Cost of Service
Stakeholder Engagement

Export Treatment

October 30, 2014

Manitoba Hydro

Welcome and Agenda

INTRODUCTION OF PARTICIPANTS

October 30th Workshop - Agenda

Approximate Time	Item	Lead
9:00 – 9:30	Welcome and Agenda	Greg Barnlund
	1. Introduction of Participants • Goals for Session • Expectations and Responsibilities • Facilitation and Ground Rules	Greg Barnlund
9:30 -10:00	2. COS Methodology Background • COS at Manitoba Hydro	Kelly Derksen
10:00-10:30	3. PCOSS14 • Key Issues/Methodology • Results	Kelly Derksen
10:30 -10:45	Break	

10:45 – 11:15	4. Export COS treatment
	• Importance
	  • NER outcome
	  • RCC outcome
		Kelly Derksen

11:15 – 12:00	5. Christensen Associates COS Report • Use of an Export Class • Assignment of Embedded Cost • Other cost allocation/assignments	Kelly Derksen/ Robert Camfield/ David Cormie/ Michael Dust
12:00 – 1:00	Lunch	

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October 30th Workshop - Agenda

Approximate Time	Item	Lead
1:00-2:00	5. Continued	
2:00-3:00	6. Treatment of Net Export Revenue • CA Report • Energy Available for Export alternative	Kelly Derksen/ Robert Camfield/ David Cormie/ Michael Dust
3:00 – 3:15	Break	
3:15 – 4:45	7. Emerging COS Issues • New Generation • BiPole III • DSM	Kelly Derksen/ David Cormie/ Robert Camfield/ Michael Dust
4:45 – 5:00	8. Wrap Up • Feedback • Next Session • Proposed Topics	Greg Barnlund

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Purpose/Goals for this Session

- Manitoba Hydro is undertaking an examination of its Cost of Service Study through a dialogue with stakeholders and intervener representatives.
- The purpose of this dialogue is to develop a common understanding of the issues and to identify possible alternatives.
- The goal is to obtain feedback to be considered in the development of Manitoba Hydro's next Cost of Service Study.

Purpose/Goals for this Session

- Create better understanding of how Manitoba Hydro allocates costs to its various customer classes and how rates are designed to recover its costs;
- Ensure stakeholder concerns and views are identified, understood and considered; and,
- Act as a forum for the exchange of information and views.

Protocol

- Expectations
- Responsibilities of Participants
- Facilitation and Ground Rules
- Issues List

COST OF SERVICE METHODOLOGY

BACKGROUND

Common Principles to Guide

- Cost causation is a goal of all allocations where practical
- Cross subsidies are to be minimized, where practical
- Selection of methods and allocations should consider stability in results

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Cost of Service

- A method of allocating total costs to the various classes of customers
- Objective is to select a method which best represents cost causation
- Methods must consider both how the utility plans and operates its system

Cost of Service

- Compares the revenue generated by each Customer Class to cost of providing service to the Class (Revenue Cost Coverage or RCC)
- Determination and substantiation of the fairness and equity in the proposed rates structure
- Can also be used to aid in rate design

Manitoba Hydro's COSS

- Recognizes that judgment is required & data limitations
- Recognize that COS is a reasonable approximation of the actual cost of serving a particular customer class
- Zone-of-Reasonableness (ZOR) is currently a range from 95% to 105%
- RCC within ZOR means the customer class is considered to be reasonably covering its costs

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Manitoba Hydro's COSS

- An embedded cost study
  - Based on original accounting costs
  - Represents average cost of serving new and existing customers and loads
- Prospective
  - Based on Second Year of IFF (Revenue Requirement)
  - Second year of the IFF assumes median water flows
    - Random variation in water availability
    - Median flows capture most likely outcome, thus appropriate for determining revenue requirements

Manitoba Hydro's COSS

The first step in COS is to functionalize the revenue requirement (IFF):

- Generation (All HVDC excluding Dorsey)
- Transmission (>100 kV and Dorsey/Riel)
- Subtransmission (33 – 66 kV)
- Distribution Plant
- Customer Service

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Manitoba Hydro’s COSS

The second step is to classify the functionalized cost:

- Energy—costs that vary based on usage
- Demand—costs that are related to capacity investment
- Customer—costs that vary with the number of customers

The third step is to allocate functionalized and classified costs to each customer class

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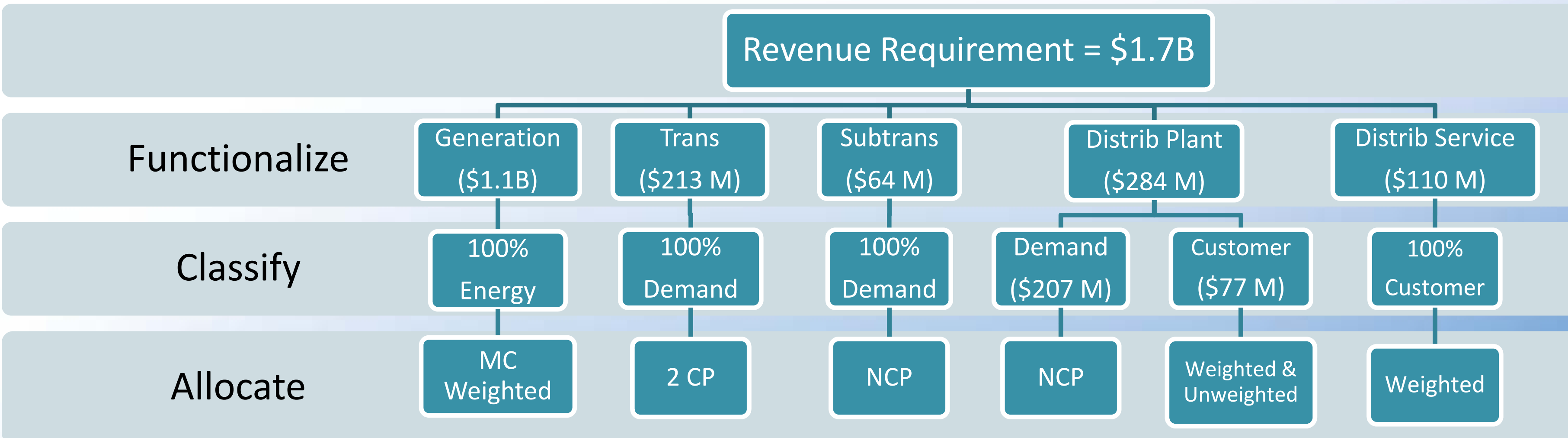
Steps in COSS



MC = Marginal Cost
CP = Coincident Peak
NCP = Non Coincident Peak

Functions Used by Class

	Res	GSS - ND	GSS - D	GSM	GSL 0-30	GSL 30-100	GSL >100	ARL	Exp
Generation	Y	Y	Y	Y	Y	Y	Y	Y	Y
Transmission	Y	Y	Y	Y	Y	Y	Y	Y	Y
Subtransmission	Y	Y	Y	Y	Y	Y		Y	
Dist - Substation	Y	Y	Y	Y	Y			Y	
Dist - P&W Primary	Y	Y	Y	Y	Y			Y	
Dist - Transformers	Y	Y	Y	Y				Y	
Dist - P&W Secondary	Y	Y	Y	Y				Y	
Dist - Services	Y	Y	Y	Y	Y				
Dist - Meters	Y	Y	Y	Y	Y	Y	Y		
Customer Service	Y	Y	Y	Y	Y	Y	Y	Y	

Key Considerations in Manitoba Hydro's COS

- Generation and Transmission functions represent approximately 74% of total cost; it is the treatment of these assets that are most impactful
- Numerous techniques available to classify G&T
- Method chosen should reflect both the utility's system and customer's load characteristics
- The treatment of export revenues has a major impact on COS results

Key Considerations – Classification Methods

- Type of generation resources
  - MH is predominantly (95%) hydraulic
- Planning and Operating Constraints
- Customer loads (peaks)

COST OF SERVICE METHODOLOGY

PCOSS14 METHODOLOGY & RESULTS

PCOSS14—Key Issues

- Reflects direction from Order 116/08
  - Dependable Exports assigned embedded G&T
  - URA and AFE assigned against Exports
- Reflects recommendations from Christensen Report
  - Differentiation of Export Sales between Dependable & Opportunity
  - DSM
- Includes Wuskwatim (fully in-service in 2013)
  - First new hydraulic generating station in 20 years
- Reflects Depreciation Study completed Oct 2011
  - Service Life extension of Subtransmission and Distribution assets

PCOSS Results

	PCOSS08 (116/08)	PCOSS10	PCOSS11	PCOSS13	PCOSS14
Residential	96.2%	96.4%	95.9%	99.2%	98.6%
GSS – ND	101.4%	105.7%	104.8%	107.6%	107.7%
GSS – D	107.8%	102.8%	103.8%	103.7%	104.9%
GSM	100.2%	101.3%	101.1%	100.0%	100.0%
GSL <30	89.9%	92.3%	91.9%	93.3%	91.9%
GSL 30-100	108.4%	106.8%	104.2%	96.6%	101.7%
GSL >100	112.0%	109.2%	112.6%	100.5%	101.0%
ARL	102.4%	100.0%	105.2%	101.8%	99.7%

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EXPORT COS TREATMENT

IMPORTANCE OF EXPORTS IN COS

Importance of Export Revenue in COS

Treatment of exports impacts domestic class RCC and subsequently rates in two ways:

1) assignment of G&T costs to exports explicitly shifts away from domestic customer costs responsibility for those costs
2) NER reduces domestic customer's cost responsibility

Importance of Export Revenue in COS
Major Issues in the View of MH

- Surplus energy available for export sales
- Therefore, how best to manage export sales revenues in COS?

