Utilities (Central Pennsylvania)	1,400	26,000	8,750	40.6
Public Service Electric and Gas (New Jersey)	2,260	2,000	2,300	40.7
SaskPower*	490	651,000	151,000	20.0
Southern California Edison	4,970	80,450	26,200	90.0
Tucson Electric Power	415	1,600	3,100	18.3
Westar Energy (Kansas)	695	16,250	9,950	30.4

Companies Under Consideration

Company	Ownership	Retail Open Access	Susceptible to Winter Storms	Susceptible to Summer Storms
Austin Energy	Municipal	Yes		T
B.C. Hydro	Provincial		S, I	
CenterPoint Energy – Electric (Houston, TX)	IOU	Yes		T, H
CPS Energy (San Antonio, TX)	Municipal	Yes		T
East Kentucky Power Coop.	Cooperative		I, S	T
Exelon – Baltimore Gas and Electric	IOU		S	T
Exelon – ComEd (Chicago)	IOU	Yes	I, S	T
Exelon – PECO Energy (Philadelphia)	IOU	Yes	S	
Hydro-Quebec	Provincial		I, S	T
Kansas City Power and Light	IOU		I, S	T, H
Manitoba Hydro*	Provincial		I, S	H
New Brunswick Power*	Provincial		I, S	
Oncor Electric Delivery (Dallas, TX)	IOU	Yes	I, S	T
PPL Electric Utilities (Central Pennsylvania)	IOU	Yes	S, I	
Public Service Electric and Gas (New Jersey)	IOU		I, S	T, H
SaskPower*	Provincial		S, I	T
Southern California Edison	IOU	Yes		
Tucson Electric Power	IOU			T
Westar Energy (Kansas)	IOU		I, S	T, H

I - Ice Storms S – Snowstorms H – Hurricanes, Tornados T – Thunderstorms, Wind

Companies Under Consideration



Approach to Metric Selection

Navigant and First Quartile recommend a balanced approach to metric selection

- Selection Criteria
  - Balanced metrics (i.e. multi-dimensional)
  - Few enough to be manageable
  - Comparable across utilities

- Level at which to track
  - Total transmission organization
  - Transmission lines versus substations
  - Hybrid combination

- Topic areas to consider
  - Cost / investment
  - Reliability
  - Safety
  - Staffing

Metrics to Consider

Four categories of performance to investigate

- Costs
  - Capital
  - Operating, Maintenance, and Administrative (OM&A)
- Reliability
  - Transmission lines
  - Substations
- Safety
- Staffing

Cost Metrics

Navigant and First Quartile recommend analysing the following cost metrics

Cost Category	Per Asset	Per Kilometre	Per MVA	Per Substation
Total Capital	X			
Lines Total Capital	X	X		
Substation Total Capital	X		X	
Total Sustaining Capital	X			
Lines Sustaining Capital	X	X		
Substation Sustaining Capital	X		X	
Total Growth Capital	X			
Lines Growth Capital	X	X		
Substation Growth Capital	X		X	
Total OM&A	X			
Lines Total OM&A	X	X		
Substations Total OM&A	X		X	X

Reliability metrics

Transmission Lines

- Element total outage frequency (TOF)
- Element sustained outage frequency (SOF)
- Element Momentary outage frequency (MOF)
- Element Sustained Outage Duration Time (SODT)
- Circuit Total Outage Frequency, Circuit-length Adjusted (TCOF100CTmi)
- Circuit Sustained Outage Frequency, Circuit-length Adjusted (SCOF100CTmi)
- Circuit Momentary Outage Frequency, Circuit-length Adjusted (MCOF100CTmi)
- Percentage of Elements with Zero Automatic Outages (PCZO)
- Sustained automatic outages by cause code

Substations

- Contribution To SAIFI
- Contribution to SAIDI
- Transformer Failures per 1000 Transformers
- % Mis-Operation Rate for Relays
- MOF from failed AC substation equipment, plus failed protection system equipment
- SOF from failed AC substation equipment, plus failed protection system equipment
- TOF from failed AC substation equipment, plus failed protection system equipment

Safety and staffing metrics

Safety

- Recordable injury rate - combined for Substations and Transmission lines
- Recordable injury rate - for Substations
- Recordable injury rate - for Transmission lines
- Days Away, Restricted, and Transfer (DART) incidence rates
- Lost workday case rates
- Lost time severity rate
- Total frequency of vehicle accidents
- High risk vehicle accident frequency rate
- Days worked since the last employee fatality
- Preventable frequency rate

Staffing

- Wage rates for key jobs -- Journey-level line-worker, substation electrician
- Span of control - Substations and Transmission lines
- Outsourcing % - Substations (Design, Construction, Maintenance)
- Outsourcing % - Transmission lines (Design, Construction, Maintenance)

The study objectives include identification of best practices for analysis

- Decisions to be made
  - Level of depth to investigate
    - Broad topics/processes at corporate level (e.g. Strategic Planning, Asset Management)
    - Very localized practices (e.g. crew sizes for specific job types)
  - Volume of areas to address
    - Comprehensive across planning, design, construction, operations, and maintenance
    - More limited scope to cover a few key areas (e.g. system expansion, system sustainment)

- Some selection criteria
  - Ability to gather comparative practice information
  - Ability to take action in reasonable time-frame (i.e. not core system design/configuration changes)
  - Practices that can be analyzed year on year with a peer group
  - Areas of particular interest to Hydro One for investigation currently

Practice Areas to Consider

Seven categories to consider

- Asset management
- Capital project and portfolio management
- System maintenance
- Emergency response
- Safety
- Staffing
- Support

Asset management and capital project portfolio management

Asset Management

- Roles and responsibilities
- Analytic approaches
- Replacement programs

Capital Project and Portfolio Management

- Work plan development
  - Project identification
  - Project evaluation and ranking
  - Project selection
- Work plan execution – portfolio management
  - Portfolio re-evaluation
  - Execution stages
- Work plan execution – project / program management
  - Staffing - project managers, program managers, etc.
  - Project planning
  - Project management approaches - managing projects
  - Project control and monitoring
  - Project close-out process

Operating practices

Maintenance

- Planning
- Work management
- Inspections
- ROW management
- Outage planning

Emergency response

- Plans and preparations
- Organization structure
- Customer communications

Staffing approaches

- Outsourcing
- Crew size / structure

Safety programs

Support functions

- Fleet management
- Materials management

Next Steps

Several short-term and some long-term activities to prepare the comparisons

- Follow-up from the stakeholder session
  - Respond to inputs
  - Modify the metrics and practice areas as necessary

- Data gathering
  - Hydro One internal data gathering
    - Interviews
    - Complete a questionnaire
  - Supplement the existing dataset with data from a few additional Canadian utilities
    - Work with other utilities to validate their data for accuracy and comparability

- Summary and reporting
  - Initial draft of data comparisons for data validation and analysis
  - Analysis and normalization
  - Draft report

- Analysis expected to be complete in late-October, next stakeholder session planned for mid-November