Contributing Factors

- Inherent scale economies in hydro facilities
- Remarkably low variable operating costs

Range of NER ($ million)

	PCOSS14 (116/08)	PCOSS14	PCOSS14 (Variable Only)
Gross Export Revenue	340	345	345
Allocated G&T	208	*175	n/a
Assigned Thermal Generation	33	n/a	n/a
Water Rentals and Variable O&M	n/a	10	34
Purchased Power	171	90	n/a
DSM	40	n/a	n/a
Policy Related Charges (AEF & URA)	36	36	36
Net Export Revenue	(148)	34	275

*includes an allocation of NG Thermal costs

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Assessment of Exports

- Appropriate test for whether export sales are beneficial is incremental benefits vs. incremental costs
- Recently NFAT concluded that the pursuit of Keeyask (including advancement), tie line, investment in US Infrastructure, and increased DSM based on economic analysis provide overall benefits
- COS, a one year allocation of financial cost, is inappropriate basis to evaluate whether Exports positively support project
- Moreover, embedded cost allocation is not considered in economic analysis of PDP
  - Export Revenue based on external market
  - Embedded G&T cost allocation against exports a convention
  - Assignment of AEF & URA a policy decision and first charge against COS NER

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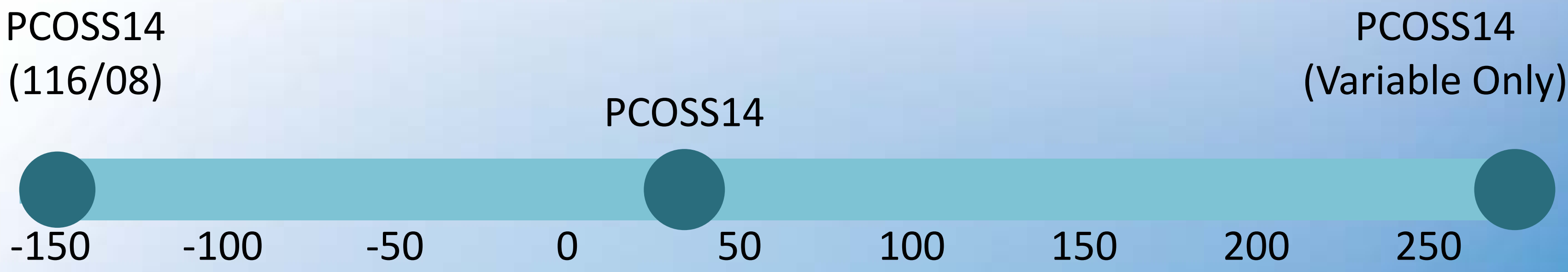
Comparison (in Unit Costs)

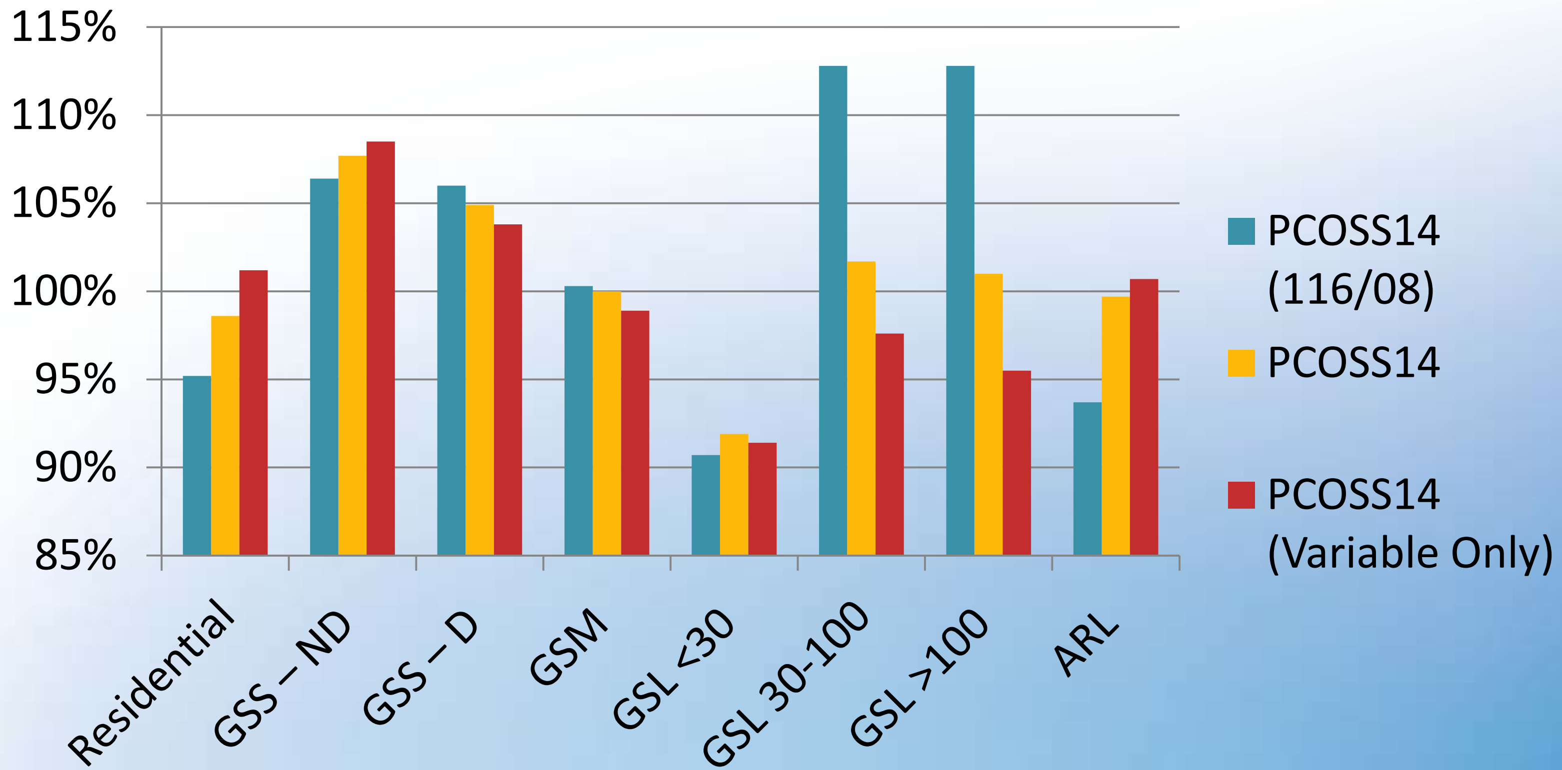
Customer Class	PCOSS14 116/08 (¢/kWh)	PCOSS14 (¢/kWh)	PCOSS14 Variable Only (¢/kWh)
GSL >100	3.10	3.91	4.88
Exports	5.42	3.45	0.78
Exports (excl AEF & URA)	5.01	3.05	0.37

Range of 'average cost' of exports can be substantial depending on approach used to cost exports

POTENTIAL RANGE OF NER ($ million)



Range of RCC


115%
110%
105%
100%
95%
90%
85%
Residential
GSS – ND
GSS – D
GSM
GSL <30
GSL 30-100
GSL >100
ARL
PCOSS14 (116/08)
PCOSS14
PCOSS14 (Variable Only)

EXPORT CLASS AND COSTS

CA Review of COS

- MH retained CA in 2011 to review its Cost of Service Methodologies
- Review undertaken to confirm best practices and to address a number of issues that arose out of previous PUB proceedings
- The Review largely endorsed MH's Export-related COS approach
- Recommendations have been reflected in PCOSS14 (and PCOSS13)

Key Findings in CA Review (Export Sales)

- Reasonable to maintain an Export Class
- Appropriate to recognize different cost assignment for Dependable and Opportunity Sales
- Reasonable that Dependable Sales are allocated embedded costs on same basis as domestic customers
- Incremental cost approach be taken to Opportunity Sales
  - Opportunity Sales considered a residual and to be assigned variable costs associated with serving these exports

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MH's Current Cost of Service Treatment

- Accepted CA's recommendations
- Recognizes that Dependable and Opportunity Sales are fundamentally different products that impose different costs upon the system
- Long-term contract commitments
  - Therefore, dependable sales allocated embedded costs on same basis as to domestic recognized as a convention
- Opportunity Sales made on an "as available" basis
  - Assigned variable costs associated with serving these exports
    - Water rentals
    - Variable hydraulic O&M on sales in excess of power purchases

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Other Findings in CA Review (Export Sales)

- No assignment of URA and AFE to Exports
  - URA and AFE to be assigned to those who cause costs
- DSM
  - Allocate to those who participate in programs since this treats DSM cost in a manner identical to any other resource
- Wind included in Generation Pool
  - Not to be directly assigned to the Export Class
  - Wind blended in MH's overall energy supply that serves both Domestic and Export Sales
- Thermal (Natural Gas)

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MH's Current Cost of Service Treatment

- MH agreed with CA's recommendations
  - However, MH has assigned the AEF and URA as a policy-related first charge against Export Revenue

ALLOCATION OF NET EXPORT REVENUE

Treatment of NER in COS

- NER is viewed as a system dividend to be shared in a fair and equitable manner, and is allocated based on total cost
- Majority of export revenues continue to be used to offset Generation and Transmission costs (which represent 71% of allocated costs)

Christensen Review of COS

CA did not identify a specific NER allocator

- No single cost allocation will suffice to provide a stable and fair allocation when dealing with substantial margins derived from competitive markets

CA recommended investigating a number of allocators:

- Existing allocators such as those used for G&T
- Allocators that recognize differential risk born by classes as NER changes over time
- Allocators based on energy available for export

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MH's Current COS Treatment

- MH view is that CA supportive of current NER treatment
- Energy Available for Export allocation
  - Assignment of capacity costs to class suggests an implicit entitlement to the underlying capacity (MW), as well as the energy that can be produced by it
  - Difference between the class's energy entitlement and their actual consumption represents the class' contribution to energy available for export
  - Domestic entitlement is premised on having paid for the total cost of generation assets, therefore only variable costs assigned to exports

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Energy Available for Export

Advantages:

- intuitive appeal as a means of determining explicit class entitlement to benefit of export sales

Disadvantages:

- may require change from Energy classification of Generation costs to a difficult to justify Demand basis
- requires domestic classes to entirely pay for G&T assets, and exports not to be assigned any embedded G&T
- novel method, controversial for the only utility identified to use the approach

EMERGING COS ISSUES

NEW GENERATION/TRANSMISSION RESOURCES
BIPOLE III
DSM

NEW G&T FACILITIES

- Keeyask:
  - $6.5B investment changes functional cost portions, as additions represent 60% of existing rate base
  - expected to be advanced to 2019/20
- 750 MW tie line, investment in US infrastructure
- Addition of significant G&T assets, at unit cost higher than existing assets, decreases RCC of industrial classes and increases RCC of distribution level customers
- Change in RCC is *incremental* to overall level of rate increases required

NEW G&T FACILITIES

Default COS Treatment

- Keeyask included as part of generation pool for allocation to domestic and dependable exports
- Tie line allocated to domestic and dependable exports consistent with treatment of existing transmission

BIPOLE III

Default COS Treatment:

- Functionalization consistent with existing HVDC facilities
  - Keewatinohk and Bipole lines functionalized as generation allocated on weighted energy
  - Riel functionalized as transmission allocated on 2CP demand

SENSITIVITY STUDY: RCC IMPACTS OF BIPOLE III

Customer Class	RCC Change Current Classification	RCC Change 100% Demand
Residential	2.9%	1.9%
GSS – ND	3.2%	2.2%
GSS – D	(0.2%)	(0.6%)
GSM	(1.7%)	(2.0%)
GSL <30	(2.9%)	(2.9%)
GSL 30-100	(5.5%)	(3.1%)
GSL >100	(7.4%)	(4.3%)
ARL	20.3%	21.7%

PCOSS14 assumes $384 M of additional G&T costs based on $4.6B investment

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DSM

Current Cost Treatment:

- Directly assigned to participating domestic customer classes
  - Fails to recognize benefit provided to all (deferred G&T)

Alternate Treatment:

- Functionalize as Generation and Transmission
  - Common approach
  - Recognizes benefits in the form of deferred G&T

SENSITIVITY STUDY: RCC IMPACT OF DSM

Customer Class	2 Times: Direct Assign	2 Times: 90% Gen 10% Trans	Potential Variation in RCC
Residential	1.3%	(0.5%)	1.8%
GSS – ND	(1.6%)	2.5%	4.1%
GSS – D	(1.8%)	1.8%	3.6%
GSM	(1.0%)	0.6%	1.6%
GSL <30	(1.2%)	0.5%	1.7%
GSL 30-100	0.3%	(1.9%)	2.2%
GSL >100	(0.7%)	(1.4%)	0.7%
ARL	2.6%	1.5%	3.9%

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CLOSING COMMENTS

FEEDBACK

FUTURE SESSIONS

Takeaway 4a: Slide 46 BiPole 3 Sensitivity Study

Provide the underlying assumptions and data used to produce the BiPole 3 (Slide 46) sensitivity analysis, as well as the resulting RCC Summary, Customer/ Demand/Energy Summary and Functional Breakdown Summary.

MH Response:

The BiPole 3 sensitivity study was prepared based on forecast capital costs of $4.6 Billion, which for discussion purposes were assumed to increase annual costs by $384 million. Domestic class revenue was increased 28% across-the-board (excluding diesel) in order to equalize costs and revenue in the PCOSS. RCC impacts shown in slide 46 must be considered in the context of this assumed 28% increase.

Under the current classification, $125 million was assumed to be Transmission related and allocated using 2CP demand and the remaining $259 million to be Generation related and allocated on weighted energy.

The alternate scenario presented results assuming functionalization was unchanged, but the generation portion was classified as demand and allocated on the basis of 2CP.

RCC, C/D/E and Functional Breakdown Summaries are attached.

Manitoba Hydro
Prospective Cost Of Service Study
March 31, 2014
Revenue Cost Coverage Analysis
Slide 46: Bipole 3 Current Classification
SUMMARY

Customer Class	Total Cost ($000)	Class Revenue ($000)	Net Export Revenue ($000)	Total Revenue ($000)	BPIII RCC % Current Rates
Residential	728,670	752,683	(13,056)	739,627	101.5%
General Service - Small Non Demand	153,265	172,669	(2,680)	169,989	110.9%
General Service - Small Demand	163,505	174,006	(2,857)	171,149	104.7%
General Service - Medium	238,725	238,858	(4,200)	234,658	98.3%
General Service - Large 0 - 30kV	119,656	108,634	(2,101)	106,532	89.0%
General Service - Large 30-100kV*	75,429	73,919	(1,344)	72,575	96.2%
General Service - Large >100kV*	253,724	242,004	(4,485)	237,519	93.6%
*Includes Curtailment Customers					
SEP	968	826	-	826	85.4%
Area & Roadway Lighting	22,940	27,658	(138)	27,520	120.0%
Total General Consumers	1,756,881	1,791,258	(30,861)	1,760,397	100.2%
Diesel	9,948	6,612	(180)	6,432	64.7%
Export	376,274	345,233	31,041	376,274	100.0%
Total System	2,143,103	2,143,103	-	2,143,103	100.0%

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Customer, Demand, Energy Cost Analysis
Slide 46: Bipole 3 Current Classification
SUMMARY

	CUSTOMER			DEMAND				ENERGY			
Class	Cost ($000)	Number of Customers	Unit Cost $/Month	Cost ($000)	% Recovery	Billable Demand MVA	Unit Cost $/KVA	Cost ($000)	Metered Energy mWh	Unit Cost ¢/kWh	
Residential	131,224	486,987	22.46	257,549	0%	n/a	n/a	352,953	7,404,453	8.25	**
GS Small - Non Demand	26,134	53,778	40.50	50,199	0%	n/a	n/a	79,612	1,605,511	8.09	**
GS Small - Demand	8,880	12,492	59.24	58,547	38%	2,390	9.28	98,936	2,047,715	6.61	
General Service - Medium	7,766	1,974	327.83	85,270	87%	7,302	10.21	149,890	3,174,662	5.06	
General Service - Large <30kV	3,906	288	n/a	38,911	100%	4,042	10.59 *	78,940	1,702,481	4.64	
General Service - Large 30-100kV	2,700	40	n/a	17,648	100%	2,894	7.03 *	56,425	1,327,210	4.25	
General Service - Large >100kV	2,494	16	n/a	48,850	100%	8,409	6.11 *	206,865	4,903,742	4.22	
SEP	326	29	935.95	132	0%	n/a	n/a	509	26,500	2.42	**
Area & Roadway Lighting	16,679	155,024	8.97	2,707	0%	n/a	n/a	3,692	100,487	6.37	**
Total General Consumers	200,109	710,628		559,812		25,038		1,027,820	22,292,761		
Diesel	239	755	26.38	359	0%	n/a	n/a	9,530	13,754	71.90	**
Export	n/a	n/a	n/a	48,535	0%	n/a	n/a	327,739	9,013,000	4.17	***
Total System	200,348	711,383		608,706		25,038		1,365,090	31,319,515		

* - includes recovery of customer costs
** - includes recovery of demand costs
*** -includes recovery of customer and demand costs

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Prospective Cost Of Service Study - March 31, 2014
Functional Breakdown
Slide 46: Bipole 3 Current Classification
SUMMARY

Class	Total Cost ($000)	Generation Cost ($000)	%	Transmission Cost ($000)	%	Subtransmission Cost ($000)	%	Distribution Cust Service Cost ($000)	%	Distribution Plant Cost ($000)	%
Residential	741,726	352,953	47.6%	112,515	15.2%	33,688	4.5%	72,440	9.8%	170,131	22.9%
General Service - Small Non Demand	155,945	79,612	51.1%	24,019	15.4%	6,081	3.9%	18,409	11.8%	27,824	17.8%
General Service - Small Demand	166,362	98,936	59.5%	28,387	17.1%	7,005	4.2%	4,399	2.6%	27,635	16.6%
General Service - Medium	242,926	149,890	61.7%	43,571	17.9%	9,686	4.0%	6,695	2.8%	33,084	13.6%
General Service - Large <30kV	121,757	78,940	64.8%	22,509	18.5%	4,842	4.0%	3,672	3.0%	11,794	9.7%
General Service - Large 30-100kV	76,772	56,425	73.5%	13,950	18.2%	3,698	4.8%	2,628	3.4%	72	0.1%
General Service - Large >100kV	258,209	206,865	80.1%	48,850	18.9%	0	0.0%	2,464	1.0%	30	0.0%
SEP	968	509	52.6%	132	13.7%	0	0.0%	309	31.9%	17	1.7%
Area & Roadway Lighting	23,077	3,648	15.8%	722	3.1%	453	2.0%	551	2.4%	17,703	76.7%
Total General Consumers	1,787,742	1,027,777	57.5%	294,656	16.5%	65,453	3.7%	111,566	6.2%	288,289	16.1%
Diesel	10,128	9,530	94.1%	0	0.0%	0	0.0%	0	0.0%	598	5.9%
Export	376,274	327,739	87.1%	48,535	12.9%	0	0.0%	0	0.0%	0	0.0%
Total System	2,174,144	1,365,046	62.8%	343,191	15.8%	65,453	3.0%	111,566	5.1%	288,887	13.3%

Manitoba Hydro
Prospective Cost Of Service Study
March 31, 2014
Revenue Cost Coverage Analysis
Slide 46: Bipole 3 Demand Classification
SUMMARY

Customer Class	Total Cost ($000)	Class Revenue ($000)	Net Export Revenue ($000)	Total Revenue ($000)	BPIII RCC % 100.0% Demand
Residential	737,860	752,683	(11,053)	741,630	100.5%
General Service - Small Non Demand	155,091	172,669	(2,268)	170,401	109.9%
General Service - Small Demand	164,491	174,006	(2,404)	171,602	104.3%
General Service - Medium	240,237	238,858	(3,534)	235,324	98.0%
General Service - Large 0 - 30kV	120,132	108,634	(1,764)	106,870	89.0%
General Service - Large 30-100kV*	73,858	73,919	(1,100)	72,819	98.6%
General Service - Large >100kV*	246,574	242,004	(3,641)	238,363	96.7%
*Includes Curtailment Customers					
SEP	968	826	-	826	85.4%
Area & Roadway Lighting	22,685	27,658	(111)	27,547	121.4%
Total General Consumers	1,761,897	1,791,258	(25,875)	1,765,383	100.2%
Diesel	9,948	6,612	(150)	6,461	65.0%
Export	371,258	345,233	26,025	371,258	100.0%
Total System	2,143,103	2,143,103	-	2,143,103	100.0%

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Customer, Demand, Energy Cost Analysis
Slide 46: Bipole 3 Demand Classification
SUMMARY

	CUSTOMER			DEMAND					ENERGY			
Class	Cost ($000)	Number of Customers	Unit Cost $/Month	Cost ($000)	% Recovery	Billable Demand MVA	Unit Cost $/KVA		Cost ($000)	Metered Energy mWh	Unit Cost ¢/kWh	
Residential	130,842	486,987	22.39	343,179	0%	n/a	n/a		274,893	7,404,453	8.35	**
GS Small - Non Demand	26,058	53,778	40.38	68,492	0%	n/a	n/a		62,809	1,605,511	8.18	**
GS Small - Demand	8,854	12,492	59.06	80,170	38%	2,390	12.71		77,871	2,047,715	6.23	
General Service - Medium	7,743	1,974	326.87	118,472	87%	7,302	14.18		117,556	3,174,662	4.17	
General Service - Large <30kV	3,895	288	n/a	56,078	100%	4,042	14.84	*	61,923	1,702,481	3.64	
General Service - Large 30-100kV	2,692	40	n/a	28,306	100%	2,894	10.71	*	43,959	1,327,210	3.31	
General Service - Large >100kV	2,487	16	n/a	86,210	100%	8,409	10.55	*	161,518	4,903,742	3.29	
SEP	326	29	935.95	132	0%	n/a	n/a		509	26,500	2.42	**
Area & Roadway Lighting	16,675	155,024	8.96	3,260	0%	n/a	n/a		2,861	100,487	6.09	**
Total General Consumers	199,572	710,628		784,299		25,038			803,900	22,292,761		
Diesel	238	755	26.30	357	0%	n/a	n/a		9,503	13,754	71.69	**
Export	n/a	n/a	n/a	84,897	0%	n/a	n/a		286,361	9,013,000	4.12	***
Total System	199,810	711,383		869,554		25,038			1,099,764	31,319,515		

* - includes recovery of customer costs
** - includes recovery of demand costs
*** -includes recovery of customer and demand costs

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Functional Breakdown
Slide 46: Bipole 3 Demand Classification
SUMMARY

Class	Total Cost ($000)	Generation Cost ($000)	%	Transmission Cost ($000)	%	Subtransmission Cost ($000)	%	Distribution Cust Service Cost ($000)	%	Distribution Plant Cost ($000)	%
Residential	748,914	274,893	36.7%	198,567	26.5%	33,590	4.5%	72,229	9.6%	169,635	22.7%
General Service - Small Non Demand	157,359	62,809	39.9%	42,389	26.9%	6,063	3.9%	18,356	11.7%	27,743	17.6%
General Service - Small Demand	166,895	77,871	46.7%	50,098	30.0%	6,985	4.2%	4,386	2.6%	27,555	16.5%
General Service - Medium	243,771	117,556	48.2%	76,895	31.5%	9,657	4.0%	6,675	2.7%	32,987	13.5%
General Service - Large <30kV	121,896	61,923	50.8%	39,724	32.6%	4,828	4.0%	3,662	3.0%	11,759	9.6%
General Service - Large 30-100kV	74,957	43,959	58.6%	24,619	32.8%	3,687	4.9%	2,620	3.5%	72	0.1%
General Service - Large >100kV	250,215	161,518	64.6%	86,210	34.5%	0	0.0%	2,457	1.0%	30	0.0%
SEP	968	509	52.6%	132	13.7%	0	0.0%	309	31.9%	17	1.7%
Area & Roadway Lighting	22,796	2,833	12.4%	1,277	5.6%	453	2.0%	550	2.4%	17,684	77.6%
Total General Consumers	1,787,771	803,871	45.0%	519,911	29.1%	65,264	3.7%	111,243	6.2%	287,482	16.1%
Diesel	10,098	9,503	94.1%	0	0.0%	0	0.0%	0	0.0%	596	5.9%
Export	371,258	286,361	77.1%	84,897	22.9%	0	0.0%	0	0.0%	0	0.0%
Total System	2,169,128	1,099,735	50.7%	604,808	27.9%	65,264	3.0%	111,243	5.1%	288,078	13.3%

Takeaway 3: Slide 35 Other Findings in CA Review

Explain the change in the share of assigned DSM Program Costs by class from PCOSS13 to PCOSS14.

MH Response:

The table below shows the assigned DSM costs by class in terms of dollars and percentages for PCOSS13 and PCOSS14 (costs are shown in Schedule E2 of PCOSS13 and PCOSS14). DSM program costs are assigned based on customer participation on a program-by-program basis averaged over ten years, and as expected the class share of total costs varies little between studies.

DSM Costs Assigned by Class				
	PCOSS13		PCOSS14	
	($ 000's)	%	($ 000's)	%
Residential	7,110	19%	6,615	19%
GSS ND	5,646	15%	5,060	15%
GSS D	5,935	16%	5,477	16%
GSM	6,886	18%	6,429	19%
GSL 0-30	3,554	9%	3,439	10%
GSL 30-100	1,037	3%	1,117	3%
GSL>100	6,798	18%	5,669	17%
A&RL	7	0%	8	0%
Total	37,535	100%	34,325	100%

MH speculates that the questioner may have been referring to the adjustment made to class revenue for the reduction in consumption due to forecast DSM activities (page 35 PCOSS13 and page 28 PCOSS14). The revenue reduction is specific to programming occurring in the two test years of the PCOSS, and is expected to be more variable in comparison to DSM Costs which are averaged over ten years and use historical data.

Takeaway 4b: Slide 48 Sensitivity Study

Provide the underlying assumptions and data used to produce the DSM (Slide 48) sensitivity analysis, as well as the resulting RCC Summary, Customer/Demand/Energy Summary and Functional Breakdown Summary.

MH Response:

The DSM sensitivity study was prepared assuming annual carrying costs of DSM were doubled from the current $39 million included in PCOSS14 to $79 million.

Since the sensitivity is intended to identify the impact of a change in the allocation of DSM costs, no changes were assumed for export revenue, class energy consumption, or domestic class revenue beyond the 3% across-the-board increase needed to equalize costs and revenue in the PCOSS.

In the 'Direct Assign' scenario the increased DSM cost is assigned to classes in the same proportion as existing programming. The alternate scenario presents the results assuming no direct assignment, and that 90% of all DSM costs or $71 million is allocated as part of Generation costs to domestic and dependable exports. The remaining 10% is allocated as part of Transmission costs to domestic and dependable exports.

The Potential Variation column presents the difference in RCC under the two costs treatments, and is intended to illustrate the potential impact to a class depending on the cost allocation scheme chosen.

RCC, C/D/E and Functional Breakdown Summaries are attached.

Manitoba Hydro
Prospective Cost Of Service Study
March 31, 2014
Revenue Cost Coverage Analysis
SLIDE 46: 2 Times DSM, 90% Gen and 10% Trans
S U M M A R Y

Customer Class	Total Cost ($000)	Class Revenue ($000)	Net Export Revenue ($000)	Total Revenue ($000)	RCC % Current Rates
Residential	627,449	605,463	10,026	615,489	98.1%
General Service - Small Non Demand	127,907	138,896	2,044	140,940	110.2%
General Service - Small Demand	133,163	139,972	2,128	142,099	106.7%
General Service - Medium	194,130	192,139	3,102	195,241	100.6%
General Service - Large 0 - 30kV	96,273	87,386	1,538	88,924	92.4%
General Service - Large 30-100kV*	60,557	59,461	968	60,428	99.8%
General Service - Large >100kV*	198,655	194,670	3,174	197,844	99.6%
*Includes Curtailment Customers					
SEP	968	850	-	850	87.8%
Area & Roadway Lighting	22,082	22,248	108	22,356	101.2%
Total General Consumers	1,461,184	1,441,084	23,088	1,464,172	100.2%
Diesel	9,948	6,801	159	6,960	70.0%
Export	321,986	345,233	(23,247)	321,986	100.0%
Total System	1,793,118	1,793,118	-	1,793,118	100.0%

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Customer, Demand, Energy Cost Analysis
SLIDE 46: 2 Times DSM, 90% Gen and 10% Trans
SUMMARY

	CUSTOMER			DEMAND					ENERGY			
Class	Cost ($000)	Number of Customers	Unit Cost $/Month	Cost ($000)	% Recovery	Billable Demand MVA	Unit Cost $/KVA		Cost ($000)	Metered Energy mWh	Unit Cost ¢/kWh	
Residential	126,834	486,987	21.70	211,654	0%	n/a	n/a		278,935	7,404,453	6.63	**
GS Small - Non Demand	25,260	53,778	39.14	40,561	0%	n/a	n/a		60,043	1,605,511	6.27	**
GS Small - Demand	8,583	12,492	57.25	47,183	38%	2,390	7.48		75,270	2,047,715	5.11	
General Service - Medium	7,506	1,974	316.86	67,981	87%	7,302	8.14		115,541	3,174,662	3.91	
General Service - Large <30kV	3,776	288	n/a	30,151	100%	4,042	8.39	*	60,807	1,702,481	3.57	
General Service - Large 30-100kV	2,610	40	n/a	12,435	100%	2,894	5.20	*	44,544	1,327,210	3.36	
General Service - Large >100kV	2,411	16	n/a	31,030	100%	8,409	3.98	*	162,040	4,903,742	3.30	
SEP	326	29	935.95	132	0%	n/a	n/a		509	26,500	2.42	**
Area & Roadway Lighting	16,634	155,024	8.94	2,374	0%	n/a	n/a		2,967	100,487	5.31	**
Total General Consumers	193,938	710,628		443,502		25,038			800,655	22,292,761		
Diesel	231	755	25.50	347	0%	n/a	n/a		9,211	13,754	69.49	**
Export	n/a	n/a	n/a	31,054	0%	n/a	n/a		290,932	9,013,000	3.57	***
Total System	194,169	711,383		474,903		25,038			1,100,799	31,319,515		

* - includes recovery of customer costs
** - includes recovery of demand costs
*** -includes recovery of customer and demand costs

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Functional Breakdown
SLIDE 46: 2 Times DSM, 90% Gen and 10% Trans
SUMMARY

Class	Total Cost ($000)	Generation Cost ($000)	%	Transmission Cost ($000)	%	Subtransmission Cost ($000)	%	Distribution Cust Service Cost ($000)	%	Distribution Plant Cost ($000)	%
Residential	617,423	278,935	45.2%	71,472	11.6%	32,561	5.3%	70,016	11.3%	164,439	26.6%
General Service - Small Non Demand	125,864	60,043	47.7%	15,257	12.1%	5,878	4.7%	17,793	14.1%	26,893	21.4%
General Service - Small Demand	131,035	75,270	57.4%	18,032	13.8%	6,771	5.2%	4,252	3.2%	26,711	20.4%
General Service - Medium	191,028	115,541	60.5%	27,677	14.5%	9,362	4.9%	6,471	3.4%	31,977	16.7%
General Service - Large <30kV	94,734	60,807	64.2%	14,298	15.1%	4,680	4.9%	3,550	3.7%	11,399	12.0%
General Service - Large 30-100kV	59,589	44,544	74.8%	8,861	14.9%	3,574	6.0%	2,540	4.3%	70	0.1%
General Service - Large >100kV	195,481	162,040	82.9%	31,030	15.9%	0	0.0%	2,382	1.2%	29	0.0%
SEP	968	509	52.6%	132	13.7%	0	0.0%	309	31.9%	17	1.7%
Area & Roadway Lighting	21,974	3,000	13.7%	470	2.1%	448	2.0%	545	2.5%	17,511	79.7%
Total General Consumers	1,438,096	800,689	55.7%	187,231	13.0%	63,274	4.4%	107,857	7.5%	279,046	19.4%
Diesel	9,789	9,211	94.1%	0	0.0%	0	0.0%	0	0.0%	578	5.9%
Export	321,986	290,932	90.4%	31,054	9.6%	0	0.0%	0	0.0%	0	0.0%
Total System	1,769,871	1,100,832	62.2%	218,284	12.3%	63,274	3.6%	107,857	6.1%	279,623	15.8%

Manitoba Hydro
Prospective Cost Of Service Study
March 31, 2014
Revenue Cost Coverage Analysis
SLIDE 46: 2 Times DSM, Assigned to Participating Customers
SUMMARY

Customer Class	Total Cost ($000)	Class Revenue ($000)	Net Export Revenue ($000)	Total Revenue ($000)	RCC % Current Rates
Residential	620,162	605,463	14,245	619,708	99.9%
General Service - Small Non Demand	133,617	138,896	2,899	141,795	106.1%
General Service - Small Demand	138,634	139,972	2,997	142,968	103.1%
General Service - Medium	198,572	192,139	4,359	196,498	99.0%
General Service - Large 0 - 30kV	98,733	87,386	2,156	89,542	90.7%
General Service - Large 30-100kV*	59,623	59,461	1,347	60,808	102.0%
General Service - Large >100kV*	198,519	194,670	4,393	199,063	100.3%
*Includes Curtailment Customers					
SEP	968	850	-	850	87.8%
Area & Roadway Lighting	21,892	22,248	154	22,402	102.3%
Total General Consumers	1,470,720	1,441,084	32,550	1,473,634	100.2%
Diesel	9,948	6,801	233	7,034	70.7%
Export	312,450	345,233	(32,783)	312,450	100.0%
Total System	1,793,118	1,793,118	-	1,793,118	100.0%

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Customer, Demand, Energy Cost Analysis
SLIDE 46: 2 Times DSM, Assigned to Participating Customers
SUMMARY

	CUSTOMER			DEMAND					ENERGY			
Class	Cost ($000)	Number of Customers	Unit Cost $/Month	Cost ($000)	% Recovery	Billable Demand MVA	Unit Cost $/KVA		Cost ($000)	Metered Energy mWh	Unit Cost ¢/kWh	
Residential	125,868	486,987	21.54	207,089	0%	n/a	n/a		272,959	7,404,453	6.48	**
GS Small - Non Demand	25,067	53,778	38.84	39,622	0%	n/a	n/a		66,029	1,605,511	6.58	**
GS Small - Demand	8,517	12,492	56.82	46,079	38%	2,390	7.30		81,042	2,047,715	5.36	
General Service - Medium	7,449	1,974	314.45	66,320	87%	7,302	7.94		120,444	3,174,662	4.06	
General Service - Large <30kV	3,747	288	n/a	29,331	100%	4,042	8.18	*	63,499	1,702,481	3.73	
General Service - Large 30-100kV	2,590	40	n/a	11,974	100%	2,894	5.03	*	43,711	1,327,210	3.29	
General Service - Large >100kV	2,393	16	n/a	29,512	100%	8,409	3.79	*	162,222	4,903,742	3.31	
SEP	326	29	935.95	132	0%	n/a	n/a		509	26,500	2.42	**
Area & Roadway Lighting	16,624	155,024	8.94	2,336	0%	n/a	n/a		2,778	100,487	5.09	**
Total General Consumers	192,580	710,628		432,396		25,038			813,193	22,292,761		
Diesel	229	755	25.30	344	0%	n/a	n/a		9,141	13,754	68.96	**
Export	n/a	n/a	n/a	31,054	0%	n/a	n/a		281,396	9,013,000	3.47	***
Total System	192,810	711,383		463,794		25,038			1,103,731	31,319,515		

* - includes recovery of customer costs
** - includes recovery of demand costs
*** -includes recovery of customer and demand costs

Manitoba Hydro
Prospective Cost Of Service Study - March 31, 2014
Functional Breakdown
SLIDE 46: 2 Times DSM, Assigned to Participating Customers
SUMMARY

Class	Total Cost ($000)	Generation Cost ($000)	%	Transmission Cost ($000)	%	Subtransmission Cost ($000)	%	Distribution Cust Service Cost ($000)	%	Distribution Plant Cost ($000)	%
Residential	605,917	272,959	45.0%	67,975	11.2%	32,313	5.3%	69,483	11.5%	163,187	26.9%
General Service - Small Non Demand	130,719	66,029	50.5%	14,511	11.1%	5,833	4.5%	17,658	13.5%	26,688	20.4%
General Service - Small Demand	135,637	81,042	59.7%	17,150	12.6%	6,719	5.0%	4,219	3.1%	26,507	19.5%
General Service - Medium	194,213	120,444	62.0%	26,323	13.6%	9,290	4.8%	6,422	3.3%	31,733	16.3%
General Service - Large <30kV	96,577	63,499	65.7%	13,598	14.1%	4,645	4.8%	3,523	3.6%	11,312	11.7%
General Service - Large 30-100kV	58,276	43,711	75.0%	8,428	14.5%	3,547	6.1%	2,520	4.3%	69	0.1%
General Service - Large >100kV	194,126	162,222	83.6%	29,512	15.2%	0	0.0%	2,364	1.2%	29	0.0%
SEP	968	509	52.6%	132	13.7%	0	0.0%	309	31.9%	17	1.7%
Area & Roadway Lighting	21,738	2,825	13.0%	449	2.1%	448	2.1%	543	2.5%	17,474	80.4%
Total General Consumers	1,438,170	813,240	56.5%	178,078	12.4%	62,795	4.4%	107,041	7.4%	277,017	19.3%
Diesel	9,715	9,141	94.1%	0	0.0%	0	0.0%	0	0.0%	573	5.9%
Export	312,450	281,396	90.1%	31,054	9.9%	0	0.0%	0	0.0%	0	0.0%
Total System	1,760,335	1,103,778	62.7%	209,132	11.9%	62,795	3.6%	107,041	6.1%	277,590	15.8%

Takeaway 1: Slide 22 PCOSS Results

Provide a summary of the changes in export related methodology between PCOSS08 (BO 116/08 version), PCOSS10, PCOSS11, PCOSS13 and PCOSS14.

MH Response:

The following table provides the key differences in methodology between the studies:

	PCOSS08 (116/08)	PCOSS10 and 11	PCOSS13 and 14
EXPORT ASSUMPTIONS	Exports not served by Thermal/Power Purchases/Wind are served from Generation Pool. Export revenue recalculated to use most recent actual prices.	Exports not served by Power Purchases/Wind are served from Generation Pool.	Differentiates between Dependable and Opportunity exports. Opportunity not served by Power Purchases (excl wind) attract Water Rentals and Variable Hydraulic O&M only. Dependable served from Generation Pool.
GENERATION COST RESPONSIBILITY			
DSM Costs	Export (DSM energy savings added back to domestic load)	Participating Domestic Class	Participating Domestic Class
Trading Desk	Export	42% Exp/58% Domestic	42% Exp/58% Domestic
Purchased Power (excl Wind)	Export	Export	Opportunity Exp
Wind Purchases	Export	Export	Domestic/Dep Exp
NG Thermal - Fuel	Export	Domestic	Domestic/Dep Exp
NG Thermal - All Other	50/50 Domestic/Export	Domestic	Domestic/Dep Exp
Coal Thermal - Fuel	Export	Domestic	Domestic
Coal Thermal - All Other	50/50 Domestic/Export	Domestic	Domestic
Balance of Generation Costs	Domestic/Remaining Exp	Domestic/Remaining Exp	Domestic/Dep Exp
TRANSMISSION COST RESPONSIBILITY			
MISO Fees	Export	42% Exp/58% Domestic	42% Exp/58% Domestic
Balance of Transmission Costs	Domestic/Export	Domestic/Export	Domestic/Dep Export

Cost of Service
Stakeholder Engagement

Generation and Transmission Treatment

December 12, 2014

Manitoba Hydro

Welcome and Agenda

INTRODUCTION OF PARTICIPANTS

December 12th Workshop #2 - Agenda

Approximate Time	Item	Lead
9:00 – 9:30	Welcome and Agenda	Greg Barnlund
9:30 -10:00	Generation Overview • Functionalization	Kelly Derksen/ Michael Dust (David Swatek)
10:00-10:30	Generation • Classification • Allocation	Kelly Derksen
10:30 -10:50	Break	
10:50 – 11:15	Generation • Allocation • Generation Pool • Wuskwatim	Kelly Derksen/ Michael Dust (Terry Miles)
11:15 – 12:00	Christensen Associates COS Report • Generation Recommendations • Value of Reserves • Equivalent Peaker Transmission Overview • Functionalization • Classification & Allocation	Mike O'Sheasy/Robert Camfield Kelly Derksen/ Michael Dust (Tony Clark)
12:00 – 1:00	Lunch	

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December 12th Workshop #2 - Agenda

Approximate Time	Item	Lead
1:00-2:00	Transmission Cont'd • CA Recommendations • Dorsey Analysis • Radial Taps	Mike O'Sheasy/Robert Camfield Kelly Derksen/ Michael Dust (Tony Clark)
2:00-3:00	COS Issues/Alternatives/Impacts Spreadsheet	Kelly Derksen/Michael Dust (David Cormie)
3:00 – 3:20	Break	
3:20 – 4:20	COS Issues/Alternatives/Impacts Spreadsheet	Kelly Derksen/Michael Dust
4:20 – 4:30	Closing Comments	Greg Barnlund

Manitoba Hydro

GENERATION

OVERVIEW & FUNCTIONALIZATION

Manitoba Hydro's COSS

The first step in COS is to functionalize the revenue requirement (IFF):

- Generation (All HVDC excluding Dorsey/Riel)
- Transmission (>100 kV and Dorsey/Riel)
- Subtransmission (33 – 66 kV)
- Distribution Plant
- Customer Service

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Generation Functionalization

Generation function includes:

- Hydraulic Generating Stations
- Water Rentals
- Mitigation costs
- Thermal Generating Stations
  - Brandon Unit 5 (coal)
  - Brandon CT (NG)
  - Selkirk GS (NG)
- Power purchases

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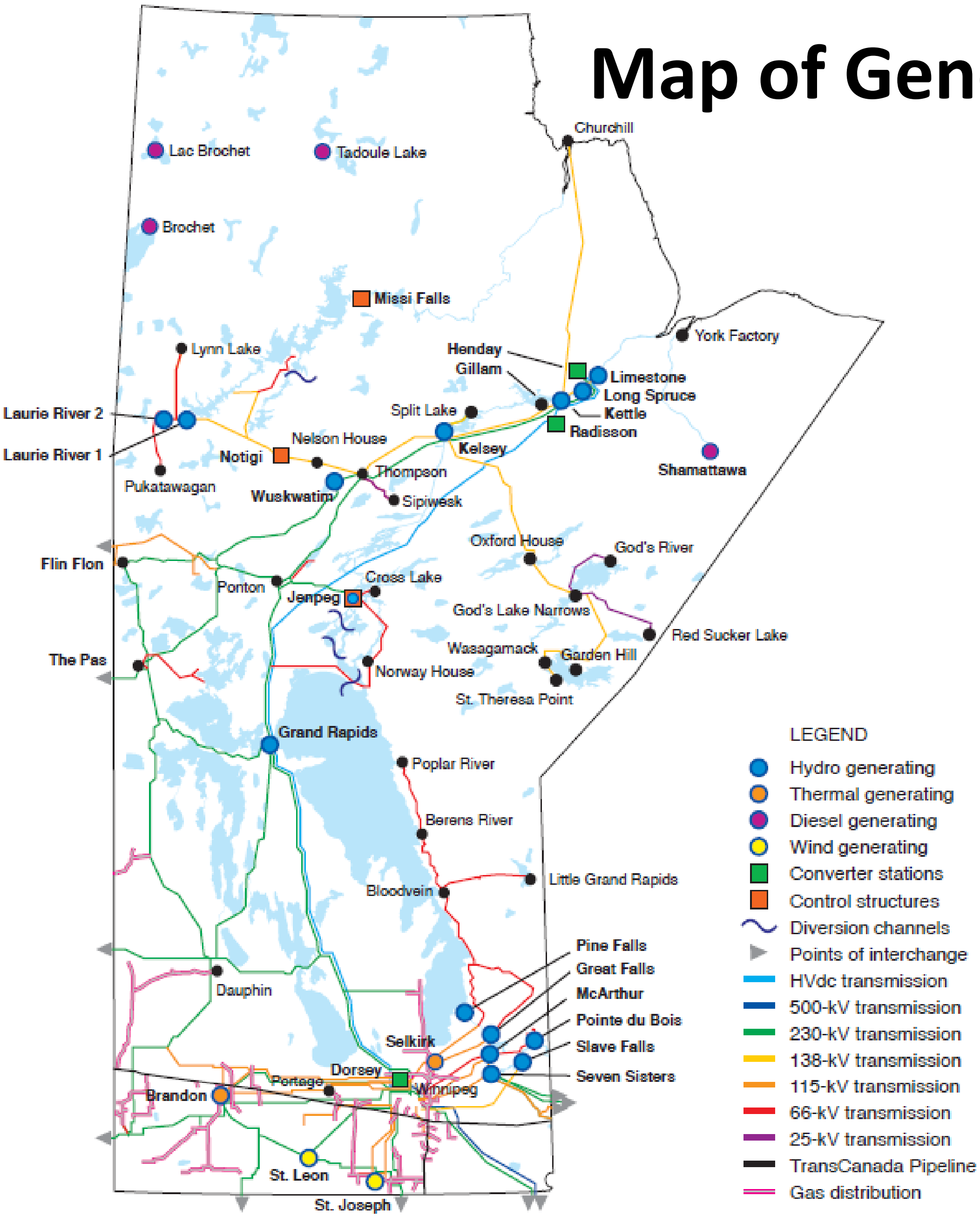
Generation Functionalization

Generation function includes:

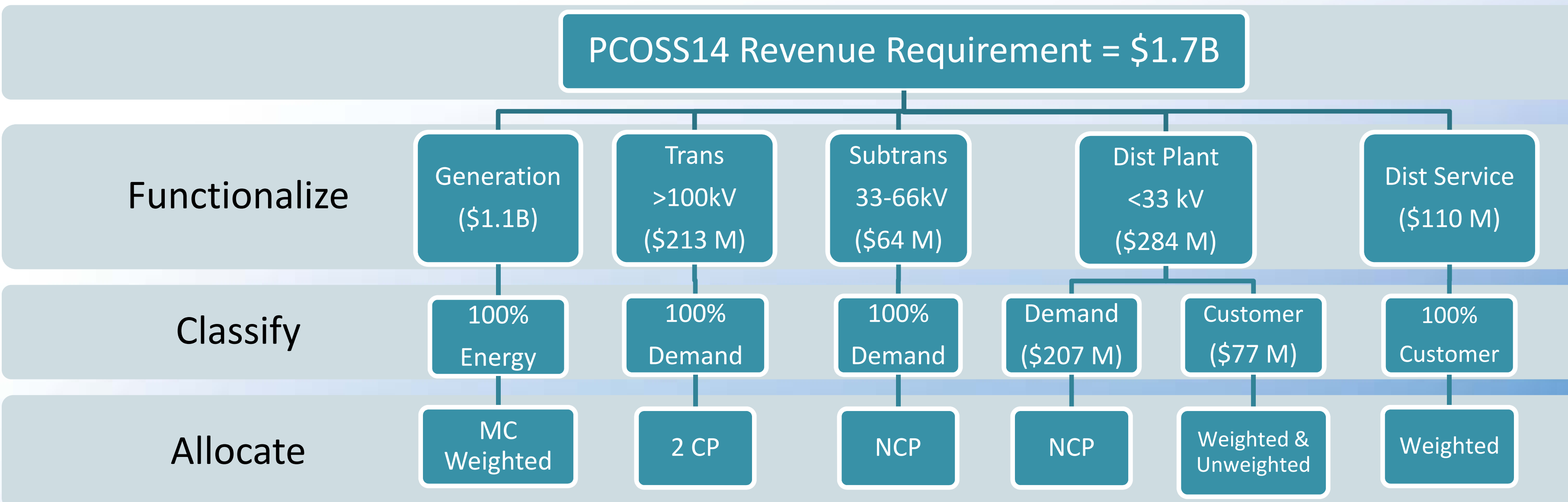
- HVDC facilities
  - Henday, Radisson, (Keewatinohk) convertor stations
  - BPI and II, (BPIII) DC transmission lines
  - Excludes Dorsey (Riel) convertor stations
- AC Collector Circuits
  - Limestone-Henday 230 kV line
  - Long Spruce – Radisson 230 kV line
  - Long Spruce – Henday 230 kV line
  - Kettle – Radisson 138 kV line
- Switching Stations (Kettle, Limestone, Long Spruce)
- DSM/AEF

Manitoba Hydro

Map of Generation Facilities



Functionalized Revenue Requirement



MC = Marginal Cost
CP = Coincident Peak
NCP = Non Coincident Peak

Generation Revenue Requirement

	Revenue Requirement ($ million)	Rate Base ($ million)
Hydraulic GS	513	4,495
CRD/LWR/Mitigation	61	820
HVDC excl Dorsey	79	353
Switching Stations	1	5
AC Collector Circuit	2	9
Coal GS	29	42
Natural Gas GS	32	156
DSM/AEF	52	173
Diesel	12	29
Bldg/Comm/Gen Equip	-	366
Water Rentals	108	
Power Purchases	90	
Wind Purchases	65	
NEB	1	
Trading Desk	13	
Uniform Rates	24	
Total	1,082	6,449

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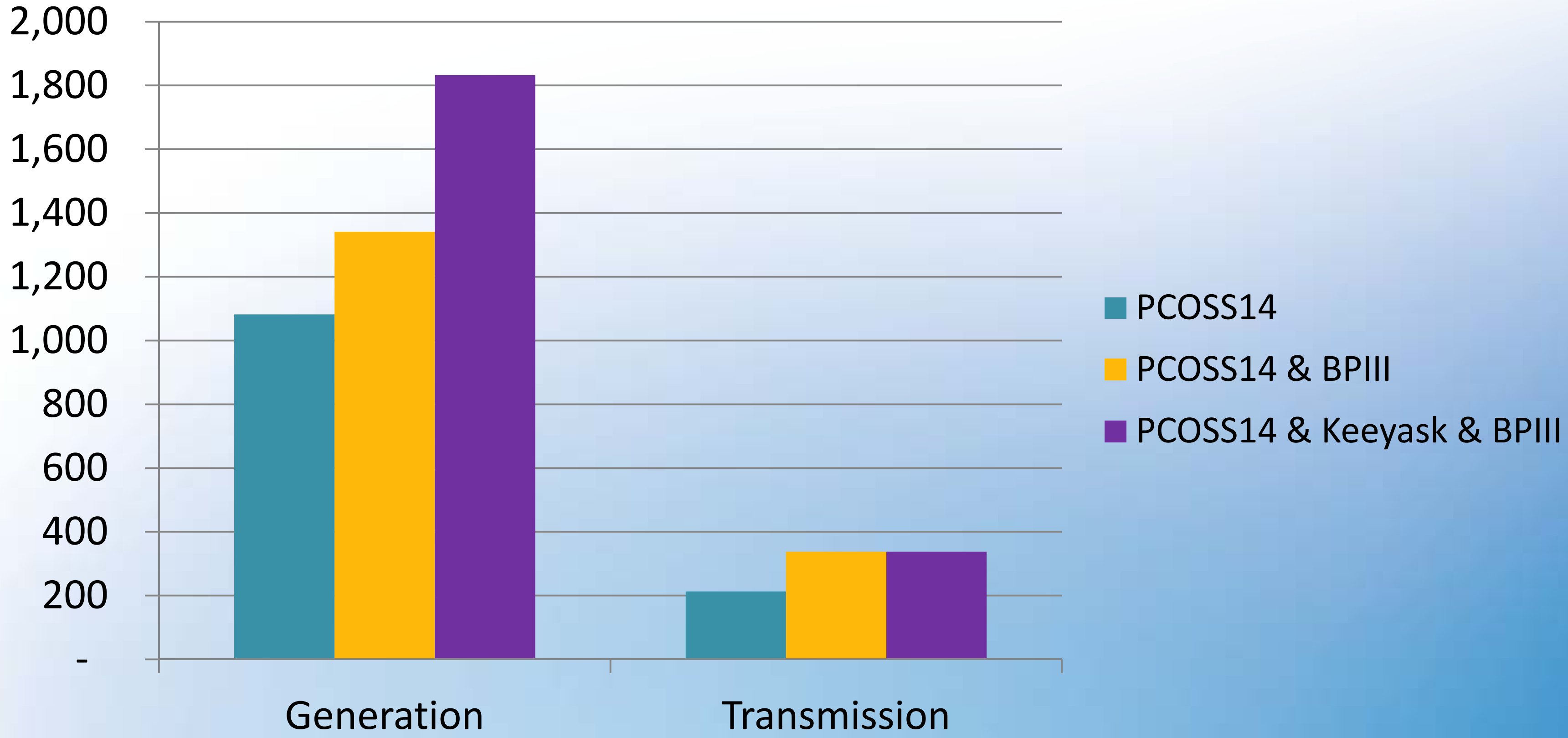
Increase in G&T Revenue Requirement (Million $)



Rate Base

- Rate Base is equal to Gross Investment less Accumulated Depreciation less Contributions
- Rate Base drives allocation of Interest
  - Finance expense
  - Net Income
  - Capital tax
- Depreciation expense functionalized consistent with Rate Base
- Addition of capital intensive Keeyask and BPIII will not only increase the amount of rate base related costs in the revenue requirement, but also change the allocation of Interest between functions
- Capital related costs (Depreciation and Interest) represent 55% of revenue requirement in PCOSS14

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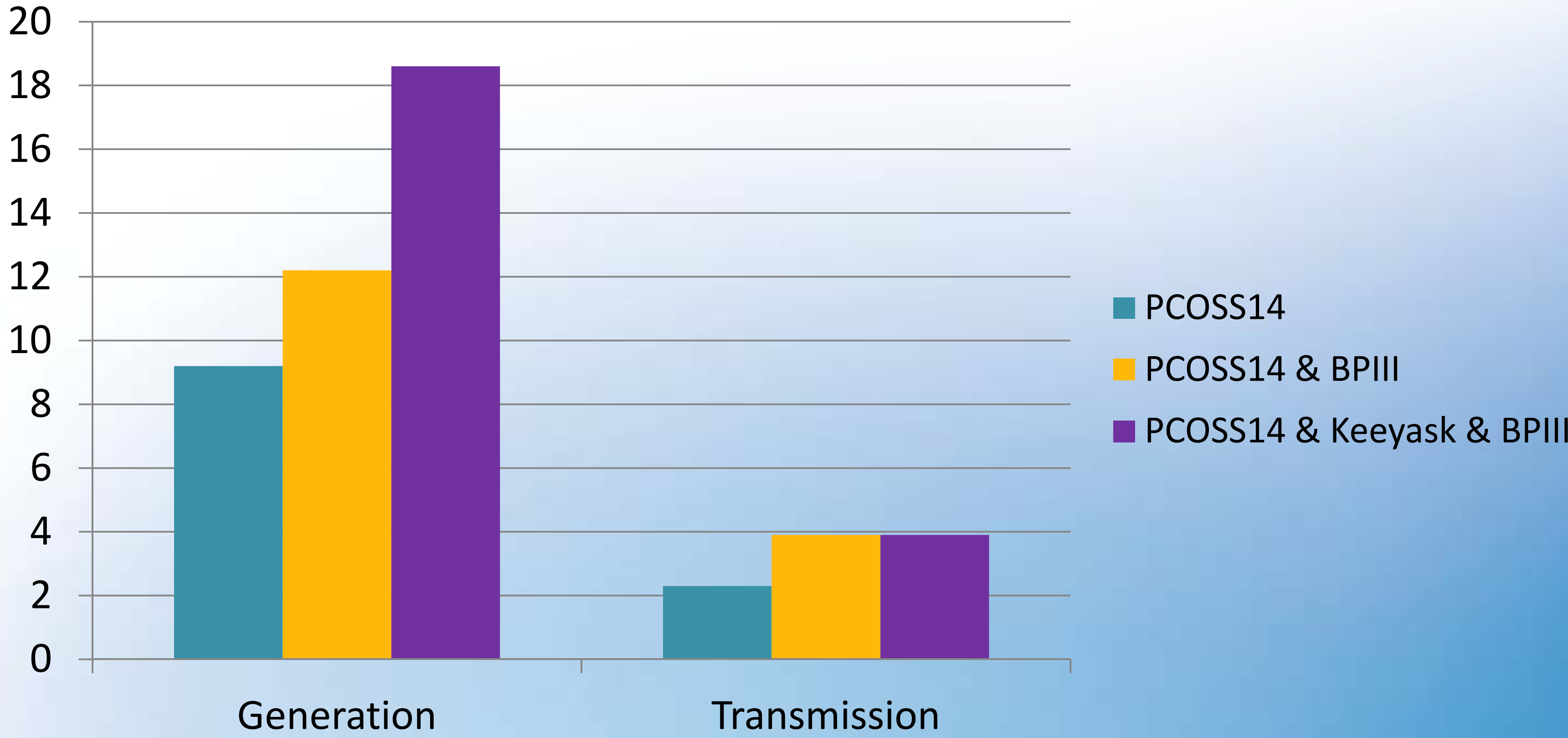
Functionalized Rate Base

PCOSS14 Rate Base = $10.6B

Function	Generation	Transmission >100kV	Subtrans 33-66kV	Distribution Plant <33 kV	Distribution Service
Rate Base	$6.4B	$1.4B	$0.4B	$2.0B	$0.1B
Share of Rate Base	62%	14%	4%	19%	1%

Increase in G&T Gross Investment (Billion $)



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Service Level-Related Cost and Classes

	Res	GSS - ND	GSS - D	GSM	GSL 0-30	GSL 30-100	GSL >100	ARL	Exp
Generation	Y	Y	Y	Y	Y	Y	Y	Y	Y
Transmission	Y	Y	Y	Y	Y	Y	Y	Y	Y
Subtransmission	Y	Y	Y	Y	Y	Y		Y	
Dist - Substation	Y	Y	Y	Y	Y			Y	
Dist - P&W Primary	Y	Y	Y	Y	Y			Y	
Dist - Transformers	Y	Y	Y	Y				Y	
Dist - P&W Secondary	Y	Y	Y	Y				Y	
Dist - Services	Y	Y	Y	Y	Y				
Dist - Meters	Y	Y	Y	Y	Y	Y	Y		
Customer Service	Y	Y	Y	Y	Y	Y	Y	Y	

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GENERATION

CLASSIFICATION

Generation Classification

- Classification phase in COS tends to be most controversial
- Methods that classify a higher share of costs as demand-related tend to favour high load factor customers
- Classification methods can also affect and inform rate design

Generation Classification – Key Considerations

- Type of generation resources
  - MH is predominantly (95%) hydraulic
- Planning and Operating Constraints
- Customer seasonality and peak loads
- Rationale for making investment in particular G&T asset should guide choice of classification method

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Generation Classification

- Fixed generation costs driven by energy in MH system:
  - Hydraulic system provides energy at low variable cost compared to thermal units
  - Large water storage capability allows MH to manage loads somewhat by managing the timing of water release
  - Variability of water conditions drives generation investment (based on lowest flow conditions)
  - Classification is notionally 100% energy

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GENERATION

ALLOCATION

Generation Allocation

- MH allocates generation costs using weighted class energy use by season and time of day period (12 periods)
- Class energy use in each period is weighted by the relative value of energy in the period to lowest priced period
- Marginal cost ratios are derived from average SEP rates over 8 years to smooth out short-term fluctuations
- Effectively short-run marginal costs

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Example of Weighted Energy Allocator

Period Specific SEP Prices

	On Peak Average $/kWh	Shoulder Average $/kWh	Off Peak Average $/kWh
Spring	0.053	0.044	0.025
Summer	0.066	0.044	0.014
Fall	0.059	0.046	0.026
Winter	0.073	0.052	0.039

Period Specific Weighting Factors

	On Peak Weight	Shoulder Weight	Off Peak Weight
Spring	3.7	3.0	1.7
Summer	4.6	3.0	1.0
Fall	4.1	3.2	1.8
Winter	5.0	3.6	2.7

Average inflation adjusted SEP prices for each period are divided by price in lowest price period (Summer Off Peak) to determine weighting factor.

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Example of Weighted Energy Allocator

	Class A kW.h	Class B kW.h	Total Energy	Weighting Factor	Energy after Weighting		Total Weighted Energy
					Class A	Class B	
Spring On Peak	100	75	175	3.7	370	278	648
Spring Shoulder	50	50	100	3.0	150	150	300
Spring Off Peak	100	150	250	1.7	170	255	425
Winter On Peak	75	25	100	5.0	375	125	500
Winter Shoulder	75	100	175	3.6	270	360	630
Winter Off Peak	100	100	200	2.7	270	270	540
Total	500	500	1,000		1,605	1,438	3,043
Class Share	50%	50%			53%	47%	

- From Load Research determine annual energy use by season and period (only two seasons shown for simplification)
- Multiply energy use in period by marginal cost weighting

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Generation Allocation – Generation Pools

Generation Pools exclude costs directly assigned:

- Power Purchases
- Opportunity export portion of Water Rentals and Variable Hydraulic O&M
- 42% Trading Desk costs directly assigned against exports
- AEF/DSM

1. Domestic Only
   - Coal generation
   - 58% Trading Desk costs
2. Domestic and Dependable Export Sales
   - All other generation costs, including Wuskwatim

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Generation Pool Allocators

	Energy Consumption GWh	Class Share	Domestic Gen GWh	Class Share Domestic	Other Gen GWh	Class Share
Class A	16,000	64%	4,000	80%	12,000	60%
Class B	4,000	16%	1,000	20%	3,000	15%
Subtotal - Domestic	20,000					
Export	5,000	20%			5,000	25%
Total	25,000	100%	5,000	100%	20,000	100%

- Costs associated with 5,000 GWh of Generation are assumed to be responsibility of domestic classes only in the COS
- Other generation costs are for resources serving 15,000 GWh of domestic consumption and entire 5,000 GWh of exports

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Generation - Wuskwatim

Wuskwatim

- 3 turbines with 200 MW total capacity
- Last turbine went in-service October 2012
- Capital costs of $1.4 billion

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Generation - Wuskwatim

- COS uses financial costs from IFF which reflects all partnership revenues and costs
- Wuskwatim costs and energy are not differentiated from any other generation in COS
    - Interest, Depreciation Expense, and O&A allocated as part of generation pool (Domestic & Dependable)
- COS includes Non Controlling Interest as Net Income, allocated on basis of Rate Base

Generation - Wuskwatim

CONSOLIDATED INTEGRATED FINANCIAL FORECAST (IFF12)

10.0 ELECTRIC OPERATIONS FINANCIAL FORECAST (MH12)

ELECTRIC OPERATIONS (MH12)
PROJECTED OPERATING STATEMENT
(In Millions of Dollars)

For the year ended March 31	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
REVENUES										
General Consumers										
at approved rates	1 331	1 361	1 374	1 390	1 404	1 424	1 447	1 462	1 485	1 506
additional*	0	48	104	165	228	297	371	447	531	619
Extraprovincial	357	344	343	380	406	435	441	464	711	839
Other	14	15	15	15	15	16	16	16	17	17
	1 702	1 768	1 836	1 950	2 054	2 172	2 274	2 390	2 743	2 981
EXPENSES										
Operating and Administrative	455	471	544	556	567	590	601	617	639	653
Finance Expense	452	444	492	524	586	656	767	781	1 001	1 097
Depreciation and Amortization	399	430	372	391	410	447	494	508	580	619
Water Rentals and Assessments	117	116	112	112	112	112	112	113	121	126
Fuel and Power Purchased	143	166	179	191	206	221	230	231	253	264
Capital and Other Taxes	88	96	101	110	119	129	136	143	149	158
Corporate Allocation	9	9	8	8	8	8	8	8	8	8
	1 664	1 732	1 808	1 892	2 009	2 163	2 349	2 401	2 753	2 926
Non-controlling Interest	14	24	21	16	13	10	6	3	4	(3)
Net Income	53	60	50	73	57	19	(68)	(9)	(7)	52

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Generation - CA Recommendations

CA agreed with conceptual framework for handling generation costs in COS and recommended considering:

- Incorporating marginal reserves costs
- Adopt hourly frequency, for computation of marginal cost/class load profiles
- Equivalent Peaker Method to recognize implicit capacity- and energy-related generation costs

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Generation - MH Response

- Believes that capacity costs, at least in part, are reflected through SEP weighted energy allocator
  - Will investigate whether the value of reserves, in each time period, could be incorporated into the weights
- Using hourly data not likely to have a material impact, but will investigate
  - Current approach groups together similar hours, and offers greater stability
- Not convinced Equivalent Peaker methodology is an improvement, but will investigate.

Incorporate Value of Capacity in Weights

- MH views the MISO Voluntary Capacity Auctions have been sporadic and do not yet provide useful indicator for COSS
- MH could incorporate value of capacity based on CRP Reference Discount as alternative
  - Reference discount is the highest amount that Hydro would pay for the curtailability that most closely approaches the benefits from generation or full load reduction
  - Discount updated annually, increasing from \$2.76/kW/mth in 2004/05 to \$3.28/kW/mth in 2013/14
  - Discount adjusted for CPI and divided by 167 peak hours in month
  - 1.9¢/kWh estimated hourly capacity is added to SEP peak price

Example of Revised Weighted Energy Allocator

Period Specific SEP Prices w/Capacity

	On Peak Average $/kWh	Shoulder Average $/kWh	Off Peak Average $/kWh
Spring	**0.072**	0.044	0.025
Summer	**0.085**	0.044	0.014
Fall	**0.078**	0.046	0.026
Winter	**0.092**	0.052	0.039

Period Specific Weighting Factors

	On Peak Weight	Shoulder Weight	Off Peak Weight
Spring	**5.0**	3.0	1.7
Summer	**5.9**	3.0	1.0
Fall	**5.4**	3.2	1.8
Winter	**6.4**	3.6	2.7

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SENSITIVITY STUDY: RCC IMPACT
REVISED WEIGHTED ENERGY ALLOCATOR

Customer Class	Weighted Energy including Capacity Value
Residential	0.1%
GSS – ND	(0.3%)
GSS – D	(0.2%)
GSM	(0.3%)
GSL <30	(0.4%)
GSL 30-100	0.4%
GSL >100	0.4%
ARL	0.5%

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Equivalent Peaker

- Method that quantifies an explicit capacity-related component of generation costs, using the all-in cost of a peaking resource
- Difference between total generation costs and costs of peaking capacity classified as energy
- Variations of the general approach can reflect the vintage of generation costs – an involved computation

Equivalent Peaker

- Wuskwatim costs used as proxy for typical Hydro plant (2011 $)
  - levelized fixed cost of approximately $560/kW per year
- Combustion Turbine proxy for Peaker plant (2011 $)
  - levelized fixed cost of $130/kW per year

Demand Share = 130/560 = 23%

Energy Share= 100% - 23% = 77%

Calculation is illustrative, so sensitivity shown over range of demand/energy ratios.

SENSITIVITY STUDY:
RCC IMPACT OF CLASSIFICATION CHANGE

Customer Class	Equivalent Peaker (70%E/30%D)	Equivalent Peaker (75%E/25%D)	Equivalent Peaker (80%E/20%D)
Residential	(0.4%)	(0.2%)	(0.0%)
GSS – ND	(0.5%)	(0.2%)	(0.0%)
GSS – D	0.1%	0.2%	0.3%
GSM	(0.2%)	(0.2%)	(0.1%)
GSL <30	(0.3%)	(0.3%)	(0.3%)
GSL 30-100	1.2%	0.5%	(0.2%)
GSL >100	2.1%	1.2%	0.3%
ARL	(0.9%)	(1.3%)	(1.6%)

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TRANSMISSION

Transmission Functionalization

Integrated bulk power supply facilities

Transmission Function includes:

- High voltage (>100 kV) transmission lines
- Dorsey Converter Station (Riel)
- Transmission Substations
  - High voltage portion of substations
  - Entire station if low side at transmission voltage (ie 230/115kV stn)
- Switching Stations (excl Long Spruce, Kettle and Limestone)

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Transmission Functionalization

- Excludes Bipoles to connect remote generation to load center
- Combination of Hydraulic GS on the Lower Nelson and HVDC were selected as the least-cost generation portfolio
- Bipole lines treated as extension of generation facilities
  - Excludes Bipole lines
    - Dedicated to specific generator
    - Untapped
    - Power flows in single direction

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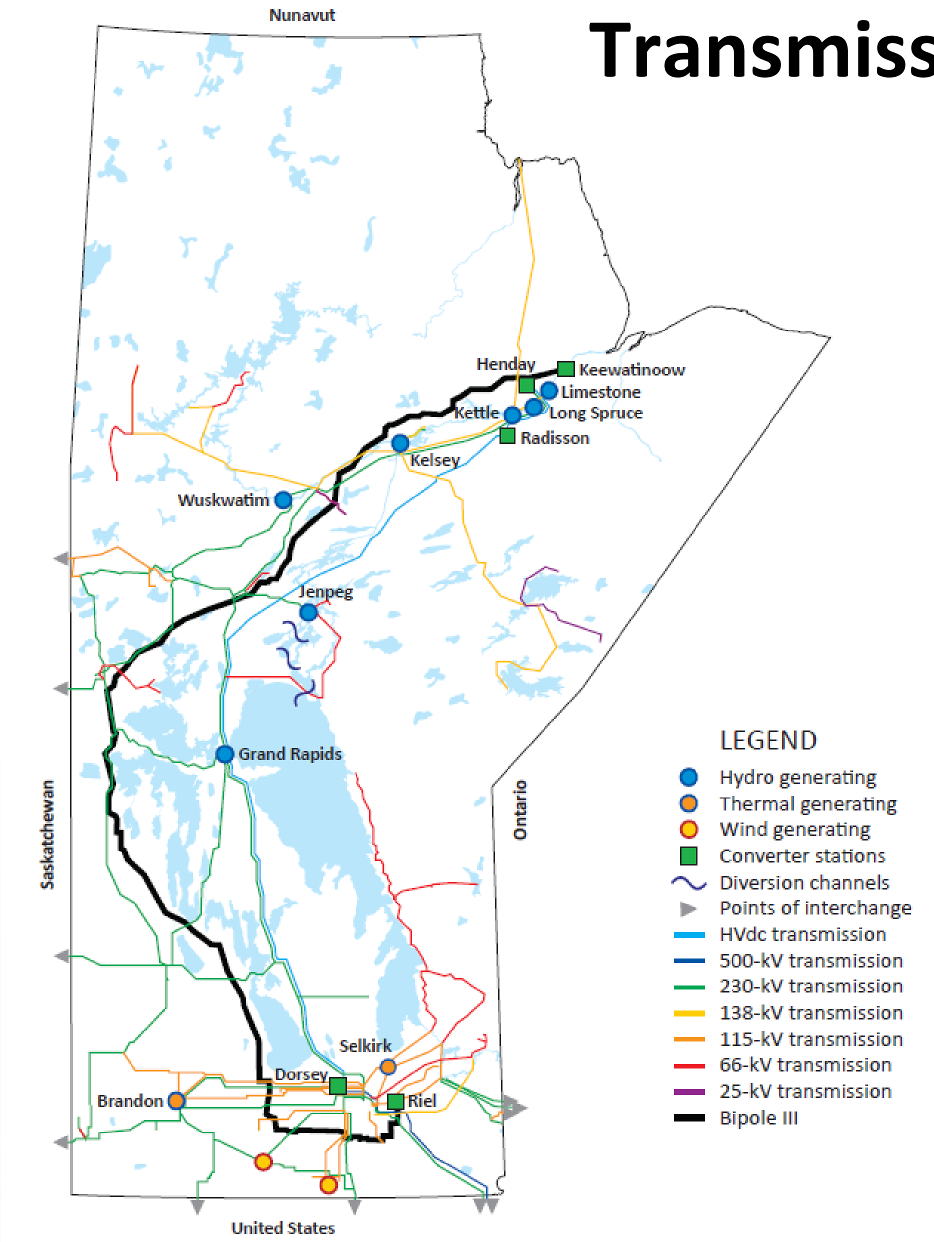
Transmission Map



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Transmission Classification & Allocation

- Classified 100% demand
- Allocated based on 2 Coincident Peak
- Average of peak demand of customer classes during highest 50 system peak hours during summer and, separately, highest 50 system peak hours during winter
- Reflects the effect of two dominant and approximately equivalent in magnitude seasonal peaks in MH system
  - Winter peaking domestically
  - Summer peaking due to extra-provincial sales

Calculation of 2CP Allocator

	(a)	(b)	(c) a/4344/b	(d)	(e)	(f) d/4392/e	(g) (c + f)/2
Class	Winter Energy MWh	Winter CP LF	Winter Demand MW	Summer Energy MWh	Summer CP LF	Summer Demand MW	2CP MW
Class A	4,000,000	80%	1,151	3,000,000	80%	683	917
Class B	1,500,000	90%	384	1,000,000	95%	228	306
Class C	2,000,000	105%	438	1,900,000	100%	433	436
Total			1,973			1,343	1,658

4,344 = winter hours
4,392 = summer hours

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Transmission - CA Recommendations

- Appropriate to functionalize BiPoles I & II as generation
- MH to investigate its cost allocation approach for Dorsey
  - A share of Dorsey (inverters) should be assigned as generation
- Recommended that radial taps either be assigned directly to responsible customers or included in Transmission function

Transmission - Dorsey Convertor Station

- PCOSS14
  - Dorsey functionalized as 100% Transmission
  - Gross investment approximately $800M
    - DC facilities is $640M
    - $130M for the AC Switchyards
  - Treatment recognizes
    - Considerable improvement in technical capability of meshed network provided by station
    - Considerable investment required to build alternative facilities in mesh transmission system to provide equivalent level of domestic reliability and availability
  - PCOSS transmission cost data is used in OATT so functionalization of costs in the study also needs to consider tariff impacts/requirements

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Transmission - Dorsey Convertor Station

- MH prepared simulation analysis
  - AC Switchyards located at Dorsey is not under review
    - 100% Transmission
  - Indicated transmission related benefits provided by inverter were 45%
  - Remaining 55% of benefits provided by inverter are attributed to a generation related benefit

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SENSITIVITY STUDY:
IMPACT OF DORSEY/RIEL FUNCTION CHANGE

Customer Class	RCC Change
Residential	0.4%
GSS – ND	0.4%
GSS – D	0.1%
GSM	0.1%
GSL <30	0.1%
GSL 30-100	(0.8%)
GSL >100	(1.0%)
ARL	(0.5%)
Export	0.0%

Transmission – Radial Taps

- Prior to CA review, MH functionalized Radial taps as Subtransmission as only assets eligible to include in the OATT were functionalized as Transmission
  - Costs immaterial ($200,000 annually) given investment largely offset by customer contributions
- CA noted that such treatment understates cost to serve GSL>100, and recommended to either directly assign the costs of radial taps to those customers requiring the taps, or to functionalize as Transmission cost
- In PCOSS14 Radial Tap costs included in Transmission and allocated to all classes
- PCOSS14 expanded to include "Tariffable and Non-Tariffable" sub-functions
  - Use of sub-functions is a presentation issue, and allows identification of costs needed for input into OATT
  - Aggregated for cost allocation purposes

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REVIEW ISSUES

ISSUES
ALTERNATIVES
IMPACTS

CLOSING COMMENTS